



# Inland Search Management for AZ SAR Coordinators

18<sup>th</sup> Edition

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Willcox, Arizona, USA

Arizona Search and Rescue Coordinators Association, Ltd.

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The best way to become acquainted with a subject is  
to write a book about it.

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*Benjamin Disraeli*

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## Disclaimer

The purpose of this manual is to support a course in managing a missing person incident conducted by competent search, rescue, or emergency response leaders. This manual does not in itself constitute training in searching, search and rescue (SAR), search management or incident management either in its original form or in a modified form. The Arizona Search and Rescue Coordinators Association, Ltd. or the Contributors to this manual cannot accept any responsibility for any outcome arising from the use of this manual. The Arizona Search and Rescue Coordinators Association, Ltd. or the Contributors to this manual may not be held liable in any way for any loss, cost, damage, liability or expense arising from the use of this manual. The Arizona Search and Rescue Coordinators Association, Ltd. or the Contributors to this manual cannot be held liable in any way for any occurrence in connection with an individual's use of the material contained in this manual that may result in injury, death or other damages.

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# Preface

## History

This work is the joint effort of professional search practitioners and is the result of a long-held belief that an Arizona-specific reference manual is required to train Arizona Search and Rescue (AZ SAR) Coordinators. It forms the basis of a 40-hour Inland Search Management course, spread over five days.

The manual is intended to be a work in progress, being continually revised. After one course ends, the manual is updated with the latest information, so that the new edition can be printed in time for the next course. This version of the manual is dated September 14, 2024.

This manual is devoted to managing searches for missing persons, primarily in wilderness environments. It is designed to be used by prospective and experienced search managers in conjunction with the software Win CASIE III and ICS-SAR, discussed in Appendix A on page 358.

The structure of this manual is based in part on the work of Bil Vandergraff and Ken Phillips, who developed the Grand Canyon National Park Service Search Management Action Plan to teach the NPS Search Management Course.

Much of the SAR content in this manual has been known for decades—knowledge gained mostly by experience. Previously, some of it has been passed down in books, some in classrooms, and some by word-of-mouth. Here we have tried to gather that knowledge in one place, giving credit wherever possible. Consequently, there is more in this manual than can be covered in a 5-day course, so course participants are expected to study the manual out of class and then use it as a reference during an incident.

## Outline of the Manual

This manual is divided into the following parts.

- *Introduction* sets out the overall philosophy and the legal aspects of SAR in AZ. It clearly distinguishes between the two types of searches encountered: Route and Location Searches, and Area Searches.
- *Module I* is devoted entirely to Route and Location Searches. Most searches fall into this category. Wherever possible, the chapters in this module are laid out in the order that an experienced SAR manager deals with an incident.
- *Module II* deals with the transition from a Route and Location Search to an Area Search. It covers establishing and segmenting the search area, and the initial consensus. Search theory is introduced in an intuitive way.
- *Module III* is devoted entirely to Area Searches. Terms like *POA*, *ROW*, *POD*, and *CPOD* are dealt with, the emphasis being on understanding and not on mathematics.
- *Module IV* contains important Reference Materials, such as checklists, forms, tables, and a SAR Glossary. These are gathered together here so they are easy to find, rather than having to hunt for them in the main text.

- *Appendices* deals with subjects such as Contour Lines, Probability, and Useful Formulas Used in SAR.
- *Additional Readings, Answers, References, and Index.*

The initial chapters in Modules I—III each contain a brief overview of some of the points to be covered in that module. Most chapters in Modules I—III have exercises and multiple-choice quizzes, with answers starting on page 386. Some of the exercises are designed to be integrated into the course. The multiple-choice quizzes form the basis of the course examinations.

## Style

When writing this manual, a conscious decision was made to exclude all occurrences of “he/she”, and use the generic “they” in its place. Thus a sentence like “He/she sets the Incident Objectives” is replaced with the sentence “They set the Incident Objectives”. Sometimes this leads to slightly awkward phrasing, but not enough to warrant the use of “he/she”.

Items in brackets, such as Reference [Anderson 1], refer to the References on page 402.

This manual was typeset using MiKTeX, a free Windows package available from <http://miktex.org/>.

Please email any corrections or suggestions to David Lovelock at [dsl@math.arizona.edu](mailto:dsl@math.arizona.edu).

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*Roial Armstrong, Michael Campbell, Aaron Dick, Grand Canyon National Park, Eric Johnson, Wren Keller, David Lovelock, Maricopa County SAR, Chuck McHugh, Jeff Newnum, Ken Phillips, John Quandel, Ursula Ritchie, Jesse Robinson, Yavapai County Search and Rescue.*

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# CHAPTER 1

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## Introduction

This chapter introduces the new or inexperienced SAR coordinator to five important questions that underpin the rest of the manual. These questions are

- Who do we search for?
- What types of searches are there?
- What do we search with?
- How do we plan for a search?
- When do we search?

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Section 1.1

### Who Do We Search For?

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Who do we search for? Missing subjects—these are people (or objects) that are not where they are supposed to be. Most SAR incidents involve searching for people.<sup>1</sup> Occasionally an incident involves searching for an object, such as an airplane or evidence. Knowing the category of a missing subject often dictates the search tactics used, so we divide the subjects into the following categories.

- **The Lost**
  - They usually self report by cell phone.
  - They are lost because they missed the trail or tried to take a short cut.
  - They want to be found.
  - Trained volunteers are used on these searches.
- **The Overdue**
  - They are usually reported missing by family or friends.
  - Most leave an itinerary or the reporting party gives a starting point for the search.
  - They want to be found.
  - Trained volunteers are used on these searches.
- **The Endangered**
  - Memory impaired.
  - Children—either lost or abducted.
  - Subjects who are unable to care for themselves.
  - They may not know or understand that they are the subject of a search.
  - Trained volunteers are used on these searches.

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<sup>1</sup> In SAR, we do not call a missing person a “victim”.



- **The Suicidal**
  - Despondents.
  - They may not want to be found.
  - There needs to be a good risk assessment before deploying trained volunteers to search for a suicidal subject.
- **Aircraft**
  - If they do not make their flight-plan destination, then a search is started immediately.<sup>2</sup>
  - If an electronic locating device (for example, an ELT or Emergency Locator Transmitter) hit is received, then a response is initiated immediately.
  - This always involves a large search area.
  - Aircraft are particularly difficult to locate because the size of the search object is unknown. It could range from an aircraft fuselage fully intact to a small burn site containing a completely destroyed aircraft. Also white aircraft are difficult to detect in snow. See Figure 1.1.



**Figure 1.1.** Aircraft crash site. Where is the plane?

- Trained volunteers are used on these searches.
- **Criminals**
  - Escapees.
  - Fleeing suspects.
  - Anyone who poses a danger to the public.
  - They do not want to be found.
  - Volunteers are not used on these searches.

However, SAR resources are not normally used to search for missing dogs, cats, horses, ostriches, parrots, ferrets, weasels, keys, . . .

A missing subject may be thought of as in one of four states during the search. See Table 1.1 on the next page.

- **Mobile and responsive.** Mobile means that the subject can move around, although they may not be moving at the present time. Responsive means that the subject has the ability and the willingness to signal the searchers in some way (voice, whistle, waving arms, mirror, etc.). An example of this is a healthy person who has merely lost the trail.

<sup>2</sup> However, there can still be a significant delay in a search being initiated. Part of this depends on whether the aircraft had a flight plan on file or not. And if a flight plan was on file, it depends on whether it was using VFR (Visual Flight Rules) or IFR (Instrument Flight Rules).

- **Mobile and unresponsive.** Unresponsive means that the subject cannot or will not signal the searchers in any way. An example of this is a healthy child who has been taught not to talk to strangers.
- **Immobile and responsive.** Immobile means that the subject cannot move around. They are stationary (standing still, not moving). An example of this is a person who has broken an ankle, but is conscious and able to communicate.
- **Immobile and unresponsive.** An example of this is a person who is in a coma or deceased.

The subject may be in one of these states permanently or temporarily. Permanently could be if the subject is in a coma or is deceased. Temporarily could be if the subject is sitting down or is asleep one moment and awake the next. However, in SAR, the temporary situations are discounted, and the search strategy is based on the predominant state the subject is most likely to be in (bearing in mind that, as the search progresses a subject may transition from “Mobile and responsive” to “Immobile and unresponsive”).

**Table 1.1.** Missing Subject State

	Responsive	Unresponsive
Mobile		
Immobile		

A subject could be intentionally unresponsive, that is evasive, or unintentionally unresponsive. Examples of intentionally unresponsive subjects are

- A child who does not talk to strangers.
- A despondent who wants to get away from people and does not want to be found.
- A criminal who is fleeing.

An example of an unintentionally unresponsive subject is someone who is unaware that they are the subject of a search, such as a dementia patient.

Knowing whether a subject is mobile or immobile, and responsive or unresponsive, impacts the tactics used during the search.

For example, if, on the one hand, it is believed that the subject is mobile, then rapidly placing resources at strategic locations to contain the subject is a high priority because it restricts the size of the subsequent search area. If, on the other hand, it is believed that the subject is immobile, then that priority is lower, and now the mission of these resources is to talk to passers-by to see whether they have important information.

In the same way, if a subject is mobile, then laying down “traps” that capture evidence of the subject passing is an excellent tactic, which is not sensible if the subject is immobile.

If the subject is responsive, then shouting, lighting flares, etc., is good practice, whereas that is not the case if the subject is unresponsive. An unresponsive subject requires more searchers closer together.

Some Incident Commanders have experienced a search where a subject that has been immobile for days suddenly, for whatever reason, becomes mobile. The thought of this mobility reoccurring and its effect on containment should be present in the mind set of every Incident Commander. This can lend itself to locating more clues and possibly an easier subject to find. However, on a multi-operational period search there are probably weather- or time-related issues that have destroyed clues and thus made the search effort less successful.

*The thought of this mobility reoccurring and its effect on containment should be present in the mind set of every Incident Commander.*

## How Do Disoriented Subjects Try To Reorient Themselves?

Sometimes lost and disoriented subjects appear to behave in bizarre and illogical ways, so it is useful to know how subjects try to reorient themselves. Ken Hill, see Reference [Hill 2], has identified nine techniques that lost subjects might use, and generally they “*will use at least one of these methods, some of which are considerably more effective than others, and most lost people will try more than one.*” What follows is a brief summary of these methods. For more details see Reference [Hill 2].

1. **Random Traveling** is where the subject moves in a random fashion with no apparent reason.
2. **Route Traveling** is where the subject decides to follow an unfamiliar trail, path, drainage, or other travel aid.
3. **Direction Traveling** is where the subject decides to follow a specific direction cross country, often ignoring trails and paths leading in the “wrong” direction.
4. **Route Sampling** is where the subject uses an intersection of trails as a “base”, proceeding to travel some distance down each trail.
5. **Direction Sampling** is similar to route sampling, except that the subject does not have an intersection of trails as a “base”, but instead selects some identifiable landmark as the “base”.
6. **View Enhancing** is where the subject decides to gain height in order to view landmarks in the distance.
7. **Backtracking** is where the subject reverses direction and tries to backtrack on the route initially followed.
8. **Using Folk Wisdom** refers to an attempt by the subject to reorient themselves by using any of the numerous adages on how to find their way to safety.
9. **Staying Put** is where the subject follows the advice “stay where you are”.

## More Than One Subject

Most of this manual is written assuming that there is only one subject missing. However, there might be more than one, which can compound the problem because different possibilities need to be considered—either the group has kept together or has split into separate groups. For example, if two people are missing, they could remain together or separate. If they separate, then one might be immobile and unresponsive and the other mobile and responsive, which could happen if one has an accident and the other goes for help. The possibility that a group has split should always be considered and investigated. Multiple subjects is the focus of Chapter 20 on page 195.

*The possibility that a group has split should always be considered and investigated.*

### Section 1.2

## What Types of Searches Are There?

Generally, there are two types of searches.

1. **Route and Location Searches.** These are searches where routes<sup>3</sup> and specific locations are the primary focus of the search resources.  
A Route and Location Search search is usually characterized by the following.

<sup>3</sup> The term “route” used in this context includes all forms of travel aids, such as pathways, roads, game trails, railroad tracks, ridges, valleys, dry washes, drainages, streams, shorelines, clearcuts, power lines, vegetation lines, or any area that provides a sense of direction and a path of little resistance.

- There are no identified search segments. Routes and locations are searched, rather than areas.
- The subject has been missing for a short time.
- Only a few local resources are used (ridge runners, trail runners, etc.) and only a few agencies are involved (one sheriff's department, SAR volunteers, etc.)
- The subject may be moving or stationary (mobile or immobile).
- The subject may be responsive or unresponsive.
- There is a quick resolution—one way or the other.
- The press might get involved, but usually not on the front page.

A Route and Location Search is usually the first type of search used during the initial response phase of a search. Such searches are called **Hasty Searches**. The purpose of the hasty search is to cover the most obvious places a subject might be in the least time possible. The term “Hasty” is used to stress the urgency and immediacy of the search—it indicates that the search is being conducted in a thoughtful, skilled, and professional manner.

*The term “Hasty” is used to stress the urgency of the search—it indicates that the search is being conducted in a thoughtful, skilled, and professional manner.*

About 85% of such searches are over within the first 12 hours.<sup>4</sup> About 97% of all searches fall into the Route and Location Searches category, and they are over within 24 hours.

Generally, the remaining 12% ( $97\% - 85\% = 12\%$ ) of Route and Location searches, which are over between 12 and 24 hours, go into another operational period, and are called **Extended Searches**. If after 24-hours the subject is not found, but there is evidence that the subject is mobile, then the extended search continues where routes and locations are still the primary focus of the search. However, if there is no evidence that the subject is mobile, then Route and Location Searches generally transition into Area Searches.

2. **Area Searches.** These are searches where segments (areas) are searched, rather than routes and locations. These searches are preceded by a consensus, where it is assumed that, if the subject is in the search area, then the subject is immobile. Only about 3% of searches reach this stage, but those that do are memorable and instructive!

An Area Search is usually characterized by the following.

- It covers many operational periods.
- Multiple resources, not all local, are used (ground teams, canine, helicopters, fixed-wing aircraft, horses, 4WD, ATV, climbers, infrared, etc.).
- Multiple agencies are involved (Sheriff/Police/Highway Patrol, National Park Service, Forest Service, FBI, military, SAR volunteers).
- There are many search segments. The emphasis is on searching areas rather than searching routes and locations.
- Search Theory is used.
- The subject is assumed to be immobile (stationary).
- There is lots of press coverage, both good and bad, with some on the front page.
- There is pressure, anxiety, and criticism.
- Lots of untrained volunteers, second-guessers, and “experts” come out of the woodwork.

In this type of search, the primary search tactic used is some form of a grid search,<sup>5</sup> in the widest sense. This would include a helicopter using a creeping line search, a ground team using critical

<sup>4</sup> This time is measured from when the initial report is made until the time the last searcher arrives home, so the actual search is considerably shorter than this.

<sup>5</sup> Grid searchers form a line, with trained team members at a specified distance apart, and progress through the assigned area together.

separation, or a handler using an air scent dog. Hasty tactics might also be used in Area Searches. For example, if a search team discovers tracks then a tracking team might follow those to allow the search team to complete its assignment.

*There are two types of searches: Route and Location Searches and Area Searches.*

Module I of this manual, *Route and Location Searches*, is devoted primarily to Route and Location Searches; Modules II and III to Area Searches.

A search that goes beyond the Initial Response is also called a **Multi-Operational Period Search**. Depending on the status of the search, a Multi-Operational Period Search could either remain as a Route and Location Search or transition to an Area Search.

Route and Location Search	Hasty Search → Extended Search
Route and Location Search/Area Search	Hasty Search → Area Search
All Searches	Hasty Search → Multi-Operational Period Search

There is another type of search, called a **Bogus Search**.<sup>6</sup> This occurs when, unknown to the searchers, the subject is not missing at all, or if the subject is missing, they have left the vicinity of the search area and are now safe, at the movies, in a tavern, . . .

Section 1.3

## What Resources Do We Search With?

Resources are the people and equipment used to help locate the lost subject.

The people come in various categories: paid or unpaid, trained or untrained. When authorized to do so, paid resources are guaranteed to respond to an incident. Because of prior and job-related commitments, unpaid resources (trained volunteers) cannot guarantee to respond.

Depending on the tactics employed, the following resources may be used.

- Ground Searchers.
- Canines.
- Horses.
- Aircraft.
- Ground Vehicles.
- Specialized Units.

### Ground Searchers

Ground searchers come in various categories, but they all refer to a resource that searches on foot. See Figure 1.2 on the next page.

- **Human Trackers—Sign Cutters.** These highly-trained resources follow the route of the subject step-by-step from the place the subject was last known to be, by identifying tracks and signs left by the subject. They can also be used to reduce the search area by binary searching.<sup>7</sup>
  - **Usage.** Usually they are among the first responders requested for a hasty search. Also, if tracks are discovered during an Area Search, then they are used while the regular searchers continue searching their segment.

<sup>6</sup> This is the current terminology. Previously it was given another name, also starting with the letter 'B', which suggested that it was an illegitimate search. That terminology is still prevalent.

<sup>7</sup> A Binary Search is a strategy that involves sending sign cutters in a direction that is perpendicular to the subject's assumed direction of travel, in an effort to reduce the size of the search area.



**Figure 1.2.** Ground searchers

- **Advantages.** They can give the subject's direction of travel, follow the subject's path, locate clues, and reduce the size of the search area.
- **Limitations.** Time consuming. Skill levels vary. Less effective if not used immediately or if clues have been destroyed by other resources or the environment. Difficult to have available and their skills require frequent updating.
- **Sources.** Trained volunteer units, National Park Service, U.S. Customs and Border Protection, law-enforcement tracking units.
- **Hasty Teams.** These trained resources are clue-conscious and very mobile searchers. They are independent and can work without supervision.
  - **Usage.** Usually used during a hasty search.
  - **Advantages.** They can search the high probability routes and locations quickly. They can also locate clues.
  - **Limitations.** May miss or destroy clues in their haste.
  - **Sources.** Trained volunteer units.
- **Grid Search Teams** (AKA Line Searchers or Sweep Searchers). These generally search areas by forming a line, with trained team members at a specified distance apart, and progressing through the assigned area together.
  - **Usage.** Usually used during an Area Search.
  - **Advantages.** They can search areas thoroughly, depending on the spacing between searchers. They can also locate clues.
  - **Limitations.** Time consuming. Low efficiency. Require a lot of man-power. May destroy clues, if not detected.
  - **Sources.** Trained volunteer units.
- **Untrained Volunteers** (AKA Spontaneous Volunteers). These are untrained personnel who offer to help with the search effort. See Figure 1.3 on the next page. For an in-depth article on Untrained Volunteers see Reference [Anderson 2].

There is no consensus in the SAR community as to whether their offer should be accepted or declined. That decision is made by the Incident Commander. Expect pressure from the family and the community if these volunteers are not used, especially if there are insufficient trained resources available. There have been situations where untrained volunteers were used who then worked against the agency, even trying to convince the family that a terrible job is being done.

- **Usage.** Whether to use them or not is determined on a case-by-case basis. Only used in the field if they are trained and supervised. Could be used in non-search capacities.
  - ◇ It requires some tact to explain to untrained volunteers why they cannot be used on a search.
  - ◇ If they are told to go away they may search on their own. Those days where control of a situation can be achieved with road blocks and crime scene tape are over. With social media, search groups of hundreds of people can be organized by amateurs in a very short time.





**Figure 1.3.** Briefing untrained volunteers

- ◇ Possibly get them involved, suggesting feasible assignments, but stress that the agency is not responsible for their actions or safety and they must not interfere with the official search.
- ◇ Discouragement was the best method but experience in recent years suggests this may not work. Encourage them to join regulated groups and get trained to participate in the next operation.
- ◇ If agency, family, and public pressure force the Incident Commander to use untrained volunteers that show up to help, train them quickly, put them with experienced trained searchers, and provide a means of communication. Give them assignments—do not let them go off on their own.
- **Limitations.** Untrained. Unprepared for environment. Unfamiliar with command structure. Might destroy authentic clues and create false ones. Require constant supervision. May be available only for a short time. Background checks required, especially in the case of a missing child. Unknown health or physical conditions. Not covered under Workman's Compensation. If used, the agency in charge of the search may be legally liable for their actions and welfare.

## Canines—K9

A canine unit consists of a dog and its handler, and sometimes an additional person to manage communications, navigation, and note-taking. Generally canines used in searches fall into two categories, Trailing Dogs (also called Tracking or Ground Scent Dogs) and Air Scent Dogs. See Figure 1.4 on the next page.<sup>8</sup>

- **Trailing Dogs.** These dogs are typified by the Bloodhound, although other breeds are said to be as effective. Like human trackers, trailing dogs follow the route of the subject from the place the subject was last known to be, by identifying scent left by the subject on the ground and nearby vegetation. Typically trailing dogs require a scent article belonging to the subject, which has been protected from contamination. Ideally this should be clothing the subject has recently worn, or bedding recently slept in. Such an article should be placed, without touching it, into a Ziploc<sup>®</sup> type bag. Some handlers prefer to collect these articles themselves, although that is not always practical.
  - **Usage.** Usually they are among the first responders requested for a hasty search.
  - **Advantages.** They can give the subject's direction of travel, follow the subject's path, locate clues, work day or night, and work independently of other resources searching the same region.

<sup>8</sup> Photo courtesy of Vi Brown, Southwest Rescue Dogs, Inc, Tucson, AZ.



Figure 1.4. Dog team

- **Limitations.** Require a scent article. Skill levels vary widely. Effectiveness adversely affected by the weather (high temperatures, low humidity, any wind). In Area Searches they are unable to search segments.
- **Sources.** Trained volunteer units, U.S. Customs and Border Protection, law-enforcement dog units (but not “piranhas on a leash”).
- **Air Scent Dogs.** These dogs typically work off-lead. They detect scent from a human as it is carried by air drifting from the source to the dog. The dog searches and samples the air currents by ranging/quarterming back and forth through the area that is assigned to the team. Usually they are unable to discriminate between the subject’s scent and that of any other human.
  - **Usage.** Can be used in any type of search.
  - **Advantages.** They can search large areas effectively and quickly, during the day or at night. No scent article is required. They can be assigned segments to search. If the search segment has been “aired” of previous search teams’ scents, air scent dogs can still search that segment effectively. They can search areas that are more difficult for ground searchers to search. They can reduce the size of the search area by determining areas where no human scent exists.
  - **Limitations.** Skill levels vary widely. Less effective if not used immediately. Effectiveness adversely affected by the weather (high temperatures, low humidity, low wind, clear sky) and possible contamination by other humans within the dog’s range of detection.
  - **Sources.** Trained volunteer units, U.S. Customs and Border Protection, law-enforcement dog units (but not “piranhas on a leash”).

Other types of dog teams that might be used in a more general search environment are Cadaver/Human Remains Detection (HRD) dogs (searching for the scent of human decomposition), Evidence dogs (searching for weapons, drugs, or explosives), Disaster dogs, Avalanche dogs, and Water-search dogs.

## Horses—Posse—Mounted

These are trained searchers mounted on horses or mules. See Figure 1.5 on the next page.

- **Usage.** Can be used in any type of search.
- **Advantages.** They can travel faster than ground teams, and carry more equipment. The rider, being higher than a ground searcher, has a different perspective and an elevated view. A horse may alert its rider to the presence of the lost subject. If the subject is found and needs transporting out of the field, a horse may do that more easily than ground searchers.
- **Limitations.** Require considerable logistical support (trailers, corral, food). Being higher off the ground, clues such as footprints may be missed. The horse’s hooves can destroy clues, such as





**Figure 1.5.** Horse team

footprints. Less effective in areas of thick vegetation or terrain where the horse has difficulty holding its footing.

- **Sources.** Trained volunteer units, law-enforcement posses or auxiliary units.

## Aircraft

Aircraft are divided into three categories, helicopters, fixed-wing, and unmanned.

- **Helicopters.** Helicopters come in many shapes and sizes, each with their own capabilities. Generally the smaller the helicopter the better it is for searching, and the larger the helicopter the better it is for transporting payloads.
  - **Usage.** Can be used in any type of search. They can be used as a search platform. They can also be used for transporting searchers/gear into the search area, or for extracting an injured subject from the search area. If used for transporting resources they might land to offload searchers, or the searchers may have to rappel out of the helicopter. See Figure 1.6 on the next page. They can be used by the command staff to overfly and evaluate the search area.
  - **Advantages.** They can search large areas quickly. Their noise can alert the lost subject that a search is in progress. Some helicopter crews can fly at night, and are particularly effective using night vision goggles, especially if the subject has been instructed to use their cell phone's LCD screen to point at the helicopter. Spotting campfires, signal fires, or any other light source with night vision goggles is very effective. Some have Direction Finding equipment on board and can be a good asset in locating ELTs<sup>9</sup> and PLBs<sup>10</sup> providing the weather is favorable. Can use the PA system to call the subject. Can be a platform for FLIR.<sup>11</sup> See Figure 1.7 on the next page. Can usually land near the Incident Command Post.
  - **Limitations.** Ineffective in searching forested areas. Some do not fly at night. Weather and altitude may prevent them flying or severely limit loads. Not always available because they are

<sup>9</sup> Emergency Locator Transmitter is a transmitter installed on most aircraft that emits a signal which can be picked up by satellites or other aircraft to determine the location of a downed aircraft. An ELT is activated by the impact of a crash.

<sup>10</sup> Personal Locator Beacon is the personal version of an ELT that is designed to be carried by a person on foot. It is manually activated.

<sup>11</sup> Quoting from Reference [FLIR], "Forward looking infrared (FLIR) is an imaging technology that senses infrared radiation. Since FLIRs use detection of thermal energy to create the 'picture' assembled for the video output, they can be used to help pilots and drivers steer their vehicles at night, and in fog, or detect warm objects against a cold background when it is completely dark (such as a cloudy, moonless night)."

in use elsewhere, or are down for maintenance, or refueling. Expensive to use. Require safety training for searchers. Usually require helispots near the Incident Command Post.

- **Sources.** U.S. Customs and Border Protection, law-enforcement, military, and EMS agencies.



**Figure 1.6.** Rappeling from a helicopter



**Figure 1.7.** FLIR image

- **Fixed-Wing Aircraft.** In searches, these are usually small, single engine aircraft.
  - **Usage.** Can be used in any type of search for searching large open areas or for locating large search subjects, such as vehicles or planes. They can also be used by the command staff to overfly and evaluate the search area.
  - **Advantages.** Can be a platform for FLIR. Can search large areas quickly. Can be used for radio communication relays.
  - **Limitations.** Ineffective in confined or wooded areas. Weather may prevent them flying. Usually cannot land near the Incident Command Post.
  - **Sources.** U.S. Customs and Border Protection, law-enforcement, Civil Air Patrol (CAP).<sup>12</sup>
- **Unmanned Aerial System.** An unmanned aerial system (UAS) is an unmanned aircraft with a ground operator (pilot). The UAS's used for SAR may have<sup>13</sup> *“a sophisticated all-weather sensor capable of providing photographic-like images through clouds, rain or fog, and in daytime or nighttime conditions; all in real-time”*. See Figure 1.8 on the next page, taken from Reference [UAV2].
  - **Usage.** Can be used in any type of search.
  - **Advantages.** Can see great details from high altitudes. Can remain airborne for up to 24 hours.
  - **Limitations.** Availability. Cannot land to help subject. Limited by weather and wind. Uncertain regulatory environment hampers deployment.

<sup>12</sup> CAP resources are accessed through AZDEMA.

<sup>13</sup> Quoted from Reference [UAV1].



**Figure 1.8.** Unmanned aerial system

- **Sources.** Military, U.S. Customs and Border Protection, some Law Enforcement Agencies, hobbyists.

### Unmanned Aerial Systems in Search and Rescue<sup>14</sup>

In recent years the availability and affordability of small unmanned aerial systems (sUAS) have made this technology increasingly common in search and rescue operations. The sUAS on the market have the ability to stream live video footage, capture still photos, and aid in the creation of maps, among other features. Operation of sUAS can be cost effective and limit the exposure of aircrews or other team members to hazards.

Prior to 2016 agencies wishing to operate the sUAS on missions, were required to obtain a Certificate of Authorization (COA) from the Federal Aviation Administration (FAA) which outlined the area and conditions under which the sUAS could operate. Obtaining the COA requires a lengthy application from which the FAA will conduct a comprehensive operational and technical review. A response from the FAA regarding the COA application can be expected within sixty days from submission. With a COA the agency can request the ability to fly in both daylight and nighttime conditions, over populated areas, and in various classifications of airspace.

The release of the Federal Aviation Administration Small Unmanned Aircraft Regulations (Part 107) in 2016 has made it possible for agencies to utilize sUAS without obtaining a COA as long as the agency operates a sUAS weighing less than 55 pounds, generally at or below 400 feet above ground level, and not over populated areas unless the unmanned aircraft has specifically been approved by the FAA to do so. The FAA currently accepts applications for rule-specific waivers to Part 107, such as UAS flights in nighttime conditions, however, the remote pilot or the agency's responsible person may need to include detailed operating procedures and additional safety risk management practices for the FAA consideration. To operate under Part 107 the pilot of the sUAS needs to possess a remote pilot airman certificate or be under the direct supervision of a person, with a valid certificate. Obtaining the remote pilot airman certificate requires that the individual be at least 16 years old and pass a knowledge test at an FAA approved testing center. After initial certification, Remote Pilots must complete an online training course through the FAA every 24 months to maintain their certification.

Caution should be used if an agency seeks assistance from unaffiliated remote pilots for search and rescue missions due to potential liability. Should unaffiliated remote pilots and equipment be used, an agency should ensure that remote pilot is legally permitted to conduct the requested mission and

<sup>14</sup> We thank Paul Clifton of the Coconino County Sheriff's Office for contributing this section.

possesses the necessary FAA authorizations or waivers and liability insurance if the remote pilot is not covered under the agency's policy. The agency may request a remote pilot's flight log, aircraft maintenance log, and other records to better determine the remote pilot's safety record and experience while conducting sUAS missions.

To ease public acceptance of sUAS operations an agency beginning a program should consider public outreach and outline the guidelines for use, benefits of the program to public safety, and the record retention policies.

A training program for sUAS pilots and observers should be developed and documented. Operation of a sUAS is a technical skill and requires competency which can only be gained by frequent flight training missions. In addition to practicing flight operations there should be practice with the operation of the sensors on board to make the sUAS team efficient and effective.

There are many manufacturers of sUAS and an agency developing a sUAS program should evaluate the different manufacturers and products to find an aircraft that suits the needs of the agency. Pricing may vary from several hundred dollars to tens of thousands of dollars depending on the features, sensors, weather resistance, and flight duration for the particular system.

In addition to the sUAS as a data acquisition tool, software exists to quickly detect color-specific pixels in photographs. Benefits to using pixel-detection software, such as *Loc8* (<https://www.loc8.com/>), include the ability to systematically scan hundreds or thousands of aerial photographs, identify potential "targets" based on colors such as the subject's last seen clothing, and provide location information for such "targets". Another benefit of using such software with automated or pre-programmed grid searches with sUAS include precise documentation of that aerial search by "tagging" each photograph taken with the sUAS's GPS coordinates when the photograph was taken. Personnel trained on such software and a laptop with a high-resolution screen is recommended to take full advantage of this capability.

Even if an agency does not have sUAS to operate there are groups that may offer assistance and public who may assist without the Incident Commander's knowledge or request. One group called Search and Rescue Drones, formerly known as Search With Aerial RC Multicopter (S.W.A.R.M.), has a network of over 1000 pilots around the world. This group monitors news feeds for search missions and may issue a Mission Alert on their Facebook page. The Search and Rescue Drones group's standard operating procedures indicate that a member-pilot should contact the agency with jurisdiction to offer their assistance and then follow the direction of that agency. Hobby groups and members of the general public may also have sUAS and offer assistance or may self-deploy.

A primary concern with sUAS is their interference with other search and rescue aviation operations. sUAS can pose a significant collision hazard to other manned and unmanned aircraft operating in the search area and their use should be well-controlled and coordinated. It is not uncommon to hear about wildland firefighting aircraft being grounded due to the presence of sUAS in the fire area. This same situation can occur on search and rescue missions. An Incident Commander may wish to implement a Temporary Flight Restriction with the FAA in the search area to aid in limiting the aircraft, both manned and unmanned, operating in that area.

As of September 16, 2023, small unmanned aerial vehicles will need to comply with the Remote ID policy from the FAA. Small unmanned aerial vehicles may either have an internal component that broadcasts Remote ID information or affix an aftermarket Remote ID broadcast module. The Remote ID policy requires that the small unmanned aerial system broadcast the location of the small unmanned aerial vehicle and either the location of the control station or the take-off location. The purpose of the Remote ID policy is to improve safety and security as sUAS are incorporated into the national airspace. Remote ID will allow the FAA and law enforcement locate the sUAS if it appears to be operating in an unsafe or otherwise illegal manner. Smartphone apps are beginning to appear in app stores that will allow for receiving sUAS location information from Remote ID when a sUAS is operating in proximity to the smartphone.

The sUAS field is a rapidly evolving one with new aircraft, new capabilities, new sensors, new analysis tools, and new rules. It is a capability worth keeping up with so that the Incident Commander knows what resources are out there and how they can best be utilized in search and rescue operations.

## Boats

- **Types** Small human powered boats such as canoes, kayaks, and small inflatables are suitable for small bodies of water and where motor boats are prohibited. These boats with their low free-board are better suited for search platforms for K9s.  
Personal watercraft can carry one or two people and operate in shallow water.  
Boats in the 16–22 foot range can cover more distance and open water. Boats without a cabin provide good visibility.  
Larger boats with cabins can handle rougher waters.
- **Usage** Boats can be useful for searching open water and also along coastlines and river banks. Ground searchers and K9 teams can search from and be deployed by boat. Boats can be stationed at visible sites and used as attraction devices.
- **Advantages** Can carry loads of people and cargo. Good platform for K9s trained in water search. Boats provide a different perspective of a search area.
- **Limitations** Must have a trained operator, who may not know SAR tactics. Might have to be transported to the search area by trailer. Safety concern with personnel operating over water. Personal Flotation Devices (PFDs) required for all occupants including subject if found. Can be expensive and might be damaged when operating in shallow areas.

## Ground Vehicles

Vehicles come in various forms, ranging from mountain bikes and 4WDs to ATVs, snowmobiles, and snow cats. They can be used for transportation and searching. In addition to searching, they are used for containment and as magnets, using their horns and lights to attract attention.

## Specialized Units

These include Divers, Climbers, Mine Rescue Units, and Cavers. Sometimes outside agencies with special skills, such as searching a landfill or a trash dump, are needed. See Figure 1.9.



**Figure 1.9.** Searching a trash dump



## Organizing Resources on a Search

Under the Incident Command System, ICS (see Chapter 12 on page 116), there are three ways to temporarily organize resources: as single resources, as strike teams, or as task forces.<sup>15</sup>

- **Single Resources.** As the name implies, a single resource is an individual piece of equipment, or group of individuals, with an identified supervisor. Examples of a single resource are: a helicopter with pilot, an air scent dog with handler, a UAV with “pilot”, an ATV with driver, or a hasty search team with leader.
- **Strike Teams.** A strike team consists of resources of the same kind. Examples of a strike team are: an 8-man team created from four 2-man hasty teams to search a segment, or two horses and their riders.
- **Task Forces.** A task force consists of resources of different kinds deployed under a single leader with common communications. An example of a task force is an air scenting dog teamed with a hasty search team to search a given segment into the wind.

### Section 1.4 How Do We Plan For a Search?

The question is “How do we plan for a search?” The answer is simple, “Create a preplan”. But, it takes effort to write a good preplan.

*It takes effort to write a good preplan.*

According to Tim Setnicka,<sup>16</sup> a “preplan is an operational guide that, if designed and implemented correctly, will help introduce order to the chaos and furor accompanying the initial notification for help ... The preplan is a combination of search technique, management guidelines, and policies integrated for use in resolving field SAR situations.”

The preplan need neither be long nor complicated, but it must be realistic, down-to-earth, clear, and up-to-date. It should be written so the new kid on the block can initiate a search as effectively as the “local expert”. It should help ensure that the initial search response is swift and apt. In fact, “preplanning” is usually planning for the hasty search phase of the incident, and during that phase, plans need to be made for the next Operational Period, and so on, which is the purpose of the Incident Action Plan discussed in Chapter 13 on page 130.

The preplan should be a group effort, involving representatives and input from all resources. It should be a checklist that is reviewed annually or even more frequently. In fact, creating a preplan is sometimes more informative than the end result.

*The preplan should be reviewed annually or even more frequently.*

Although a preplan depends on the specific agencies and groups involved, some questions to be answered in the preplan are:

1. What is the objective/purpose of the preplan?
2. Which agency is responsible for the management of the search?
3. Who should be advised of the incident?

<sup>15</sup> More precise definitions of these items are given in Chapter 12 on page 116.

<sup>16</sup> See Reference [Setnicka, page 51]

4. Which forms, papers, procedures, manuals, etc., should be available for reference purposes, to ensure that the initial response runs smoothly?
5. What is the environment like, including hazards, past incidents, weather, maps?
6. How is the urgency of the search determined, and what type of response is justified for that urgency?
7. Which resources are typically available, including qualifications, response times, contact information?
8. What equipment is typically available, including response times, contact information?
9. Who is responsible for the initial callout of these resources and equipment?
10. Does the incident have a robust and reliable incident support system? A highly functional support system that supplies the IRIC with the management staff, the personnel, and the resources they need is important. “One riot, one deputy” is unacceptable on a SAR incident.
11. Who is in charge of investigations, completing the Lost Person Questionnaire?
12. Who is in charge of keeping track of clues?
13. What are the communication options?
14. What documents should be completed during the initial response and by whom?
15. How are the arrival, briefing, tracking, and debriefing of the search resources managed?
16. How is the care and feeding of the search resources managed?
17. How are the family, media, stake-holders, handled?
18. What are the plans if a resource is injured?
19. What are the options if the subject is found: healthy, injured, deceased?
20. What are the guidelines for suspending a search if the subject is not found?
21. What are the demobilization plans?

### Section 1.5 When Do We Search?

When do we search? Day and night. However, for night searches, it is the duty of the Incident Commander to balance the search urgency against the safety of the searchers.

The tactics used for night searches may differ from day searches. For example, if the search is in unfamiliar or dangerous territory, or the weather is bad, then the emphasis at night might be on passive search tactics such as placing resources at safe locations to contain the subject, thereby restricting the size of the subsequent search area. These resources can shout the subject’s name to attract their attention. They can also interview non-SAR personnel in the search area who might have valuable information about the subject.

#### Advantages of Night Searching

- Some resources search well at night, for example, canines, resources using night vision goggles, FLIR, and thermal-imaging devices.
- Because it is quieter at night than during the day, human voices and sounds carry farther. This increases the effectiveness of any search tactics involving sound.
- Light signals from the subject are more easily detected by searchers.
- The subject is usually immobile at night. There are two advantages to this. Subjects are more likely to hear searcher sounds, and searchers on trails can overtake them.
- Searchers have the ability to control the angle of light from flashlights to best illuminate tracks and cast shadows.

#### Disadvantages of Night Searching

- Even with a full moon, visibility is not as good as in daylight.

- There is an increased risk to searchers. Aside from a hazard like the terrain, deer and other prey move at night, which attracts predators such as mountain lions and bears.
- A missing person could be injured while attempting to move towards searchers.
- Clues can be missed or destroyed.

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

- 1.1.** What are the categories that canines usually fall into within SAR?
- 1.2.** Discuss some of the problems that could arise if untrained volunteers are used in an incident.
- 1.3.** Discuss some of the advantages and disadvantages of grid searching.
- 1.4.** Discuss some of the advantages and limitations of using helicopters in an incident.
- 1.5.** Under what circumstances is a search classified as a Bogus Search?
- 1.6.** A hunter's wife reports that her husband is two days overdue returning from a hunting trip in northern Arizona. How urgent is this incident? What would you do? What resources would you request? Create plausible scenarios that would account for the hunter being (a) Mobile and responsive. (b) Mobile and unresponsive. (c) Immobile and responsive. (d) Immobile and unresponsive.
- 1.7.** A mother reports that her 5 year-old daughter disappeared an hour ago from her backyard in a semi-urban area of Phoenix. How urgent is this incident? What would you do? What resources would you request? Create plausible scenarios that would account for the child being (a) Mobile and responsive. (b) Mobile and unresponsive. (c) Immobile and responsive. (d) Immobile and unresponsive.
- 1.8.** Discuss the pros and cons of searching at night.
- 1.9.** Find out whether your agency has a SAR preplan. If it does not, initiate one. If it does, review it and update as necessary.

**1.10.** Discuss the differences between a Route and Location Search and an Area Search.

**1.11.** Explain why it is important to decide whether a subject is mobile or immobile, and responsive or unresponsive.

**1.12.** Explain what disoriented subjects do to try to reorient themselves.

### Quizzes

**1.13.** The term "Hasty" is used to indicate that the search is being conducted in a thoughtless, unskilled, or unprofessional manner. (a) True. (b) False.

**1.14.** A subject who is unable to walk, but is otherwise healthy is (a) Mobile and responsive. (b) Mobile and unresponsive. (c) Immobile and responsive. (d) Immobile and unresponsive.

**1.15.** A missing subject with dementia (a) Wants to be found. (b) Does not want to be found. (c) May not understand that they are the subject of a search.

**1.16.** Most searches are (a) Area Searches. (b) Route and Location Searches.

**1.17.** In an Area Search the subject is assumed to be (a) Mobile. (b) Immobile. (c) Responsive. (d) Unresponsive.

**1.18.** After a Hasty Search is completed unsuccessfully, the search becomes (a) Either an Extended or Area Search. (b) Only an Extended Search. (c) Only an Area Search.

**1.19.** Grid searching is the preferred method of searching during a Route and Location search. (a) True. (b) False.

**1.20.** A preplan is a document that contains information on (a) Search techniques. (b) Management guidelines. (c) The resources that are typically available. (d) All of the above.



**1.21.** Searches are never conducted at night.  
(a) True. (b) False.

**1.22.** In SAR, the letters “ICS” stand for (a) Information Communication Support. (b) Incident Capturing Search. (c) Incident Centralized System. (d) Incident Command System.

**1.23.** Under ICS, two ways to temporarily organize resources are as (a) Strike teams and task forces. (b) Strike forces and task teams. (c) Single resources and task strike forces.

**1.24.** Under ICS, the number of ways to temporarily organize resources is (a) 2. (b) 3. (c) 4. (d) ICS does not address this issue.

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## CHAPTER 2

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# SAR Authority and Legal Issues in Arizona

### SAR Agreements

According to a written communication from Bill Clarke, Lt Col, USAF,<sup>1</sup> *While there is no federal legislation that places responsibility for searches with any local agency, the National SAR Plan (paragraph 9) identifies the states as being able to retain authority for search and rescue within their state boundaries if the state chose to accept that. All states in the United States have chosen to retain responsibility for local search and rescue.*

There are two different agreements between the State of Arizona and the U.S. Air Force regarding SAR in Arizona. The first agreement is a formal Memorandum of Agreement (MOA) between the 1<sup>st</sup> Air Force Commander and the Governor of the State of Arizona that outlines which entity is responsible for air search and which entity is responsible for ground search in the state. This is a legal document. The second agreement is a Memorandum of Understanding (MOU) between the Air Force Rescue Coordination Center (AFRCC) and the Arizona Department of Emergency and Military Affairs (AZDEMA).<sup>2</sup> This MOU puts the MOA into a workable format by defining terms, specifying agency and/or mission responsibility, and listing agency contact phone numbers for day-to-day coordination of SAR operations.

The MOA between the AFRCC and the Governor of the State of Arizona states that AZDEMA is the entity responsible for missing aircraft searches within the state and the County Sheriff within each county is responsible for missing person searches within the state.

*AZDEMA is the entity responsible for missing aircraft searches within the state and the County Sheriff within each county is responsible for missing person searches within the state.*

Per the MOU between AZDEMA and the AFRCC, AZDEMA serves as the state agency for coordinating searches with the AFRCC, the County Sheriffs, and other law enforcement agencies. For missing aircraft searches the AFRCC will coordinate all federal assets, including the Civil Air Patrol (CAP) unless coordinating directly with the CAP, through AZDEMA. Once the missing aircraft is located crashed on the ground the responsibility shifts to law enforcement (that is, the County Sheriff) for the recovery of personal property and the death investigation, if there is a fatality, and to the Federal Aviation Administration (FAA) and the National Transportation Safety Board (NTSB) for the air crash

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<sup>1</sup> See Appendix E on page 381.

<sup>2</sup> AZDEMA is sometimes referred to as DEMA.

investigation. For missing person searches the AFRCC will coordinate all federal assets, including the CAP, through AZDEMA as the representative for the County Sheriffs.

SAR authority on tribal lands can be complicated. While the law is not entirely clear on this issue some Sheriff's Offices hold that if the subject of a search is a tribal member on tribal land the Tribal Authorities have primary jurisdiction and if the subject is a non-tribal member on tribal land the Sheriff's Office has primary jurisdiction. Many tribal agencies do not have organized SAR teams and may request assistance from the local Sheriff's Office for SAR operations.

*SAR authority on tribal lands can be complicated.*

Many National Park Service units have well-organized and well-equipped SAR teams in the park or monument. Generally there is a MOU in place with the NPS unit and the county Sheriff regarding law enforcement and SAR within the park or monument. County Sheriffs are generally ready and willing to assist NPS units with SAR in accordance with the established MOU. NPS units are also often willing to assist counties with SAR outside the park or monument boundaries.

## SAR in Arizona

On state lands in Arizona the responsibility for SAR lies with the Sheriff of each county as outlined in Arizona Revised Statute 11-441c which states "*The Sheriff shall conduct or coordinate within the county SAR operations involving the life or health of any person, or may assist such operations in another county at the request of that county's Sheriff, and may request assistance from any persons or agencies in the fulfillment of duties under this subsection.*"

This statute was adopted as a result of a search for a family in the desert between Cave Creek and Bartlett Lake in August of 1970 for an adult and four small children. The subjects were eventually all found deceased from exposure to extreme heat. Upon reviewing this incident the Arizona Legislature determined that no one entity was responsible or required to conduct searches such as this. In January of 1971 House Bill 10 added the SAR responsibility to ARS 11-441.

The Sheriffs of each county in Arizona have generally chosen to designate one or more deputy sheriffs as SAR coordinators for their county. The SAR Coordinators manage the day-to-day SAR operations. However, most counties rely heavily on SAR volunteer organizations to aid in conducting SAR missions.

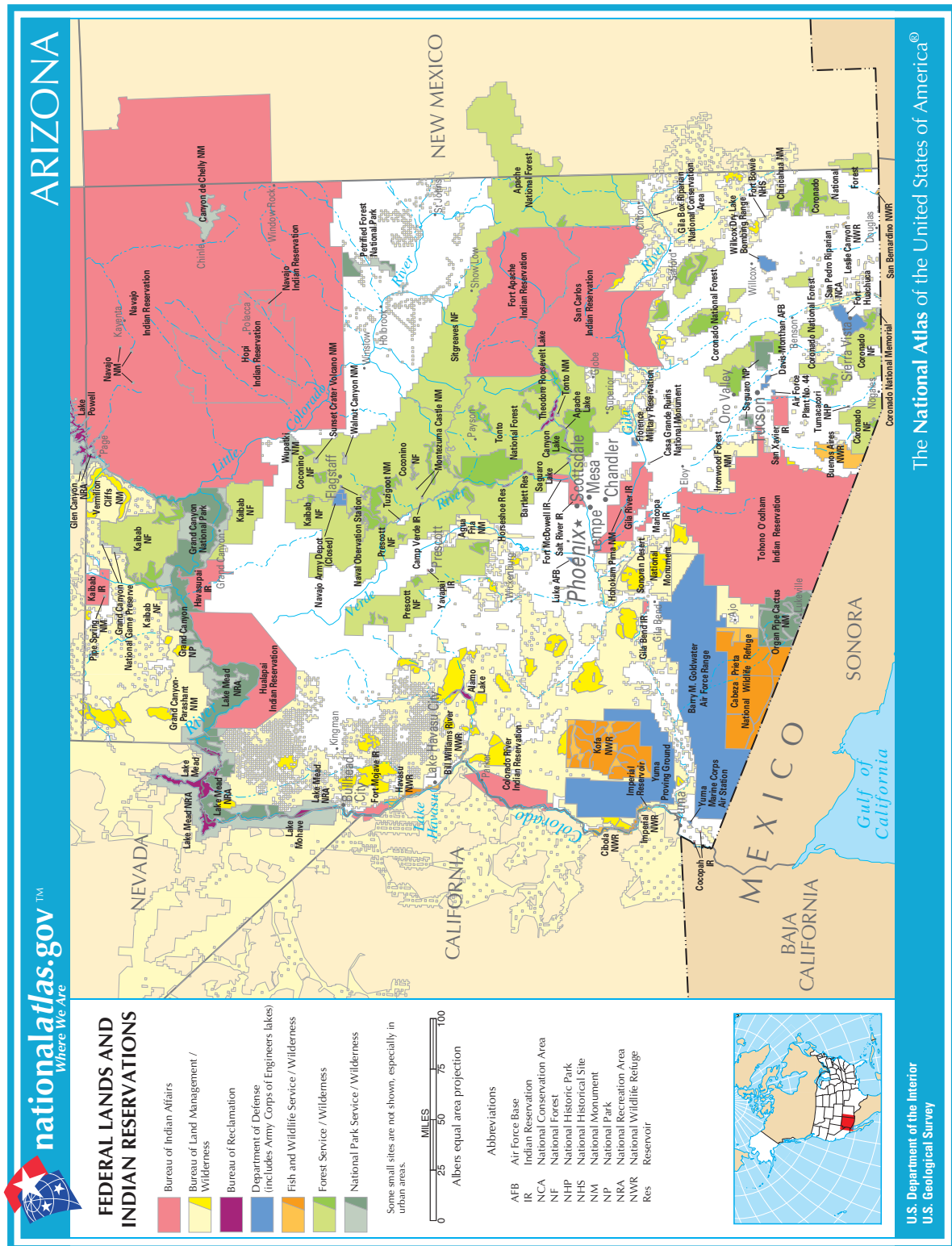
In order to support the Sheriffs in their SAR responsibility the State of Arizona Department of Emergency Management and Military Affairs developed the position of 'State SAR Coordinator'. This position serves to

- Administer the reimbursement of eligible expenses to the counties.
- Aid the counties if a request for state or federal assets are needed to conduct an operation on a SAR mission.
- Issue state mission numbers.
- Act as the state representative on the scene of a SAR incident.

The State SAR Coordinator also acts as the lead coordinator on overdue aircraft incidents that may span multiple counties.

## Missing or Overdue Aircraft

Overdue or missing aircraft and any Emergency Locator Transmitter (ELT) or Personal Locator Beacon (PLB) missions are coordinated by the AZDEMA State SAR Coordinator. The notification about one of these incidents should come from the AFRCC to AZDEMA so that the appropriate response is conducted. The State SAR Coordinator, after receiving the information from the AFRCC, generally



**Figure 2.1.** State, Federal, and Tribal lands

contacts the affected county or counties to coordinate any actions. If a county SAR coordinator receives a notification about an overdue or missing aircraft or an ELT or PLB activation from any source other than the State SAR Coordinator the county SAR coordinator should immediately call the State SAR Coordinator to inform on the situation and receive direction.

As soon as an aircraft becomes overdue various attempts to locate the aircraft are made including the Information Request to Departure Station (QALQ) and Information Request (INREQ). The QALQ is generally issued first. If an aircraft is 30 minutes overdue the destination facility for the overdue aircraft transmits an INREQ to the departure facility, base of operations, en route Flight Service Stations (FSS), and Air Route Traffic Control Centers (ARTCC) along the route. When an QALQ or INREQ is received by one of the facilities mentioned they will check their records for the aircraft. It is not uncommon for local FSS to call local law enforcement to conduct ramp checks at airports for an overdue aircraft before they issue an Alert Notice (ALNOT). An ALNOT is issued if the INREQ results are negative or if the aircraft is not located within one hour of the issuance of the INREQ. The ALNOT is transmitted to Regional Operations Centers and aircraft facilities within the search area as well as to the AFRCC. FSS are the main point of contact for collecting and disseminating information about an overdue or missing aircraft which is not on an Instrument Flight Rules (IFR) flight plan and ARTCC are the main point of contact for aircraft with an IFR flight plan. Many general aviation aircraft are not on an IFR flight plan. The FSS will issue an ALNOT prior to the AFRCC starting a search and rescue mission.

If an airport falls within a municipality, the local police department may be contacted about the INREQ and requested to do a ramp check. As this is not a common occurrence there may be some question about what to do and the police department may contact the Sheriff's Office to speak with a SAR Coordinator. At that point the direction should be to check the airport ramp for an aircraft matching the description given. Any further investigation or actions should be coordinated with the State SAR Coordinator.

## **SAR Reimbursement from the State of Arizona**

To help ease the burden on County Sheriffs' Offices, the State of Arizona reimburses some eligible expenses that counties incur on SAR missions from the Governor's Office Emergency Fund. The following is a list of expenses that are eligible for reimbursement.

- Overtime pay for overtime eligible government employees.
- Cost of salaries or contracts for services of specialized personnel. Prior approval must be secured from the Arizona Division of Emergency Management, AZDEMA.
- Telecommunication expenses related to SAR missions.
- Cost of materials and supplies procured with public funds or taken from government stock which are consumed, lost, damaged, or destroyed on SAR missions.
- Rental costs of specialized equipment or aircraft provided that the rates do not exceed the lowest rates available for the same or similar equipment. Prior approval must be secured from AZDEMA for the rental of specialized equipment or aircraft for that cost to be eligible for reimbursement.
- Actual costs of fuel or lubricants paid for by the county government for the operation of vehicles, equipment, or aircraft.
- Repair to surface/subsurface vehicles and equipment damaged during SAR missions—restoration is limited to immediate pre-mission conditions.
- Reimbursement of recovery expenses should the subject of a SAR mission be found deceased. Reimbursement of recovery expenses of a subject suspected to be deceased may be authorized only with prior approval from AZDEMA.
- Recovery expenses of a suspected decedent when authorized by the Director of AZDEMA. Standards for the Director's discretion shall include

- The subject of the recovery mission is known or believed to be the object of a previous SAR mission.
- The nature and complexity of the search or rescue are within the capability, training, and experience of those who perform the mission.
- Foreseeable hazards that may be encountered are identified and can be mitigated.
- The proper assets, resources, and equipment are available for the mission.
- Searcher risks are minimized; associated risks are weighed against desired gain.
- An effective and reasonable plan with options is developed, detailing a projected time period and necessary expenses for the operation.
- The Director shall determine the eligibility of other expenses on a case-by-case basis.

Expenses that are not eligible for reimbursement through the state are:

- Regular salaries or wages of government employees.
- Salaries or wages of elected or appointed officials.
- Office supplies and equipment.
- Rental of administrative office space.
- Purchase of equipment or facilities.
- Cost of items of personal wearing apparel.

Expenses from SAR missions must first be borne by the agency conducting the mission. The agency can then submit eligible expenses to AZDEMA for reimbursement within 60 days of the close or suspension of the mission.

Claims for reimbursement require certification from the county sheriff or state agency. The certification shall include:

- The name of the claimant county Sheriff or agency.
- The date of the claim.
- The SAR mission number.
- The date, type of eligible expense, and the amount paid.
- A statement that the documents supporting the claim are available in the claimant agency for review by the State Auditor General or the auditor from AZDEMA.

The Sheriff is authorized to file claims for the claimant agency.

Counties are reimbursed at a rate of 50% for the first \$1000 spent, 75% for the next \$21,000, and 100% for expenses exceeding \$21,000 in a fiscal year.

## Workers Compensation Coverage for SAR Volunteers

In 1981 the State Workers Compensation Fund was amended to provide Workers Compensation coverage for SAR volunteers participating in a SAR operation with a SAR mission number.

For an actual SAR mission the coverage starts at the time of the call-out and continues until the volunteer has returned home without any major deviation in travel. If a volunteer is released from a mission and on the way home stops at a grocery store then the coverage ends then, the time the volunteer deviated from travel home.

For a SAR training mission the coverage is in effect at the training site only, and then just for the time specified by the SAR coordinator when the mission number was requested.

While the process to be followed if someone is injured on a SAR mission varies from county to county in every case AZDEMA requires early notification by telephone followed up by the written report.



## Liability in SAR Operations

Arizona has statutes that protect SAR volunteers from litigation provided that they have acted in good faith and did nothing that was grossly negligent.

The Arizona Good Samaritan Law, ARS 32-1471 states “*Health care provider or any other person; emergency aid; non liability. Any health care provider licensed or certified to practice as such in this state or elsewhere, or licensed ambulance attendant, driver or pilot as defined in ARS 41-1831, or any other person who renders emergency care at a public gathering or at the scene of an emergency occurrence gratuitously and in good faith shall not be liable for any civil or other damages as the result of any act or omission by such person rendering the emergency care, or as the result of any act or failure to act to provide or arrange for further medical treatment or care for the injured persons, unless such person, while rendering such emergency care, is guilty of gross negligence.*”

ARS 12-982 Qualified Immunity insurance coverage states:

- “A. A volunteer is immune from civil liability in any action based on an act or omission of a volunteer resulting in damage or injury if:
1. The volunteer acted in good faith and within the scope of the volunteer’s official functions and duties for a nonprofit corporation or nonprofit organization, hospital or governmental entity.
  2. The damage or injury was not caused by wilful, wanton or grossly negligent misconduct by the volunteer.
- B. Notwithstanding subsection A of this section, in any suit against a nonprofit corporation or nonprofit organization, hospital or governmental entity for civil damages based on the negligent act or omission of a volunteer, proof that the act or omission was within the scope of the volunteer’s official functions and duties is sufficient to establish the vicarious liability, if any, of the organization.”

The best way to avoid civil litigation is to do the right things and do the right things right. Quality training, good search management practices, and detailed documentation are key to avoiding litigation related to SAR operations.

*The best way to avoid civil litigation is to do the right things and do the right things right.*

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

- 2.1.** Discuss the role and responsibilities of the AZ State SAR Coordinator.
- 2.2.** Identify the SAR expenses that are, and are not, eligible for reimbursement through the state.

### Quizzes

- 2.3.** The entity responsible for missing person searches in Arizona is (a) AFRCC. (b) County

Sheriff. (c) AZDEMA. (d) Arizona Department of Public Safety.

- 2.4.** The entity responsible for missing aircraft searches in Arizona is (a) CAP. (b) AFRCC. (c) County Sheriff. (d) AZDEMA.

**2.5.** Expenses from SAR missions must first be borne by the agency conducting the mission. (a) True. (b) False.

- 2.6.** After expenses from SAR missions are paid by the agency conducting the mission, the agency must submit eligible expenses to AZDEMA for reimbursement within how many days of the close

or suspension of the mission? (a) 15. (b) 30. (c) 45. (d) 60.

**2.7.** AZ State Workers Compensation Fund covers SAR volunteers participating in a SAR operation whether or not a SAR mission number is issued. (a) True. (b) False.

**2.8.** AZ State Workers Compensation Fund covers SAR volunteers participating in a SAR train-

ing mission from the time the volunteer leaves for training until the volunteer has returned home without any major deviation in travel. (a) True. (b) False.

**2.9.** If a volunteer is injured on a SAR mission then AZDEMA (a) Is not notified. (b) Is notified as a courtesy. (c) Is notified by telephone followed by a written report.



## Route and Location Searches

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## CHAPTER 3

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### Initial Actions Overview

In any search and rescue incident the initial actions set the stage for the rest of the incident. Although around 97% of all SAR incidents are resolved in the first 24 hours, good quality initial actions are extremely important to optimize the outcome. Actions taken during the first few hours often dictate the outcome of the incident. Search is an unknown emergency at an unknown location.

*Actions taken during the first few hours often dictate the outcome of the incident.*

Once the Incident Commander for the Initial Response phase of the incident has been identified—usually called the Initial Response Incident Commander (IRIC)—the initial missing person report must be evaluated appropriately to determine the type of response that is needed. Initial Actions include investigation, scenarios, containment, and the hasty search.<sup>1</sup>

A useful acronym that dictates the order of initial actions is ICS. In addition to standing for Incident Command System, discussed in Chapter 12 on page 116, ICS stands for **I**nvestigate, **C**ontain, **S**earch. The order SCI is a recipe for disaster.

*ICS is an acronym that dictates the order of initial actions—**I**nvestigate, **C**ontain, **S**earch.*

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#### Section 3.1

### Investigation and Interviewing

Once the initial report is received the investigation begins and continues until the incident is concluded. Investigation can easily be overlooked in favor of field operations, but to do that is a serious mistake.

Good investigation allows the Initial Response Incident Commander to allocate field resources in the best and most efficient ways. It is critical to develop a fairly accurate picture of what is occurring or has occurred—and that is done by investigation. A report of a missing or overdue person can be just that, but it could be the result of a criminal act or an intentional disappearance. The initial investigation determines whether only law enforcement resources are used or whether volunteer SAR resources are also employed. Investigation is critical to the success of a SAR operation. It must not be overlooked.

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<sup>1</sup> A Job Action Sheet for the Initial Response Incident Commander can be found in Table 38.1 on page 335.

*Investigation is critical to the success of a SAR operation.  
It must not be overlooked.*

There is a wealth of investigative material available. Chapter 4 on page 54 describes important considerations and sources for investigators.

### Lost Person Questionnaire (LPQ)

The dispatch center is the most common source of the initial missing person report and the dispatchers generally gather basic information about the nature of the call and details of the reporting party. A SAR Coordinator or law enforcement officer should then follow up with the reporting party to complete a lost person questionnaire, LPQ.<sup>2</sup> The LPQ serves as a guide for collecting important search data including

- The subject's name and description.
- The subject's experience level.
- Any potential complications.
- The last known position/place last seen.
- A trip itinerary.
- Any known equipment carried.
- Other valuable information.

This form must be included in the incident documentation file. At this point it is worth considering whether a dedicated investigator be assigned to the incident to collect and analyze information about the subject(s) and the situation. An Investigation Checklist is reproduced in Chapter 34 on page 278 and is also available in the software program Win CASIE III, discussed in Section A.7 on page 363. This guide aids the investigator in gathering the important information needed during a search.

### Search Urgency Rating Chart

As the information is gathered a Search Urgency is determined using the Search Urgency Rating Chart shown in Table 33 on page 276. This chart can be easily completed in Win CASIE III and imported into the incident documentation. Every incident requires an immediate response, but response does not necessarily mean deploying resources into the search area. The Search Urgency rating is used to help decide on the level of response to the incident. On the one hand it might indicate that an urgent situation exists necessitating one type of response, while on the other hand it might indicate that the situation is less urgent but requires additional investigation.

*Every incident requires an immediate response, but response does not necessarily mean deploying resources into the search area.*

### Missing Person Flyer

The information collected on the LPQ is used to create a Missing Person Flyer, such as the ones in Figure 3.1 on the next page. This flyer is distributed to the media and by the searchers to the public in order to maximize awareness of the incident. Many valuable tips are received as a result of media attention and the posting of missing person flyers. A missing-person-flyer template is available as a Microsoft® Word document in ICS-SAR (see Section A.4 on page 360).

<sup>2</sup> There are many acronyms used in SAR. They are collected together in Chapter 40 on page 352.

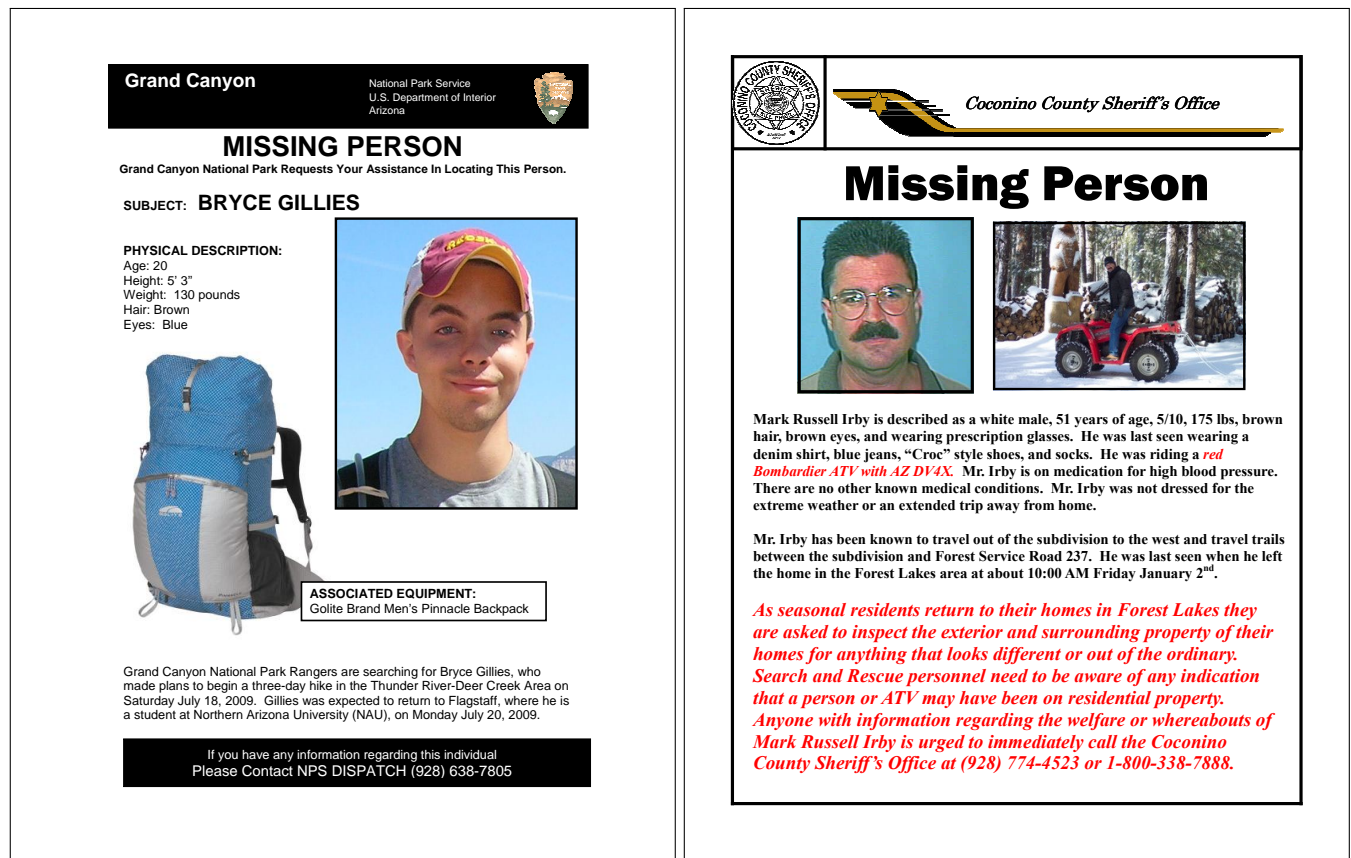


Figure 3.1. Missing person flyers

## Initial Planning Point

Once the Last Known Position, LKP,<sup>3</sup> or Place Last Seen, PLS, is identified, it must be protected and treated as a crime scene. Either the LKP or PLS is selected as the Initial Planning Point, IPP, which is the hub of the search. After the IPP is established it is not changed, even though new LKP's and PLS's may emerge.

Many valuable clues can be discovered at LKP's and PLS's, which may be related to a criminal event. Preventing the contamination of the LKP's and PLS's is very important so that clues can be properly documented and investigated. They can be crucial to the search and to the prosecution of any crime. Many times there is foot track or scent evidence that can be used by search resources to determine a direction of travel.

## Section 3.2 Scenario Analysis

Once the investigative part of the incident is underway, the Incident Commander tries to make an educated guess as to what might have happened to the missing subject by creating different scenarios. This helps to focus on

- Where to search.
- How to search.
- What containment and attraction techniques are needed.

<sup>3</sup> These terms are discussed in Section 4.3 on page 59.

When creating scenarios and establishing containment, the Lost Person Behavior, LPB, category should be considered. Typically lost subjects are divided into different categories, such as

- Children (1 to 3 years)
- Children (4 to 6 years)
- Children (7 to 12 years)
- Youths (13 to 15 years)
- Climbers
- Despondents
- Elderly
- Hikers
- Hunters
- Miscellaneous
- Fishermen
- Skiers
- Walkaways

Then within each category there is data that can be very useful, such as how the subject behaved when lost, how far they were found from the IPP (as the crow flies), and so on.

There are many sources of Lost Person Behavior data one of which is found in Table 32.1 on page 264, and is also in Win CASIE III for easy reference.

Whichever source is used for LPB it should be identified and documented in the incident file. It is important to remember that the subject of this search is not yet part of the LPB data set. This subject's behavior may deviate markedly from other members of the subject's group.

*It is important to remember that the subject of this search is not yet part of the LPB data set. This subject's behavior may deviate markedly from other members of the subject's group.*

The State of Arizona is developing LPB information specific to this state from the information collected on the AZDEMA SARFORCE database. It is very important to future search missions that the information collected in the field is accurate and complete so that the best Arizona LPB profiles are developed. The latest Arizona LPB distance traveled data is shown in Table 32.2 on page 271. For example, this table shows the distance that 75% of lost children between 1 and 3 years old, were found from the IPP, as the crow flies—1.03 miles—an extremely useful piece of information.

A good approach to understanding what might have happened to the missing subject is to create a Scenario—a plausible story—that suggests what they did after leaving the IPP. Scenarios should

1. Fit with known facts, in particular what is contained in the LPQ and the investigative report.
2. Be a real possibility.
3. Be in general agreement with Lost Person Behavior characteristics.
4. Take into account the terrain.
5. Suggest where the missing person might have gone and how they got there.

Scenarios constitute an important part of the initial action process and need to be documented. This is discussed in more detail in Chapter 5 on page 66.

## Searching For Subjects with Autism

The National Autism Association has compiled a SAR checklist when the missing subject is autistic ([http://www.awaare.org/docs/NAA\\_AWAARE\\_LEASHEETCHECKLIST.pdf](http://www.awaare.org/docs/NAA_AWAARE_LEASHEETCHECKLIST.pdf)), as has the Autism Safety Project ([http://www.autismsafetyproject.org/site/c.kuIVKgMZIx/b.5058459/k.987A/Search\\_and\\_Rescue.htm](http://www.autismsafetyproject.org/site/c.kuIVKgMZIx/b.5058459/k.987A/Search_and_Rescue.htm)).<sup>4</sup> Their suggestions are summarized here.

<sup>4</sup> These links are no longer active. The website <https://www.autismspeaks.org/information-law-enforcement> and the document <http://nationalautismassociation.org/docs/BigRedSafetyToolkit-FR.pdf> contain similar suggestions.

### Searching For Subjects with Autism Checklist

- Treat each case as **CRITICAL**. Children with autism generally have an impaired sense of danger and often die very quickly.
- Interview and listen to caregivers, they know best the areas their subject may be seeking.
- Ask if the subject wears a personal tracking device—if so, immediately initiate tracking measures.
- **SEARCH WATER FIRST**. Immediately dispatch personnel to nearby bodies of water. Ask about any pools, rivers, ponds, . . . , in the area that the child may be especially drawn to.
- Ask about other dangers that the subject may be attracted to: busy roads/highways/construction sites, . . . , and immediately dispatch personnel to secure those areas.
- Find out if there has been anything that has attracted the attention of the subject within the past 24 hours. Have they been obsessed with a location or object, at a location, within that time?
- Ask about the subject's likes that may assist in search efforts. Are they drawn to certain music, favorite characters, fire trucks, . . . ?
- Ask about subject's dislikes and fears or sensory issues that may hinder search efforts. (Dogs, Sirens, Aircraft, Lights, Shouting.).
- Ask if the subject responds to his/her name when called.
- On many searches the autistic person has hidden from searchers.
- Remember that someone with Autism most likely does not experience fear. Do not discount searching any location that a reasonable person would not enter.
- Immediately implement Reverse 9-1-1 (A Child is Missing).
- Issue an Endangered Missing Alert.
- Make sure that the Incident Commander understands the degree of Autism they are dealing with. It makes a difference in dealing with the subject when located.

Once the subject is found:

- Maintain a calm and relaxed environment.
- Speak in a normal tone of voice using simple phrases.
- Bring caregiver to the recovery site as quickly as possible.
- Avoid the use of restraints.

### Searching For Subjects with Alzheimer's

Subjects who have Alzheimer's Disease (AD) and are missing, should not be referred to as "missing persons" but as "endangered individuals". Because 50% of those not found within 24 hours perished and because the behaviors of lost persons with AD are so unusual, it is critical to begin the search as soon as possible. These incidents are true emergencies.<sup>5</sup>

### Unusual Behaviors When Lost

Individuals with AD behave very differently after they become lost. The most striking differences are

- They do not ask for help, often not even realizing that they are lost.
- They do not respond to searchers, even those who are in very close proximity and calling their names.

<sup>5</sup> This material is extracted, with permission, from "Missing Incidents in Persons with Alzheimer's Disease: Current Research and Search Strategies" by M. Rowe, C. Greenblum, G. Pulyak, G. Saunders, and T. L'Herrou, *The Police Chief* 78 (November 2011): 66–70. [http://www.policechiefmagazine.org/magazine/index.cfm?fuseaction=display\\_arch&article\\_id=2536&issue\\_id=112011](http://www.policechiefmagazine.org/magazine/index.cfm?fuseaction=display_arch&article_id=2536&issue_id=112011) accessed on November 2, 2012.

- Some seclude or hide themselves and remain secluded until they are found or they die of exposure.
- There is an inability to problem solve even in the most familiar environments. When found, they often act as if nothing is wrong and attempt to hide the fact that they are lost or confused.

### **Locations Most Often Found**

Among those who leave on foot, the large majority will continue to walk in the community close to the IPP. About 40% are found within 1 mile of the IPP, and almost 90% are found within a 5-mile radius. The locations the individuals are most often found, in descending frequency, are

- Their own neighborhoods.
- Standing, sitting, or walking down streets or highways.
- In businesses.
- In health-care institutions.

These results highlight the importance of both a community notification system, such as reverse 9-1-1, and of driving patrols within a 5-mile radius of the IPP. While most of the individuals were found during daylight hours, about 1/4 were found during the night, underscoring the importance of continuing the search during the nighttime hours, particularly with driving patrols.

### **Seclusion in Natural and Difficult-to-Find Areas**

There is a tendency for some individuals to seclude themselves in unpredictable and dangerous ways. A small subset of those who are missing decide to hide or seclude themselves in areas that would be unusual for an older adult to go. Most often, for just under 90% of the individuals this was in natural areas such as the woods, fields, ditches, ravines, or parks. In urban settings, locations included abandoned structures, roofs, and closets. Once in these locations, individuals often further conceal themselves by covering themselves or crawling into tight spaces of cover such as bushes in natural areas or vents in building structures. Generally they remain secluded until found or until they die of exposure. This behavior is associated with a high death rate; more than 2/3's of these individuals died, usually as a result of exposure or drowning. Those dying by exposure can potentially be saved if found earlier. It is critical to include these areas in a comprehensive search strategy.

### **Rapid Submitting to Drowning and Exposure**

As mentioned earlier 50% of those not found within 24 hours were found dead. After 5 to 6 days, almost all were found dead unless they received some help, for instance as a John or Jane Doe in a hospital. The most effective search strategy is searching on foot; research has repeatedly demonstrated that the large majority of these individuals are found either by a walking Good Samaritan or searcher. Although helicopters and search dogs are frequently used, they are rarely responsible for a discovery. Because an older adult cools quickly, helicopters are most successful immediately after the person is missing and is still discoverable with heat-seeking technology. Most typically helicopter searchers find individuals who have drowned in a body of water.

### **Good Samaritans: An Important Adjunct to the Search**

Good Samaritans are critical in assisting persons with AD who are lost in the community; they find about 40% of these missing individuals. These include passersby who are concerned, as well as businessmen and postal workers. A community notification alert can facilitate the activity in this important group.



## Dispelling Search Myths

Two suggestions that are commonly heard regarding searches for persons with dementia are to search in the direction of the handedness of the lost individual (that is, toward the right for right handers) and to identify barriers as persons with AD will stop when they reach a barrier and have to turn. Two of the authors recently conducted a study to test these two hypotheses. In the case of the “direction of handedness” suggestion, they found there was no such pattern. In the case of the “barrier” suggestion, they concluded that “identifying barriers where individuals would get stuck as a locating strategy likely would not be effective”.

## What Does This Mean for the Responding Officer?

Search efforts for the lost person with AD should be initiated immediately. It is critical to find individuals before they enter secluded areas where it is difficult to search and death is likely. In particular while interviewing and investigative tasks are important, as is a search of the subject’s current residence, these should not delay the initial search efforts.

The initial search should extend 1 mile from the IPP. In particular all accessible areas within a 1-mile radius should be searched, with most areas requiring a rapid foot search. This includes around nearby houses; inside easily accessible buildings; and a quick search of streets, highways, and footpaths.

Ensure that a familiar person is in the residence in the event of a successful find or return and that the primary caregiver is reachable by phone during the search. A community notification bulletin should be considered early in the search rather than later.

If the search efforts in the 1-mile radius are not productive, quick search activities should be expanded out to a maximum 5-mile radius from the IPP. These efforts should continue to include driving and walking patrols in nearby neighborhoods, roadways, and walkways. Community notification alerts and media involvement should be considered, because almost 40% of lost persons with AD are found by Good Samaritans.

During this extended search, a more intensive search of natural areas within a 1-mile radius of the IPP should be conducted. Almost 90% of the time, persons with AD who died while lost were found within 1 mile of the IPP. Trained ground-sweep teams can begin to search these areas as soon as they arrive and can include trained dog teams (both air scent and tracking when possible), if rapidly available. Ensure that teams search the woods, brush, fields, the water; and abandoned spaces such as cars and buildings, taking into account the unusual behaviors of lost persons with AD. Search teams cannot assume that an older person would not go into an area because it is dense or difficult. There have been many searches that have located a person in just such unreasonable areas.

Plan the search so that every inch of natural area has been inspected visually or on foot because these individuals are known to hide effectively. In the authors’ research and search experience, when the body of a lost AD person was eventually discovered, it was almost always in an area where searchers had been but had not found the individual.

### Section 3.3

## Searching For Children

Searching for a lost child is very emotional—for the relatives, for the search management team, and for the searchers. Although managing a search for a child is, in many ways, no different from that for an adult, there are different issues that need to be considered.

In addition to categorizing lost children by age, they also need to be categorized by whether or not they have Special Needs. To quote from [https://en.wikipedia.org/wiki/Special\\_needs](https://en.wikipedia.org/wiki/Special_needs),

*“In the United States, special needs is a term used in clinical diagnostic and functional development to describe individuals who require assistance for disabilities that may be medical,*

*mental, or psychological. . . . Types of special needs vary in severity. People with autism, Down syndrome, dyslexia, blindness, ADHD, or cystic fibrosis, for example, may be considered to have special needs.”*

### Investigative Checklists

Figures 3.2 and 3.3 constitute an Investigative Checklist, created by the National Center for Missing & Exploited Children® (NCMEC), that can be used in a traditional missing child incident. The checklist can be downloaded from [http://www.missingkids.com/en\\_US/publications/NC88.pdf](http://www.missingkids.com/en_US/publications/NC88.pdf).

Figures 3.4 and 3.5 constitute an Investigative Checklist, created by NCMEC, that can be used in a search for a missing child with special needs. The checklist can be downloaded from [http://www.missingkids.com/en\\_US/publications/NC55.pdf](http://www.missingkids.com/en_US/publications/NC55.pdf).

### LPQ for Missing Children with Special Needs

Figures 3.6 through 3.9 constitute an LPQ for Missing Children with Special Needs, created by NCMEC, that can be used in a search for a missing child with special needs. The LPQ can be downloaded from [http://www.missingkids.com/en\\_US/publications/SpecialNeeds\\_Questionnaire.pdf](http://www.missingkids.com/en_US/publications/SpecialNeeds_Questionnaire.pdf).

### National Center for Missing & Exploited Children®

When the subject of a search is a child, then requesting resources from NCMEC should be considered. The NCMEC website is <http://www.missingkids.com/> and their phone number is 1-800-THE-HELP® (1-800-843-5678). There is no charge for their services, which, through Team Adam, range from reproducing and distributing missing person flyers to searching landfills. See <https://esp.missingkids.org/content/dam/missingkids/pdfs/publications/nc170.pdf> for more details.

The NCMEC manual “Missing and Abducted Children: A Law-Enforcement Guide to Case Investigation and Program Management”, mentioned in these documents, can be downloaded from <https://www.missingkids.org/content/dam/missingkids/pdfs/publications/nc74.pdf>.

## Section 3.4 Containment

Once the IPP has been determined and the investigation is continuing, possible scenarios have been discussed and evaluated, then the initial search area must be contained. Containment serves to detect and limit the search subject’s movements because a small geographic area is easier to search than a large one. Containment can be physical or virtual. Physical containment includes the use of

- Trail blocks.
- Road patrols.
- Track traps, etc.

Virtual containment includes

- Leaving voice mail messages, text messages, email messages, and notes on cars or residences.
- Checking with transportation companies.
- Checking with hospitals or jails, etc.

If appropriate, containment can be combined with attraction to catch the subject’s attention. This is discussed in more detail in Chapter 6 on page 72.

## INVESTIGATIVE CHECKLIST FOR FIRST RESPONDERS



This Checklist is meant to provide a framework of actions, considerations, and activities that may assist in performing competent, productive, and thorough missing/abducted-children investigations.

### First Responder

- ☐ Activate patrol-vehicle-mounted video camera, if circumstances warrant, when approaching the scene to record vehicles, people, and anything else of note for later investigative review.
- ☐ Interview parent(s)/guardian(s)/person who made the initial report.
- ☐ Confirm the child is in fact missing.
- ☐ Attempt to verify the child's custody status.
- ☐ Identify the circumstances of the missing episode.
- ☐ Determine when, where, and by whom the missing child was last seen.
- ☐ Interview the individuals who last had contact with the child.
- ☐ Identify the child's zone of safety for his or her age and developmental stage.
- ☐ Make an **initial assessment**, based on the available information, of the type of incident whether nonfamily abduction; family abduction; runaway; or lost, injured, or otherwise missing.
- ☐ Obtain a **detailed** description of the missing child, abductor, and any vehicles used.
- ☐ Secure photos/videos of the missing child/abductor, and don't forget photos that may be available on cell phones.
- ☐ Evaluate whether the circumstances meet **AMBER Alert™ criteria** and/or other immediate community-notification protocol if not already activated. Discuss plan activation with supervisor.
- ☐ Evaluate whether the circumstances warrant requesting the National Center for Missing & Exploited Children®'s (NCMEC) Team Adam. If a Child Abduction Response Team (CART) is in the area, does the child's case meet their activation criteria?
- ☐ Relay detailed descriptive information to communications unit for broadcast updates.
- ☐ Determine need for additional personnel including investigative and supervisory staff.
- ☐ Brief and bring up-to-date all additional responding personnel.
- ☐ Identify and separately interview everyone at the scene. Make sure their interview and identifying information is properly recorded. To aid in this process, if possible, take pictures or record video images of everyone present. Video cameras affixed to patrol vehicles may be helpful with this task.
  - ☐ Note name, address, home/business phone numbers of each person.
  - ☐ Determine each person's relationship to the missing child.
  - ☐ Note information each person may have about the circumstances surrounding the missing episode.
  - ☐ Determine when/where each person last saw the child.
  - ☐ Ask each one, "What do you think happened to the child?"
  - ☐ Obtain names/addresses/phone numbers of the child's friends/associates and other relatives and friends of the family.
  - ☐ Determine if any suspicious activity or people were seen in the area.
  - ☐ Determine if any people were seen who seemed unusual, strange, or out-of-place.
- ☐ Continue to keep communications unit apprised of all appropriate developing information for broadcast updates.
- ☐ Obtain and note permission to search home or building where incident took place **even if the premises have been previously searched by family members or others.**
- ☐ Conduct an immediate, thorough search of the missing child's home **even if the child was reported missing from a different location.**
- ☐ Seal/protect scene and area of the child's home, including the child's personal articles such as hairbrush, diary, photos, and items with the child's fingerprints/footprints/teeth impressions, so evidence is not destroyed during or after the initial search and to help ensure items that could help in the search for and/or to identify the child are preserved. Determine if any of the child's personal items are missing. If possible, photograph/take videos of these areas.
- ☐ Evaluate the contents and appearance of the child's room/residence.
- ☐ Inquire if the child has access to the Internet and evaluate its role. Do not overlook activity on social-networking websites and teen chatlines.
- ☐ Ascertain if the child has a cell phone or other electronic communication device and obtain the most recent records of their use.
- ☐ Extend search to surrounding areas and vehicles, including those that are abandoned, and other places of concealment such as abandoned appliances, pools, wells, sheds, or other areas considered "attractive nuisances."
- ☐ Treat areas of interest as potential crime scenes including all areas where the child may have been or was going to be located.
- ☐ Determine if surveillance or security cameras in the vicinity may have captured relevant information. This information may be used to help locate the child and/or corroborate or refute witness statements.
- ☐ Interview other family members, friends/associates of the child, and friends of the family to determine
  - ☐ When each last saw the child.
  - ☐ What they think happened to the child.
  - ☐ If the child had complained about being approached by anyone.

Figure 3.2. Investigative Checklist—Page 1

- [ ] Review sex-offender registries to determine if registered individuals live/work in the area or might otherwise be associated with the case. Call NCMEC toll-free at 1-800-THE-LOST® (1-800-843-5678) to request assistance with this step.
- [ ] Ensure information regarding the missing child is entered into the National Crime Information Center's (NCIC) Missing Person File no more than two hours after receipt of the report and any information about a suspected abductor is entered into the NCIC Wanted Person File. Carefully review NCIC categories before entering the case, and be sure to use the Child-Abduction flag whenever appropriate.
- [ ] Prepare flier/bulletin with the child/abductor's photo and descriptive information. Distribute in appropriate geographic regions. Call NCMEC toll-free at 1-800-THE-LOST (1-800-843-5678) for assistance with this step.
- [ ] Prepare reports/make all required notifications.

#### Supervisory Officer

- [ ] Obtain briefing and written reports from the first responding officer and other personnel at the scene.
- [ ] Decide if circumstances meet the protocol in place for activation of an **AMBER Alert** and/or other immediate community-notification systems if not already activated.
- [ ] Determine if additional personnel are needed to assist in the investigation.
- [ ] Establish a command post away from the child's residence.
- [ ] Determine if additional assistance is necessary from
  - [ ] State/Territorial Police.
  - [ ] Missing-Children Clearinghouse.
  - [ ] Federal Bureau of Investigation (FBI).
  - [ ] Specialized Units.
  - [ ] Victim-Witness Services.
  - [ ] NCMEC's Project ALERT®/Team Adam.
  - [ ] CARTs.
- [ ] Confirm all the required resources, equipment, and assistance necessary to conduct an efficient investigation have been requested and expedite their availability.
- [ ] Ensure coordination/cooperation among all law-enforcement personnel involved in the investigation and search effort.
- [ ] Verify all required notifications are made.
- [ ] Ensure all agency policies and procedures are in compliance.
- [ ] Be available to make any decisions or determinations as they develop.
- [ ] Use media including radio, television, and newspapers to assist in the search throughout the duration of the case.

#### Investigative Officer

- [ ] Obtain briefing from the first responding officer and other on-scene personnel.
- [ ] Verify the accuracy of all descriptive information and other details developed during the preliminary investigation.
- [ ] Initiate a neighborhood canvass using a standardized questionnaire.
- [ ] Obtain a brief, recent history of family dynamics.
- [ ] Correct and investigate the reasons for conflicting information offered by witnesses and other individuals.
- [ ] Collect article(s) of the child's clothing for scent-tracking purposes.
- [ ] Review and evaluate all available information and evidence collected.
- [ ] Secure the child's latest medical and dental records.
- [ ] Contact landfill management and request they delay or at least segregate garbage and dumping containers from key investigative areas in cases where it is suspected there may be imminent danger to the missing child.
- [ ] Develop and execute an investigative plan.
- [ ] Conduct a criminal-history background check on all principal suspects, witnesses, and participants in the investigation.
- [ ] Determine what additional resources and specialized services are required.
- [ ] Ensure details of the case have been reported to NCMEC.
- [ ] Prepare and update bulletins for local law-enforcement agencies, missing-children clearinghouse, FBI, and other appropriate agencies.
- [ ] Establish a phone hotline for receipt of tips and leads. Consider establishing an e-mail address and other methods of electronically receiving leads as well.
- [ ] Establish a leads-management system to prioritize leads and help ensure each one is reviewed and followed up on. **Note:** NCMEC has developed software, named the Simple Leads Management System, designed to manage and prioritize leads associated with missing-child investigations. It is available at no cost by calling NCMEC's Missing Children Division toll-free at 1-800-THE-LOST (1-800-843-5678).

This "pocket guide" is adapted from and to be used as a supplement to *Missing and Abducted Children: A Law-Enforcement Guide to Case Investigation and Program Management*. That guide contains additional investigative Checklists and materials. To request a free copy or technical assistance for specific cases, call **NCMEC at 1-800-THE-LOST (1-800-843-5678)**. This project was supported by Grant No. 2013-MC-FX-K001 awarded by the Office of Juvenile Justice and Delinquency Prevention, Office of Justice Programs, U.S. Department of Justice. This document is provided for informational purposes only and does not constitute legal advice or professional opinion on specific facts. Information provided in this document may not remain current or accurate, so recipients should use this document only as a starting point for their own independent research and analysis. If legal advice or other expert assistance is required, the services of a competent professional should be sought. Points of view or opinions in this document are those of the author and do not necessarily represent the official position or policies of the U.S. Department of Justice. Copyright © 2004, 2006, and 2011 National Center for Missing & Exploited Children. All rights reserved. National Center for Missing & Exploited Children®, 1-800-THE-LOST®, and Project ALERT® are registered trademarks of the National Center for Missing & Exploited Children. NCMEC Order #88.

**Figure 3.3.** Investigative Checklist—Page 2

## INVESTIGATIVE CHECKLIST FOR LAW ENFORCEMENT WHEN RESPONDING TO MISSING CHILDREN WITH SPECIAL NEEDS



This Checklist is meant to enhance the response measures taken by law enforcement to safely recover missing children with special needs and is to be used in conjunction with the *Missing Children With Special Needs* addendum and *Missing Children With Special Needs Lost-Person Questionnaire*.

### Call-Intake Questions

Public-safety telecommunicators are encouraged to **immediately** obtain the information listed below and provide it to all first responders. Additionally they are encouraged to **immediately** contact the National Center for Missing & Exploited Children® at 1-800-THE-LOST® (1-800-843-5678) to ensure resources, including search-and-rescue experts, are immediately deployed at the onset of the incident.

- ☐ Is the child wearing or carrying any tracking technology device? If so, which one and how is location information accessed?
- ☐ Is the child attracted to water? If so, can the child swim?
- ☐ Is the child attracted to active roadways/highways?
- ☐ Does the child have a fascination with vehicles such as trains, heavy equipment, airplanes, or fire trucks?
- ☐ Has the child wandered away before? If so, where was he or she found?
- ☐ Does the child have a sibling with special needs? If so, has that sibling wandered away before? If so, where was the sibling found?
- ☐ Where does the child like to go? Does the child have a favorite place?
- ☐ Is the child nonverbal? How will the child likely react to his or her name being called?
- ☐ Will the child respond to a particular voice such as that of his or her mother, father, other relative, caregiver, or family friend?
- ☐ Does the child have a favorite song, toy, or character? If so, what or who is it?
- ☐ Does the verbal child know his or her parents' names, home address, and phone number?
- ☐ Does the child have any specific dislikes, fears, or behavioral triggers?
- ☐ How might the child react to sirens, helicopters, airplanes, search dogs, people in uniform, or those participating in a search team?
- ☐ How does the child respond to pain or injury?
- ☐ What is the child's response to being touched?
- ☐ Does the child wear a medical ID tag?
- ☐ Does the child have any sensory, medical, or dietary issues and requirements?
- ☐ Does the child rely on any life-sustaining medication?
- ☐ Does the child become upset easily? If so, what methods are used to calm him or her?

### The Initial Response

- ☐ Identify hazards in the area where the child was last seen and dispatch personnel to those locations to search for the child, paying special attention to any bodies of water and specific locations of interest to the child such as his or her favorite places.
- ☐ Secure identified hazardous areas near where the child was last seen to prevent the child from entering those areas.
- ☐ Determine if the child was wearing/carrying a tracking device and, if so, immediately initiate tracking measures to locate the child.
- ☐ Determine if the child is frightened by aircraft, dogs, ATVs, or any other resources used to assist in searches. Remember using search dogs at the onset of the initial response will better ensure successful tracking.
- ☐ Determine if the child is sensitive to or frightened by noise and how he or she will typically react to that type of noise.
- ☐ Establish containment measures of the child's known routes to prevent him or her from wandering further away from the place last seen using all appropriate means such as road, bike, and air patrol.
- ☐ Contact the National Center for Missing & Exploited Children without delay to request assistance from their search-and-rescue and search-management experts.
- ☐ Ensure the lead agency is using the services of a reverse 911 system, such as A Child Is Missing Alert at [www.achildismissing.org](http://www.achildismissing.org). This service helps alert the local community via a rapid-response, neighborhood-alert program using high-tech phone systems.
- ☐ Determine if an Endangered Missing Child Alert has been issued.

### Investigative Measures

- ☐ Contact the child's parent/guardian to further assess the child's special-needs condition.
- ☐ Determine if the child has any history of wandering or eloping and, if so, where and what physical features associated with those episodes may have attracted the child.
- ☐ Identify additional physical features the child may be attracted to such as roadways/highways, trains, heavy equipment, fire trucks, park swings, and road signs.
- ☐ Determine if the child has any favorite places.
- ☐ Determine if the child has a favorite song, toy, or character.

Figure 3.4. Investigative Checklist for Children with Special Needs—Page 1

- [ ] Determine if the child has any dislikes, fears, or behavioral triggers and, if so, how he or she will typically react to negative stimuli.
- [ ] Determine how the child reacts to sirens, dogs, vehicles used in searches, and people of authority/in uniform. Children with autism will sometimes avoid search teams or attempt to hide in small places.
- [ ] Determine the communication abilities of the child regarding verbal versus nonverbal skills.
- [ ] Determine if the child will respond to his or her name when being called.
- [ ] Determine if the child knows his or her parents' names, home address, and phone numbers.
- [ ] Determine if the child has any other mental or physical conditions.
- [ ] Determine if the child has any dietary issues or requirements.
- [ ] Determine if the child is taking any medications, and, if so, the type of medications, risks involved with delayed or missed doses, and potential side effects if the medication is not taken as prescribed.
- [ ] Determine if the child wears a medical identification bracelet or tag.
- [ ] Determine how the child responds to pain or injury.
- [ ] Determine the child's response to being touched.
- [ ] Determine what methods are used to calm the child.

#### Search and Rescue Measures

- [ ] Preserve the place the child was last seen.
- [ ] Use search-and-rescue personnel accustomed to the existing geography whether urban, suburban, or rural.
- [ ] Provide a detailed briefing to search-and-rescue personnel arriving on scene about the behaviors of the missing child.
- [ ] Consider using the National Center for Missing & Exploited Children's *Missing Children With Special Needs Lost-Person Questionnaire*.
- [ ] Initiate search-and-rescue efforts with an emphasis on bodies of water, high-hazard areas, travel corridors, routes to favorite places, previous locations visited, and any other areas of interest suggested by those who know the child.
- [ ] Attempt to attract the child by using his or her favorite things such as playing a favorite song or driving a favorite type of vehicle into the search area.
- [ ] Use night-search techniques, if appropriate, such as projected lights and patterns, especially spinning patterns, or other types of favorite visuals to attract the missing child. **Note:** Be aware night searches could be hazardous to the child if the terrain includes dangers such as cliffs, drop offs, mine shafts, or bodies of water. Attempting to draw a child into these areas could lead to tragic consequences if these are not identified by searchers and secured prior to using attraction devices.
- [ ] Extend search duration because the unique behaviors of some children with special needs may have a protective effect allowing the child to survive longer than what is considered to be a normal survival rate for a child.
- [ ] Evaluate the overall effectiveness of the search operations, in the event of a prolonged search, and adjust as necessary for the next operational phase to include immediate and long-range resources and logistical requirements for deployment of those resources.
- [ ] Determine if there are any gaps in the original search area and make arrangements to search those areas again.
- [ ] Consider using trained search-and-rescue personnel with volunteer searchers to enhance the search capabilities.

#### Recovery and Reunification Measures

The considerations noted below are recommended to deescalate and/or minimize any heightened emotions or anxieties the child may experience at the time of recovery.

- Maintain a calm and relaxed environment.
- Contain the child in a passive way to keep him or her from running or bolting and avoid use of restraints.
- Bring a parent or guardian immediately to the recovery site, whenever possible, and tell the child that person is on the way.
- Approach the child at his or her level, kneeling if necessary, and speak in a normal tone of voice using simple phrases.
- Use a task-and-reward process to ease anxiety and enhance compliance using phrases such as, "First we are going to stay here, and then your father is going to come here."
- Avoid assuming the child understands everything being said and done at the recovery scene.
- Use communication aids, written instructions, drawings, or prompts if possible.
- Use humor and familiar topics when possible. For instance if the child is wearing a shirt with a cartoon character on it, talk to the child about the character to help lessen any anxiety the child may be feeling and calm the child if upset.
- Check for any identification such as a medical bracelet or tracking device.
- Contact the National Autism Association for further reunification assistance at 1-877-622-2884.

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**Figure 3.5.** Investigative Checklist for Children with Special Needs—Page 2



## Missing Children With Special Needs Lost-Person Questionnaire

This questionnaire should be used in conjunction with the National Center for Missing & Exploited Children's *Missing Children With Special Needs* addendum and *Investigative Checklist for Law Enforcement When Responding to Missing Children With Special Needs* available at the Resources for Law Enforcement section of [www.missingkids.com](http://www.missingkids.com).

For immediate assistance with the search for a missing child call the National Center for Missing & Exploited Children at 1-800-THE-LOST® (1-800-843-5678).

Incident Name		Today's Date		Time	
Interviewed By			Case Number		
<b>Lost Person</b>					
Full Name			DOB		Sex
Home Address				Zip + 4	
Home Phone			Cell Phone		
<b>Physical Description</b>					
Height	Weight	Age	Build	Eye Color	
Hair		Glasses			
Distinguishing Marks (scars/moles/tattoos/piercings)					
Overall Appearance					
Photo Available		Y <input type="checkbox"/>	N <input type="checkbox"/>	Where?	
<b>Next of Kin</b>					
Name					
Address					
Home Phone			Cell Phone		
Relationship to Subject					
<b>Close Friend</b>					
Name					
Address					
Home Phone			Cell Phone		
Name					
Address					
Home Phone			Cell Phone		
<b>Place Last Seen</b>					
Time	Where			How	
Seen by Whom					
Weather Conditions at Time Last Seen					
Current Weather Conditions					
Direction of Travel Last Seen					

Figure 3.6. LPQ for Children with Special Needs—Page 1



Reason for Leaving				
Mood (confident, confused, other)				
Comments				
<b>Clothing/Equipment</b>				
	<b>Style</b>	<b>Color</b>	<b>Size</b>	<b>Other</b>
Shirt/Sweater				
Pants (Belt)				
Hat				
Rain Gear				
Gloves				
Shoes				
Sole Pattern				
Jacket				
Additional Clothing				
Tracking Device				
<b>Family Doctor/Pediatrician</b>				
Name				
Office Address				
Office Phone		Cell Phone		
Other Contact Information				
<b>Caregiver</b>				
Name				
Address				
Home Phone		Cell Phone		
<b>School</b>				
Name				
Address				
Teacher's Name				
Phone Number				
<b>Outdoor Experience</b>				
Familiar With Area				
Ever Lost Before		Y <input type="checkbox"/>	N <input type="checkbox"/>	When
Where				
<b>Health/General Condition</b>				
Overall Health				
Overall Physical Condition				
Known Medical/Dental Problems				
Handicaps/Deformities/Prosthetics				
Known Psychological Problems				

Figure 3.7. LPQ for Children with Special Needs—Page 2

Medication		
Dosages		
Medication Side Effects		
<b>Witness Information</b>		
Name		
Home Address		
Home Phone	Cell Phone	Relationship
Witness Comments		
<b>Actions Taken</b>		
By Family/Friends		
Results		
Others		
Results		
Comments		

**Additional Information For Children With Autism  
To Address Immediate Life Saving Efforts**

Tracking Technology Device Worn/Carried		Y <input type="checkbox"/>	N <input type="checkbox"/>
If So, How Are Tracking Measures Initiated			
Child Attracted to Water	Y <input type="checkbox"/>	N <input type="checkbox"/>	If Specific Body of Water, Which One
Child Able to Swim	Y <input type="checkbox"/>	N <input type="checkbox"/>	
Child Attracted to Roadways/Highways	Y <input type="checkbox"/>	N <input type="checkbox"/>	If Specific, Which One(s)
Child Attracted to Trains	<input type="checkbox"/>	Heavy Equipment	<input type="checkbox"/> Airplanes <input type="checkbox"/> Fire Trucks <input type="checkbox"/>
Other Vehicles, Specify			
Child Wandered Before	Y <input type="checkbox"/>	N <input type="checkbox"/>	
Where Found			
Child Have Siblings With Special Needs	Y <input type="checkbox"/>	N <input type="checkbox"/>	
Sibling Wandered Before	Y <input type="checkbox"/>	N <input type="checkbox"/>	
Where Found			
Favorite Places/Locations			
Child Verbal	<input type="checkbox"/>	Nonverbal	<input type="checkbox"/>
Reaction When Name Called			
Responds to Voice of Mother	<input type="checkbox"/>	Father	<input type="checkbox"/> Other, Specify
Favorite Song			
Favorite Toy			
Favorite Character			
Knows Parents' Names	<input type="checkbox"/>	Home Address	<input type="checkbox"/> Phone Number <input type="checkbox"/>
Other Contact Information, Specify			
Dislikes			

**Figure 3.8.** LPQ for Children with Special Needs—Page 3

Fears	
Behavioral Triggers	
<b>Reaction to</b>	Sirens
	Aircraft
	Canines/Search Dogs
	People in Uniform/Searchers
Response to Pain/Injury	
Response to Being Touched	
Wears Medical ID Tag   Y <input type="checkbox"/> N <input type="checkbox"/>	
Sensory, Medical, Dietary Issues/Requirements	
Methods Used to Calm Child Once Upset	
Special-Needs Conditions	

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**Figure 3.9.** LPQ for Children with Special Needs—Page 4

### Section 3.5

## Hasty Search

After the IPP has been established, containment is in place, and the investigation is ongoing, the hasty search portion of a Route and Location Search is started. LPB must also be considered at this point. During the hasty search the routes and locations of high probability, arising from the most likely scenarios, are searched. These areas generally include

- Roads and trails.
- Utility corridors.
- Other travel aids.
- Areas of known hazard.
- Areas of attraction (likely spots) for the subject.
- Locations where subjects are historically found.

Hasty search team members

- Are clue-aware searchers that are capable and prepared for the assignment.
- Must be self-sufficient for 24 hours and have appropriate communications systems to receive and relay information between the team and the Incident Commander.
- Must have maps so that they can be spatially aware of the area and can relate the location of any clues found to the type of surrounding terrain.

The appropriate tactics should be selected, and the teams should be briefed, based on the search information available at that point. Search tactics vary depending on the category of subject that is being sought and whether that subject is believed to be responsive, unresponsive, or evasive. An adult may react to their name being called whereas a child might be scared of strangers and so not react. Developmentally disabled and dementia patients may react in unpredictable ways to searchers so the investigator should be consulted to determine the best tactic to be used in this search.

Typically the hasty and extended search phase lasts from 12 to 24 hours, or until it is believed that the subject is no longer mobile, in which case the search transitions to an Area Search. Even after that point hasty tactics may still be employed, such as using a tracking team if a set of tracks is located during an area search.

The actions of the hasty search teams must be well documented. An easy way to record hasty search team assignments and actions is the use of the Initial Note<sup>6</sup> in Win CASIE III.

During the initial response phase of a search, the Incident Commander must plan for the next Operational Period. This must be done carefully and thoughtfully because searches that continue beyond this phase can escalate rapidly out of control. The plan not only details the additional field resources required, but it also specifies which of the Incident Management Team positions are to be filled. The Incident Action Plan, IAP, which is designed specifically for this purpose, is discussed in detail in Chapter 13 on page 130.

## Acronyms

There are many acronyms used in SAR, and they are collected together in Chapter 40 on page 352. The ones used most frequently during the initial response phase of a search are

- IAP—Incident Action Plan.
- ICS—Incident Command System.
- IPP—Initial Planning Point.
- LKP—Last Known Position.
- LPB—Lost Person Behavior.
- LPQ—Lost Person Questionnaire.
- PLS—Place Last Seen.

## Initial Response Outline

### Initial Response Outline

1. Start investigation and create lost person flier.
2. Determine search urgency.
3. Identify and protect IPP.
4. Determine direction of travel.
5. Consider LPB characteristics.
6. Construct scenarios.
7. Identify areas of high probability.
8. Contain the subject.
9. Hasty search the areas of high probability.
10. Document everything.
11. Plan for the next Operational Period.

A very detailed Initial Response Checklist can be found in Chapter 35 on page 280.

<sup>6</sup> See Section A.7 on page 364 for an example of an Initial Note.

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

- 3.1.** Explain to a layman the difference between physical and virtual containment of the search area.
- 3.2.** What are the Initial Response Objectives?

### Quizzes

- 3.3.** The correct order of events during the initial actions of an incident is (a) Search, Contain, Investigate. (b) Contain, Search, Investigate. (c) Contain, Investigate, Search. (d) Investigate, Contain, Search.
- 3.4.** The percentage of all searches resolved in the first 24 hours is about (a) 70%. (b) 80%. (c) 90%. (d) 97%. (e) 100%. (f) None of the previous answers.
- 3.5.** In SAR, the letters “IPP” stand for (a) Individual Planning Point. (b) Integrated Planning Procedure. (c) Initial Planning Point. (d) Initial Planning Place.
- 3.6.** Typically the IPP is updated as the search progresses. (a) True. (b) False.
- 3.7.** The Initial Planning Point is the location in a search incident (a) Where the initial planning is done. (b) Of the first LKP or PLS. (c) Where the pre-plan is created. (c) Where the plan is created.
- 3.8.** The Missing Person Flyer is created from the (a) IPP. (b) LKP. (c) PLS. (d) LPQ. (e) LPB.
- 3.9.** The LPB data is important because the subject’s behavior always follows what others in the same category have done in the past. (a) True. (b) False.
- 3.10.** There is a rule that determines when the end of the Initial Response is reached. (a) True. (b) False.
- 3.11.** The name of the plan that identifies the additional resources required for the next Operational Period is called the (a) Resource Plan. (b) Incident Commander Plan. (c) Incident Action Plan. (d) Overhead Team Plan.
- 3.12.** A missing-person-flyer template is available as a Microsoft® Word document in the program (a) ICS-SAR. (b) Win CASIE III. (c) Neither of these programs. (d) Both of these programs.

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## CHAPTER 4

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### Investigation and Interviewing

Good investigation and interviewing techniques set the tone for the entire search. Investigation as used in a search context is an ongoing process of gathering information about the missing subject and the circumstances under which they are missing. The initial investigation and its documentation are critical in locating the missing person. This process commences with the first report of the missing subject and is completed at the end of the search operation. It includes a post-incident interview with the found subject to determine what happened.

*The initial investigation and its documentation are critical in locating the missing person.*

The investigation can shed light on places the subject is likely to be found or not found and builds a profile of the missing person through interviews of friends, family, and acquaintances, criminal history, information on the internet (GOOGLE search, social networking sites, personal websites), financial information, medical history, cell phone use, and other information collected on a lost person questionnaire. This creates a better understanding of what the missing subject might do in a particular situation, which is critical for building scenarios (see Chapter 5 on page 66). Although the investigation process continues from the start of the incident to its end, the initial information influences the direction and urgency of the search.

There is a wealth of investigative material that can be mined for information about a search subject. A creative investigator can learn much about the search subject during the investigation by considering the wide variety of sources of information that can be accessed.

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#### Section 4.1

#### The Investigator

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In the early stages of an incident, the Incident Commander is likely to be the investigator, but as soon as possible a dedicated investigator should be identified. After that the Incident Commander and the Lead Investigator should anticipate additional investigative staffing. The Lead Investigator should be another law enforcement officer and preferably be a detective with access to specialized investigative databases.

## Interaction Between Investigations and the Incident Commander

It is critical that there is a good working relationship between the investigators and the Incident Commander in order to maximize the chances for a successful conclusion to the incident. On occasion the investigators may want to limit the access to the information and leads that they have developed. While there may be some information that needs to be withheld pending further investigation it is critical that there be regular communication between the Incident Commander, the Planning Section and the Operations Section Chiefs (if assigned),<sup>1</sup> on the one hand, and the Investigations Unit on the other. Ideally the Lead Investigator attends the Strategy and Tactics Meetings and the Planning Meetings, see Chapter 13 on page 130, to provide insight into the status of the investigation. Results of the investigation can have significant impact on the strategy and tactics being used in the search and withholding that information from the Incident Management Team can be very detrimental.

The Incident Management Team should be comprised of personnel that can be trusted to handle sensitive investigative information appropriately and know whether and how to properly disseminate that information to the searchers if required.

### Section 4.2 Initial Report and LPQ

A search for a lost or missing person is an emergency and should be treated with urgency.

## Initial Report

The response starts with the initial report where intelligence gathering is critical and can have a significant impact on the outcome of the search. The initial report (from a dispatcher or reporting party) contains information on what has happened and typically includes

1. Reporting party's name and contact information.
2. Name of missing person(s).
3. Identifying the place where the subject was last known to be.
4. Finding out what has happened and why a missing person report is made. It could include what the subject was doing, where they might have been going, and any plans or intentions they might have had.
5. Obtaining additional information. Was there anything different or unusual about the missing person's behavior? Was there anything happening in the area that might have influenced their behavior? Are there any particular domestic circumstances that are worth recording?
6. Obtaining weather conditions. What was the weather when the person first went missing? What is the weather now? What is the forecast?

## LPQ

The response continues with initiating a LPQ where the following information about the missing subject is obtained from the reporting party, who should be thoroughly interviewed.<sup>2</sup>

1. Name, age, gender, nickname.
2. Address.

<sup>1</sup> The Planning Section Chief and the Operations Section Chief are members of the overhead team. Their roles are discussed in Chapter 12 on page 116.

<sup>2</sup> If the Incident Commander is shorthanded, then the LPQ might be partially completed by a family member.



3. Physical description. The minimum information required includes height, build, racial type, facial appearance (beard or moustache, glasses, hair color, length and style) and any distinguishing marks or features.
4. Clothing worn. Style, make, and color of all clothing that the missing person was wearing, including footwear.
5. Items carried. This means either items relating to the activity that the subject was undertaking or personal effects. Give sufficient detail to enable an identification to be made if anything is found. Include such things as cell phone (if possible with number), personal locator beacon, satellite emergency notification device (SEND), money (how much?), ATM or credit cards, and keys. It might be necessary to check their home or room to get this information.
6. Capability/health/medication. This includes such things as:
  - a) The subject's level of mobility.
  - b) The distance they could travel.
  - c) Were they on regular medication? Have they got it with them? When did they last take it? When is their next dose due? What happens if they miss a dose?
  - d) Do they have full control of all their faculties?
  - e) Do they always behave rationally?
  - f) What would they most likely do in a stressful situation, such as being lost?
7. Habits/hobbies/interests/likely activities. Any information that could indicate what the subject might have been doing or where they might have gone.
8. Previous relevant history. Have they gone missing before? If they have when was it, where did it happen, what happened, and where were they found?
9. Identify the location of scent articles for dog handlers to collect when they arrive on scene. Whenever possible, allow the dog handlers to collect those items.

<b>SEPARATED PARTY QUESTIONNAIRE</b>	CASE # SAR #	DATE PREPARED: TIME PREPARED:	US PARK RANGER:
<b>REPORTING PARTY IDENTIFICATION</b>			
FIRST NAME:		STREET ADDRESS:	
LAST NAME:		CITY:	
RELATIONSHIP TO SUBJECT:		STATE/COUNTRY:	ZIP:
HOME PHONE #:		CELL PHONE #	
<b>SEPARATED PARTY INFORMATION</b>			
FIRST NAME:		STREET ADDRESS:	
MIDDLE NAME:		CITY:	
LAST NAME:		STATE/COUNTRY:	ZIP:
HOME PHONE #:		CELL PHONE #:	
DATE OF BIRTH:	AGE:	SEX:	HEIGHT:      WEIGHT:
HAIR COLOR:	EYES:	HAIR STYLE / LENGTH:	
COMPLEXION:		LANGUAGE:	
DISTINGUISHING MARKS:			
DISABILITIES/ ILLNESS/ INJURY:			
MEDICATIONS & ALLERGIES:			
MENTAL ATTITUDE:			
<b>CLOTHING/EQUIPMENT</b>			
TOP (TYPE & COLOR):		PANTS (TYPE & COLOR):	
OUTER WEAR / JACKET / SWEATER (TYPE & COLOR):			
HAT (TYPE & COLOR):		WHAT ARE THEY CARRYING:	
<b>POINT LAST SEEN</b>			
TIME LAST SEEN:		DATE LAST SEEN:	
POINT LAST SEEN:			

VEHICLES: (LOCATION, DESCRIPTION, PLATES, KEYS):  INTENDED ROUTE:  CURRENT / PREDICTED WEATHER / HAZARDS:  COMMENTS/ NOTES: (DISPOSITION/PERSONALITY, RELATIONSHIP WITH SPOUSE/FAMILY/FRIENDS):  AVAILABILITY OF PHOTOGRAPH(S) & LOCATION
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Figure 4.1. NPS Separated Party Questionnaire, AKA the “Short” form

There are several LPQ's available in Win CASIE III (see Section A.7 on page 363), ICS-SAR (see Section A.4 on page 360), and in the document section of SARAZ.ORG (see Section A.6 on page 363). Select a suitable LPQ and use it. Figure 4.1 on the previous page shows a typical LPQ—this one from the NPS. The NPS uses two LPQ forms—the “Short” form and the “Long” form. The Short form is the Separated Party Questionnaire form and is used when a report of a missing person initially comes in. If the person is not found quickly, then the Short form feeds into the Long form.

The investigator should maintain contact with the reporting party. As clues develop the investigator may need to be able to authenticate those clues. Additionally there are always more questions to ask as the investigation continues. Finally, notifications about the status of the search may need to be made (subject located healthy, injured, or dead; subject not located).

*The investigator should maintain contact with the reporting party.*

## Lost Subject Self-Reports By Phone

With the increased usage of cell phones, more and more subjects are reporting themselves lost via a cell phone. Interviewing these subject requires a different mind set from interviewing a typical reporting party.

### Interviewing Lost Subject By Phone Checklist

1. Location
  - a) Where did you start from? How long ago?
  - b) Where is your vehicle?
  - c) What does your vehicle look like (make/model/color/plate)?
  - d) What was your destination?
  - e) What does the terrain around you look like? Are you in pines, cactus, wash, landmarks?
  - f) Can you take a photo of your current view plus any shots of your route, and then send by cell phone?
  - g) Can you see the city or lights?
  - h) Can you tell where North is?
  - i) Can you describe what you can see by turning through 360 degrees?
  - j) What is the weather like where you are?
  - k) What time did you start hiking?
  - l) How long have you been hiking?
  - m) Describe the route you took to where you are?
  - n) Did you follow a trail or go cross country?
  - o) Were there any significant points along the way?
  - p) Can you hear anything (traffic/waterfall)?
  - q) Is there anyone we can contact to inform and reassure them of your circumstances? (This will enable you to find out more about the lost subject.)
2. Preparedness
  - a) How much food and water do you have?
  - b) How much food and water have you consumed?
  - c) How long were you planning to be out?
  - d) How much experience do you have?
  - e) What gear do you have, foot wear?

- f) Do you have a light source? Can you signal aircraft or searcher?
- g) Can you make fire or shelter?
- h) Cell Phone number, send text if no answer.
- i) What kind of cell phone (model)?
- j) Carrier?
- k) Tracking capability?
- l) GPS/PLB/SPOT? ID/Provider?
- m) Cell phone battery life?
- 3. Medical
  - a) What is your chief complaint (mechanism of injury, nature of illness)?
  - b) What is your current condition? Can you walk? Can you move? Self help? Treat?
  - c) What is your level of pain 1—10, 1 being no pain.
  - d) Do you have any allergies?
  - e) What is your medical history?
  - f) What medications are you taking?
- 4. Detectability
  - a) What is your description?
  - b) Clothing description? Shoes and prints?
  - c) Can you take a cell phone photograph of your shoe print and send it to us?
  - d) Will we be able to see you?
  - e) Can you signal aircraft or searcher? Do you have a smart phone or camera?
  - f) Can your phone give GPS coordinates?

### Search Urgency Rating Chart

While the LPQ data is being acquired, it is important to determine the urgency of the incident, because that dictates the level of the response. Table 33 on page 276 shows a means of determining the urgency.

#### Demonstration—Using Search Urgency Rating Chart

*On a Friday in July at about 0900 hours, Mr Leathwhite called 911 to report that his healthy 2-year old son is missing from their campground in the White Mountains. He was last seen dressed in only a diaper, with no shoes or top. The current weather is overcast with a temperature of 50 °F. Forecast is for heavy thunderstorms later in the day with a high of 75 °F. Bear tracks were found near the camp site the previous day. Use Table 33 on page 276 to determine the urgency rating for this incident.*

#### Answer: Urgency Rating

Age Of Subject: Very Young (1).

Medical Condition Of Subject: Healthy (3).

Number Of Subjects: One (1).

Subject Experience Profile: Not experienced, does not know area (1).

Weather Profile: Past and/or existing hazardous weather (1).

Equipment Profile: Inadequate for environment and weather (1).

Terrain/Hazard Profile: Known hazardous terrain or other hazards (1).

Urgency Rating = 1 + 3 + 1 + 1 + 1 + 1 + 1 = 9.

## Section 4.3

## Place Last Seen, Last Known Position, Initial Planning Point

The place where the subject was last seen or known to be is either the Place Last Seen (PLS) or the Last Known Position (LKP).

The **PLS**, Place Last Seen, is the location where the missing subject was actually seen by another person. The **LKP**, Last Known Position, is the last known location of the missing subject determined by physical evidence such as a vehicle, a discarded object, or a footprint. Initially one of these is the hub of the search, and is called the **IPP**, Initial Planning Point, being the first LKP or PLS that is relevant. Note, as the search progresses, the PLS and LKP can change, whereas the IPP does not. The IPP is important, not only because it is the hub of the search, but also because it is the point from which all statistical data is measured, such as that shown in Tables 32.2 to 32.3 on pages 271–273.

If the IPP is a PLS then include the name of the person who made the sighting together with the date and time last seen and any other information that may be of use, such as the answers to the following questions.

- How did they know it was the missing person?
- What were the circumstances of the sighting?
- What was the missing person's direction of travel?
- What did they have with them?
- What condition did they appear to be in?
- Were they alone?

Note that there may be an element of uncertainty about a PLS. Did the person who made sighting know the missing person? How close were they? What was the level of visibility?

Because of the importance of the IPP the following suggestions should be observed.

- Protect the IPP from further disturbance by taping it off for the following reasons.<sup>3</sup>
  - It may yield valuable information to a trained tracker, for example a direction of travel.
  - If a crime is suspected then the IPP needs to be investigated by detectives from a criminal investigations division.
- Do not locate the Incident Command Post directly at the IPP.
- The Incident Commander should visit the IPP in case there is something of significance that others have missed.

Note: If there is no IPP then there is no focus for search operations. Search operations cannot be effectively undertaken until that focus is determined.

*If there is no IPP then there is no focus for search operations.*

## Crime Scene Considerations

Many valuable clues can be discovered at LKP's and PLS's, which may be related to a criminal event. Preventing the contamination of the LKP's and PLS's is very important so that clues can be properly documented and investigated.

While not very frequent a missing/overdue person case can turn into a criminal investigation. In that case the clues located by investigators and searchers are not only relevant to the search but may also be evidence used in a criminal prosecution. Proper handling of this evidence is critical. During the briefing to searchers the protocol for handling evidence should be reviewed.

<sup>3</sup> If additional PLS's and LKP's are discovered as the search progresses, these too should be protected from further disturbances.

## Disseminate Initial Information

The information collected on the LPQ, together with a current photograph of the subject, is used to create a Missing Person Flyer, such as the ones in Figure 3.1 on page 38. This flyer is distributed by the Public Information Officer (PIO) to the media (TV, radio, and print news), telephone 911 reverse, and to neighbors, and by the searchers to the public in order to maximize awareness of the incident. Many valuable tips are received as a result of media attention and the posting of missing person flyers. A missing-person-flyer template is available as a Microsoft® Word document in ICS-SAR (see Section A.4 on page 360).

## Interview and Interrogation

Non-criminal interviewing for SAR should contain a combination of both open and closed interviewing techniques. It can be conducted by any experienced and trained SAR personnel but whenever possible law enforcement should be leading the interview.

Open-ended interviewing contains questions that cannot just be answered with a simple “Yes” or “No”, but requires more description and allows the person being interviewed to expand on the question with their own thoughts and words. This can be helpful in learning more information about the lost person and can lead to follow-up questions by the interviewer. For open-ended interviewing to be effective the interviewer needs to be an active listener. An active listener is one who hears not only what the subject says but allows the subject to finish speaking before clarifying the answer or asking further questions. It encourages the subjects to finish their thought process for each question and be an active participant in the interview. Be careful not to ask leading questions.

Closed-ended interviewing, “Just the facts Ma’m”, contains direct fact-finding questions such as biographical descriptions of the lost person. This information may need follow-up questions without encouraging the subject’s personal thoughts or feelings. This line of questioning is useful in getting the subject back on track if the interview starts losing direction.

Before ending the interview it is important to ask the person being interviewed if there is anything that the interviewer did not ask that is important for the interviewer to know in order to find the missing person.

At the completion of the interview the subject interviewed should feel that they have been helpful. This can be done by ending the interview with asking what they think happened to the lost person and where they think the searchers should be looking. The goal of the interview is to glean as much uncontaminated information as possible.

*The goal of the interview is to glean as much uncontaminated information as possible.*

If a group is encountered it is a best practice to interview each member of the group individually so that the information received from each member is not tainted by hearing the opinions of the other members of the group.

Some critical questions to ask during an interview are the 5 W’s and How.<sup>4</sup>

1. What occurred?
2. Why did it occur?

<sup>4</sup> “I keep six honest serving-men  
(They taught me all I knew);  
Their names are What and Why and When  
And How and Where and Who.”  
Rudyard Kipling “Just So Stories” (1902)

3. Who did it occur to?
4. When did it occur?
5. Where did it occur?
6. How did it occur?

The interview should be conducted in the most comfortable setting possible and away from distractions so that the interviewer and the person being interviewed can focus on the questions and the answers.

In addition to the answers provided by the interviewee it is also important to note their body language. If it appears that the person being interviewed is uncomfortable by certain questions it is important to note that. The interviewer might consider telling the interviewee that even though there might be some uncomfortable or embarrassing information discussed, that information might be very helpful in locating the missing person, which is the objective. The interviewer can reassure the person being interviewed that the information will be not be widely disseminated beyond the personnel that need to know for search planning and investigation.

Personnel conducting the interview may be trained investigators (law enforcement officers or detectives) or may be SAR volunteer personnel encountering potential witnesses in the field. SAR volunteer personnel should be trained on the proper way to document the interview. Often experienced SAR personnel know what questions to ask but sometimes fail to document the interview appropriately. If possible, record the interview with a digital audio recorder. In the field personnel may not be carrying digital recorders so taking good notes is essential. Ideally these notes should be written on an ICS 214 form, see Section 36 on page 311, and turned in during the debriefing. It is also very important for the interviewer to, at a minimum, document the time of the interview, the location, the name of the person being interviewed, and their contact information (phone numbers, home addresses, email addresses, and travel plans). If it is possible to get the date of birth of the interviewee that is helpful for the investigator to complete the report. The personal information collected about the person being interviewed allows the Incident Investigator to conduct follow-up with that person if needed.

## Investigation Tools

There are many tools at the disposal of the investigator.

### Clue Manager

Much data can be generated by searchers and investigators during the incident. It is easy for some clues to be overlooked simply due to the volume of information. One tool to assist the Incident Management Team and the investigator is the Clue Manager software, see Section A.1 on page 358. That software allows for efficient tracking and documentation of clues located in the field or during investigations. An investigator should periodically review the Clue Manager reports to track the status of clues and follow up on any unresolved clues.

### Cell Phones

Cell phones are an excellent investigative tool that can assist in narrowing the search area. Each cellular company has their own requirements and capabilities but in general they can provide information from the last cell tower used and when that happened. They can tell if the phone is powered on or off and in some cases they can provide coordinates. It takes less power to text and so thought should be given to attempting a text message when low or no power is a possibility. Additional specialized cell phone forensic assistance is available through the CAP and the U.S. Marshals Service. Cell phones are discussed extensively in Chapter 16 on page 156.

## Digital Photographs

Increasingly outdoor users are taking digital photographs of their activities with devices that encode geo-tags into the metadata of the photograph.

For example, many photos taken with smartphones will have the location of the photo in the metadata unless the user has turned off the geotagging feature in the smartphone camera settings. This can be an important clue to establish the PLS or LKP if it is unknown to the reporting party, but the reporting party either received or found a digital photo taken by the subject of the search. In order to analyze the data, the investigator will need the digital photograph file and not a screen shot of the photo from a phone or camera. If possible, the reporting party should forward the digital photograph file to the investigator via email or SMS. The investigator can then save the file on their smartphone or computer to be able to load it into the website or app to analyze the data.

There are several free apps and websites that allow for uploading a photo in order to extract the metadata such as exifinfo.org and Exif Metadata app in the Apple App Store among others. Once a photo is uploaded to the website or app the available metadata is displayed with can include the location of the photo (in latitude and longitude), the type of camera or smartphone, the camera settings, and the date the image was taken. All of this data can be valuable for the investigation to establish a PLS or LKP and validate other information already collected.

Figure 4.2 is a screenshot from the Exif Metadata app showing the image being analyzed and the date it was taken. Figure 4.3 is a screenshot from the Exif Metadata app showing the location information of the device when it took the photograph. Figure 4.4 is a screenshot from the Exif Metadata app showing details about the camera make and model that took the photograph. This information may be useful in case a phone/camera is found while searching in order to authenticate the clue.

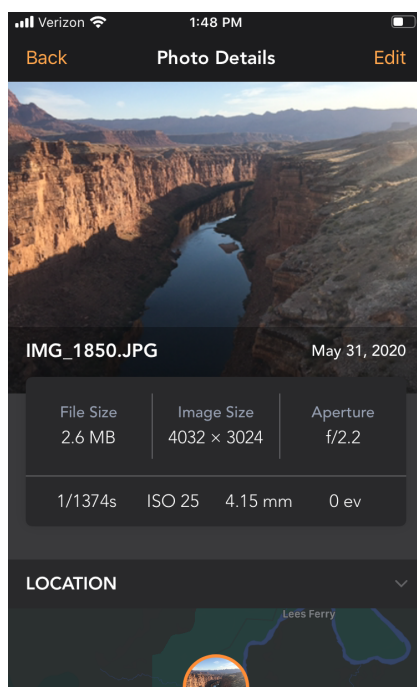


Figure 4.2.

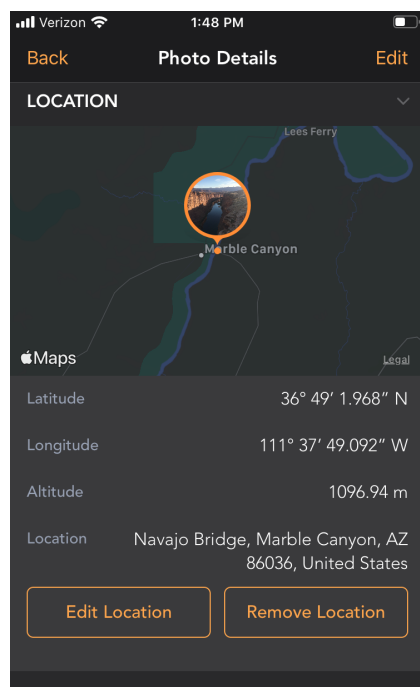


Figure 4.3.



Figure 4.4.

## Vehicle Based Assistance Systems

Many vehicles have a vehicle assistance feature such as OnStar<sup>®</sup> for GM vehicles, SafetyConnect<sup>®</sup> for Toyota vehicles, Starlink<sup>®</sup> for Subaru vehicles, mbrace<sup>®</sup> for Mercedes-Benz vehicles, among others.



An aftermarket system called Hum is offered by Verizon. These systems are subscription based and allow the user to summon assistance including emergency assistance. Many systems can also be used to help locate the vehicle in the event that it is stolen, involved in an abduction, or involved in some other emergency, and will also summon assistance automatically if it detects that the vehicle has been involved in a collision.

### The Internet

The internet is of great value in conducting investigations as it provides access to much data and data sources. It is fairly easy to find photographs, legal proceedings, phone numbers, social networking information, and employer information regarding a missing person, by using an internet search engine. Other entities that may be of value in conducting an investigation also have a web presence such as the courts, government offices, weather web sites (both current and historical information), earthquake monitoring centers, etc. Many law enforcement agencies have access to subscription databases that can yield a great deal of background information about the search subject. The appendix E on page 391 contains a list of useful websites for SAR investigations.

### Investigation Documentation

Once all the investigative information is gathered it needs to be analyzed and documented. The investigation report should be included in the incident file. If the investigative information yields clues that are pertinent to the search they can be recorded in Clue Manager to track their status.

In addition to its value in search planning, investigation gathers historical and statistical data that can be useful in future searches for similar subjects. The investigation report should include post-search information on the effectiveness of the resources utilized in locating the missing subject. In addition, the complete report of the investigation and the management of the search incident can later be incorporated into a training exercise.

### Interviewing People In The Field

If searchers encounter someone in the field then that person could have valuable information and should be interviewed. Searchers should identify themselves, explain the purpose of the search, and show the missing person flier containing a photo of the missing subject. See Figure 4.5.



**Figure 4.5.** Interviewing people in the field

The person should be asked to

- Describe where they have been.

- Describe any people that they have encountered in the area, including
  - A detailed description of the encountered people.
  - The time and location of the encounter.
  - The direction the encountered people were heading.
- Describe anything they noticed that was out of the ordinary.
- Supply their name and contact information, should follow-up questions be necessary.

All witnesses should be thanked for their assistance, and, if appropriate, be encouraged to proceed to the Incident Command Post for further interview.

Regardless of the importance of the information gathered, all responses should be documented on the Activity Log form ICS 214, see Section 36 on page 311, or a Clue Log form if available and appropriate, and relayed to the Incident Command Post.

## Multiple Subjects

When investigators start obtaining information about a missing subject, they should not overlook the possibility that there is more than one subject missing. If there is, the investigator should get answers to the following questions.

1. What are the chances that a group might stay together or split?
2. Which of the group members is likely to be more dominant?
3. How do the group members interact?

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

- 4.1.** Give at least two reasons why the IPP is important.
- 4.2.** Explain to a layman, the difference between LKP, PLS, and IPP.

### Quizzes

- 4.3.** The following is true regarding SAR investigations.
- (a) The Incident Commander decides whether an investigation is necessary.
  - (b) The investigation starts shortly after the initial resources are briefed.
  - (c) The investigation ends shortly after the initial resources are in the field.
  - (d) The investigation starts immediately and continues until the search concludes.
- 4.4.** Which of the following items directly influence the status of the Search Urgency?

- (a) Subject's age.
- (b) Weather profile.
- (c) Subject's medical condition.
- (d) All of the above.

**4.5.** In determining Search Urgency on a scale of 7 to 21,

- (a) A higher number indicates a higher priority.
- (b) A lower number indicates a higher priority.

**4.6.** There is no need for the investigator to remain in contact with the reporting party once the initial report and LPQ are completed. (a) True. (b) False.

**4.7.** It is good practice to locate the Incident Command Post at the IPP. (a) True. (b) False.

**4.8.** Search operations cannot be effectively undertaken if there is no IPP. (a) True. (b) False.

**4.9.** In an interview, open-ended questions are ones that can just be answered with a simple "Yes" or "No". (a) True. (b) False.

**4.10.** If a group is to be interviewed, it is good practice to interview them individually. (a) True. (b) False.

**4.11.** If SAR volunteers interview a potential witness in the field, they should record the information on ICS Form (a) 202. (b) 203. (c) 204. (d) 205. (e) 214. (f) None of these.

**4.12.** In SAR, the letters “PLS” stand for (a) Point Last Seen. (b) Person Last Seen. (c) Place Last Seen. (d) Please.

**4.13.** There are several LPQ’s available in the program (a) ICS-SAR. (b) Win CASIE III. (c) Neither of these programs. (d) Both of these programs.

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## CHAPTER 5

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### Scenario Analysis

This chapter<sup>1</sup> is an attempt to put on a formal basis, something that is usually done informally, (see Figure 5.1)—understanding what might have happened to the missing subject. It is important that this is done before making important decisions like

- Where to search.
- How to search—the resources and tactics to use.
- What containment and attraction techniques are needed.



**Figure 5.1.** Informal scenario creation

Predicting behavior is about generalities and not absolutes. How a person will behave in any given situation depends on a complex mix of factors: the situation and ambient conditions, their ability to cope with their possible current situation (character and personality), their general health and mental state, their capabilities (age) and limitations. Before developing scenarios a knowledge of these factors is needed. They come from the LPQ, map analysis, LPB statistics, and, to paraphrase Syrotuck in Reference [Syrotuck, page 21]: “*Putting yourself in the subject’s shoes*”.

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<sup>1</sup> This chapter is based on the work of Dave Perkins and Pete Roberts (Reference [Perkins 3]). Used with permission. Scenario Analysis as described in this chapter is completely different from the Scenario Analysis described in Reference [Hill 3].

A good approach to understanding what might have happened to the missing subject is to create a scenario that suggests what they did after leaving the IPP.

There are three components to good scenario construction.

1. Get the facts.
2. Make reasonable assumptions.
3. Fit them together.

These are considered in turn.

### 1. Get the facts

- a) The missing person's profile. Who is the subject of the search? What kind of person are they, their age, background, and health? This information is contained in the LPQ.
- b) The incident history. What did the missing person set out to do and what were they doing when last seen? This is contained in the investigative report.
- c) Map analysis. What kind of terrain is the subject in? Where are the hazards and what are they? What might act as a barrier or a likely spot (magnet)? Are there any well-defined routes that they might have followed? This involves local knowledge (so if possible involve someone who knows the area) and understanding and interpreting topo maps.<sup>2</sup>
- d) Lost Person Behavior information. Having decided on the category of the missing person then LPB information (see Chapter 32 on page 264) provides the following.<sup>3</sup>
  - The type of behavior that people in this category have exhibited.
  - The location that they were found in. Most categories of missing person tend to favor certain types of locations. By matching these with the map, likely places for the missing person can be identified.
  - The “as the crow flies” distance they were found from the IPP. This gives an idea of the possible size of the search area.

### 2. Make reasonable assumptions

- a) To paraphrase Syrotuck in Reference [Syrotuck, page 21]: *“Put yourself in the subject's shoes”*. *“If you were that age, that height, that frame of mind, and in that situation, what might you do?”*
- b) Activity or purpose. What might the missing person have done to take them away from the IPP?
- c) Direction of travel. Which direction would that activity take them from the IPP, bearing in mind any barriers, likely spots (magnets), and routes identified on the map?
- d) Destination. This could be a place that they set out to travel to, or a location from LPB information that is consistent with their direction of travel.

### 3. Fit them together

- a) The scenario should fit with the known facts—these are contained in the missing person's profile, the incident history, and features on the map.
- b) The scenario should be realistic. It should fit with the LPB information for this kind of person and this type of terrain rather than involving extraneous agencies and chance events.
- c) It is perfectly acceptable to have scenarios that take the missing person out of the immediate vicinity, for example they might have gone home or they might have had an accident and be in hospital.
- d) Routes and Locations. It helps to visualize the scope of the problem by drawing the scenarios on a map.

<sup>2</sup> For an introduction to contour lines, see Appendix B on page 367.

<sup>3</sup> It is important to remember that the subject of this search is not yet part of the LPB data set. This subject's behavior may deviate markedly from other members of the subject's group.

- i. Mark any travel aids that the scenarios suggest the missing person might have followed. Remember that there may be more than one route to get from the IPP to a possible destination.
- ii. Mark any locations and hazards suggested by these scenarios. These can be specific, for example a particular building, a well-known viewpoint, or general, for example the edge of a wood, a dry wash, a cliff face, or the shore of a lake.

The preferred method is to generate a number of scenarios rather than relying on one. How many scenarios should be generated? At least three, although five or six is usually better. More than that and there may be too many to handle. Less than that and some perfectly reasonable possibilities may be missed.

Good scenarios will include a direction of travel, a route, and a likely location. It may be that a number of scenarios cover a range eventualities that appear to contradict each other but this is perfectly possible—discount nothing, accept anything that is “reasonable”, and avoid fantasy.

Having constructed reasonable scenarios, two things need to be done.

1. Write down the details of each scenario.
2. Give each scenario a priority. Deciding where to search, what tactics to use, and where to assign resources is based on where the missing person is most likely to be. That comes from these scenario priorities.

Scenarios constitute an important part of the initial response and must be documented. See Figure 5.2 on the next page for a suggested form.

### Instructions for Completing Scenario Record Sheet, Figure 5.2

1. **Scenario Details.** Write down any scenarios that may describe what happened to the missing person. Write them in any order. Include the assumed state of the subject: mobile, immobile, responsive, unresponsive.
2. **Priority.** Give each scenario some indication of how likely it is that it describes what actually happened. Base the priorities on what is known about the missing person, information obtained from the map, local knowledge, and information from LPB characteristics. Use numbers to indicate priority (1 for the highest, 2 for next highest, and so on). Equally likely scenarios are given the same priority number.

Finally,

- Without scenarios the Incident Commander is doing little more than guessing where the missing person might be.
- All four information sources needed to create scenarios must be used—missing person profile, incident history, map analysis, and LPB information. If one is omitted the picture is incomplete.
- The generation of scenarios needs to be an established part of the incident management procedure.

### Demonstration—Creating Scenarios

*On a Sunday in July at about 0800 hours, Mrs John Fairbrother called 911 to report that her husband, a white male aged 50 years, and two other men left Phoenix early Saturday to search for the fabled Lost Dutchman Gold Mine. They should have returned the same evening, but they did not, and Mrs Fairbrother has heard nothing from her husband. John’s vehicle was discovered at the First Water trail head in the Superstition Mountains at 0900 hours. See Figure 6.3 on page 77. John had searched for the mine often, and was very excited about going back this time, more so than any time in the past. They were not prepared to spend the night in the wilderness. John weighs 300 pounds, has a heart condition, and routinely carries large amounts of cash. The other two men are Ben Duang (a male of Cambodian descent, aged 70 years, in good physical shape, been friends with John for 30 years,*

Scenario Record Sheet		
No.	Scenario Details	Priority
1		
2		
3		
4		
5		
6		
7		

Each scenario should contain possible route(s) and likely destination(s). Also the assumed subject's state: mobile, immobile, responsive, unresponsive.

Name	Signature	Date	Time
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**Figure 5.2.** Scenario record sheet

*unmarried), and Helmut Grässer (a white male aged 60 years, speaks with a German accent, unmarried, suffers from asthma, smokes Camel cigarettes, met John and Ben for the first time at a bar a week ago). Temperatures in the area are in the triple digits. Historically, searches for seekers of the Lost Dutchman Gold Mine resulted in most subjects being found off trail, but with no discernible location pattern. Describe possible scenarios that can reasonably account for the men's disappearance.*

### **Answer: Possible Scenarios**

Because of John's physical condition they would not have gone far, perhaps less than a mile, and because they were searching for the Lost Dutchman Gold Mine, they could be off trail.

1. All three subjects are alive and well. Initially they took either Dutchman's Trail or Second Water Trail. They became disoriented. They have either decided to sit in the shade and wait to be rescued or to try to find their own way back. They are mobile and responsive.
2. At least one subject is unwell or died accidentally. Initially they took either Dutchman's Trail or Second Water Trail. In scrambling off trail at least one of them was injured or died. One of the healthy ones is hiking out for help. The others are waiting to be rescued, in which case they are immobile and at least one is responsive. The person hiking out is mobile and responsive.
3. All subjects are unwell or died accidentally. Initially they took either Dutchman's Trail or Second Water Trail. In scrambling off trail all three were injured or died. If all three are dead, they are immobile and unresponsive. If any are alive and conscious, they are immobile but responsive.



4. All three subjects are alive and well. They found Lost Dutchman Gold Mine, and are so excited they have lost all track of time. They are mobile and responsive, although they may be evasive.
5. All three subjects are alive and well. They found Lost Dutchman Gold Mine, but are trapped inside. They are immobile and responsive.
6. Some or all are the object of foul play, either by someone within the party, or by unknown subjects.

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

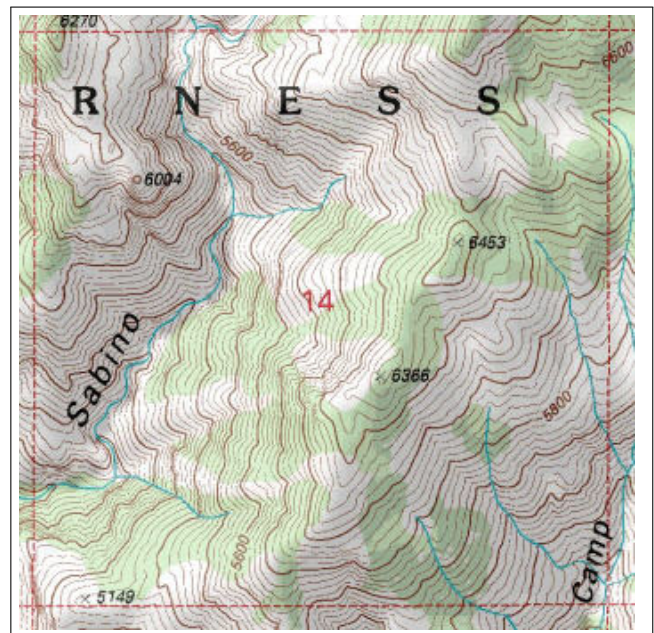
**5.1.** Explain to a layman the meaning and significance of a scenario.

**5.2.** What is the purpose of constructing scenarios?

**5.3.** What facts are needed before constructing scenarios?

**5.4.** Why should scenarios be constructed before deciding which resources and tactics to use?

**5.5.** Figure 5.3 is part of a topo map. Answer the following questions. (a) What is the contour interval? (b) Where are the steepest cliffs in this map? (c) What is the elevation of the highest contour in this map? (d) What are the elevations of the two highest benchmarks in this map? (e) Identify the ridges, gulleys and saddles associated with these two highest benchmarks. (f) Identify two neighboring hills with benchmarks that have no saddle between them.



**Figure 5.3.** Part of a map

**5.6.** The Agua Caliente Park covers 101-acres to the east of Tucson. It is rectangular in shape, 1100 yards by 450 yards. It is fenced and bordered by four roads, with a perennial warm spring. An artificial stream links together three ponds within the park, as do various footpaths. The ponds are fed by the spring water and support diverse wildlife and fish populations. There is parking and a picnic area alongside the main pond. Shade is supplied by mature palm trees and native mesquite trees. See Figure 5.4 on the next page and Figure 5.5 on the next page.

On September 11 2010, Amy and Don Jerkins and their three children, John (9 years), Martin (7 years), and Wendy (5 years), are feeding the ducks in the main pond. At 0930 hours, Amy realizes that Wendy is missing. She last saw her 5 minutes ago at the edge of the pond. The family

searched the area for 15 minutes with no success, and then called 911. You are the search coordinator on duty, and arrive 1000 hours.

Describe at least four possible scenarios that could reasonably account for Wendy's disappearance.



**Figure 5.4.** Aqua Caliente Park main pond, looking north

## Quizzes

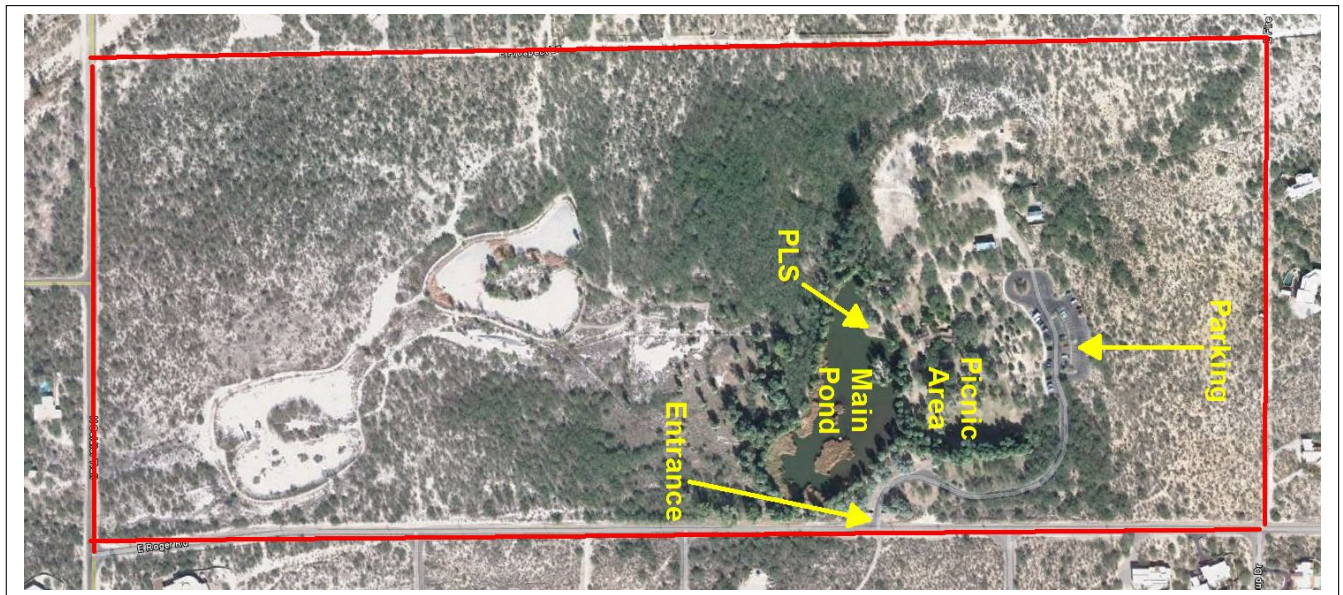
**5.7.** Scenarios should be created before (a) Deciding where to search. (b) The LPQ is started. (c) Any investigation takes place.

**5.8.** In constructing scenarios it is an acceptable practice to include extraneous agencies and chance events. (a) True. (b) False.

**5.9.** In constructing scenarios, it is perfectly acceptable to have scenarios that take the missing person out of the search area. (a) True. (b) False.

**5.10.** Scenarios constitute an important part of the initial response and must be documented. (a) True. (b) False.

**5.11.** When creating scenarios, which pieces of information must be used? (a) Missing person profile. (b) Incident history. (c) Map analysis. (d) LPB information. (e) All of the above.



**Figure 5.5.** Aqua Caliente Park area, ▲ North

We wanted to get out quickly and work on containment. This morning, we began to eliminate areas. We wanted to eliminate the high priority areas first.

*Tim Scott*

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## CHAPTER 6

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# Containment and Attraction

There are two different modes of searching, Passive and Active.<sup>1</sup> **Passive Searching** is where the searchers let the lost person come to them, for example a road block, or a resource placed at a high point with good visibility to constantly scan the terrain (a lookout). **Active Searching** is where the lost person is actively sought by resources committed by the incident management team, for example a hasty team. Both modes can be used simultaneously. This chapter deals with Passive Searching of which there are two main tactics, Containment and Attraction.

The purpose of **Containment** is to keep the lost subject within a specific area, and, if that fails, to know whether they have left the area. It assumes that the subject is Mobile.

The purpose of **Attraction** is to catch the attention of the lost subject causing them to either respond or walk out on their own. This is done by searchers producing some form of visible or audible signal. It assumes that the subject is Responsive.

If it is assumed that the subject is Immobile and Unresponsive then these techniques are not necessary,<sup>2</sup> although, if there are sufficient personnel for containment assignments, valuable witness information may still be captured from non-SAR personnel, such as campers, hikers, hunters, etc.

At this stage in the incident the IPP is known, the urgency of the incident has been assessed, and various scenarios, partially based on LPB, have been developed. Assuming the urgency dictates that a search occurs, then Containment and Attraction techniques are immediately put into play. However, whether a hasty search is initiated simultaneously depends on the incident. For example, if overdue persons in a canyon are reported at nighttime and the Incident Commander suspects that they are not in trouble but are delayed by weather conditions in the canyon, then containment teams are deployed (which then continue into the daytime), but hasty teams might be held back until the following morning to reduce the risk (for example, hazards). However, and this is more common, if the same incident is reported in the morning, then containment and hasty teams might be deployed almost simultaneously.

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### Section 6.1

## Containment

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The size of the potential search area can be estimated by making an educated guess as to how fast the person is traveling away from the IPP (their speed), and how long it has been since they left the IPP (their time). From these two numbers it is possible to find the distance that the subject has traveled (distance = speed  $\times$  time) away from the IPP. If the direction of travel of the subject is not known, then

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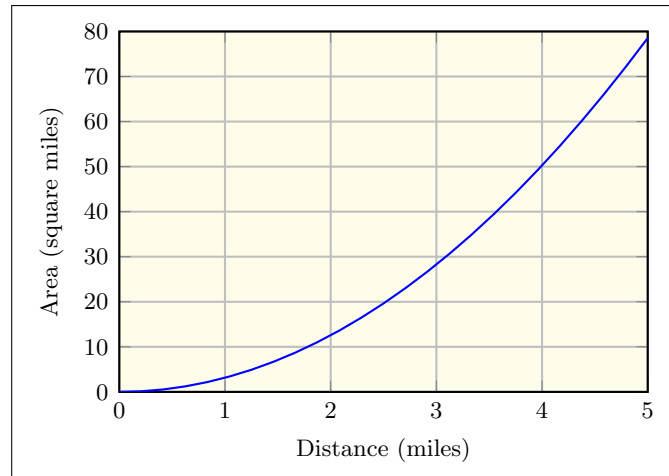
<sup>1</sup> Sometimes these are referred to as Indirect and Direct modes of searching.

<sup>2</sup> However, there are searches where the subject has been immobile for days, and then suddenly becomes mobile, in which case containment and attraction become critical again.



the potential search area is a circle with the IPP as center and with radius the distance the subject has traveled.

Figure 6.1 shows the potential search area in terms of the “as the crow flies” distance the subject has traveled from the IPP. This shows that, if nothing is done to contain the subject, the potential search area can get very large very quickly. Containment immediately limits how far the subject can travel without being detected.



**Figure 6.1.** Potential search area versus distance from IPP

Thus, the Incident Commander tries to create a ring of searchers around the area containing the subject, so that the subject cannot leave that area without being detected, thereby lessening the chances that the search area needs enlarging. However, creating a ring of searchers is not always possible for various reasons: lack of resources, difficult terrain, and problems transporting searchers to their assigned spots. Nevertheless, even containment on one or two sides limits the area that needs to be searched. Also, some containment techniques might be used within the search area, not just on the perimeter.

According to Tim Setnicka,<sup>3</sup> containment “*requires an emergency response rushing some rescuers off while the data gathering and planning phases commence and continue.*”

Physical Containment includes the use of

- **Trail Blocks.** These are resources placed at trail junctions or choke points (narrow routes from one region to another, such as a bridge or a mountain pass), and are staffed constantly. Trail blocks serve several purposes.
  - To locate the subject if they find and follow the trail to the trail block.
  - To interview possible witnesses and to gather information on conditions in the search area. The fact that someone hiking in the search area did not see anything is important information for search planners to know—knowing where the subject is not is a step to finding where the subject is. It is common to try to record the names of people both entering and leaving the search area. Also people entering the area are made aware of the missing subject and can become an asset to the search effort.
- **Road Blocks.** Road blocks are established and staffed by law enforcement. They intercept all traffic entering and leaving the search area. It is common to record the license numbers of all vehicles. Road blocks serve several purposes.
  - To prevent the missing person from emerging on a road and leaving the search area without realizing they are the subject of a search.
  - To inform those entering the area of the missing subject so they can then become assets to the search effort.

<sup>3</sup> See Reference [Setnicka, page 109]

- Road blocks might include voluntary vehicle searches, especially in the case of a missing child.
- **Road Patrols.** A road patrol usually consists of a single- or two-person vehicle driving back and forth between two points on an established road. A road patrol has elements of both containment and search.
- **Track Traps.** These are natural or man-made traps that are used in areas of constricted passage, typically on trails or roads. They are designed to capture evidence of the lost person passing through the area. They can be made in dry washes, sand, mud, snow, plowed fields, power line areas, etc., by smoothing the area so that it is clear of tracks. Track traps are not staffed, but are checked periodically.
- **String Lines.** String lines are often used in dense woods or brushy areas. This string is marked with tags, each placed frequently enough to be visible to the lost person who locates the string. These tags give directions and distances to safety. String lines are not staffed, but are checked periodically. Broken string lines may indicate the subject's presence and direction of travel. Although effective, this technique is seldom used. It requires much manpower, equipment, and time.
- **Lookouts.** A lookout is an elevated place giving a wide view for observation.
- **Camp-ins.** A camp-in refers to any of the containment techniques where searchers are stationed on a full-time basis.

Ideally all physical containments are carried out by a team of two persons, although, if resources are scarce, a single person might be assigned to do containment at a trailhead or to act as a radio relay.

Some examples of Physical Containment are shown in Figure 6.2.

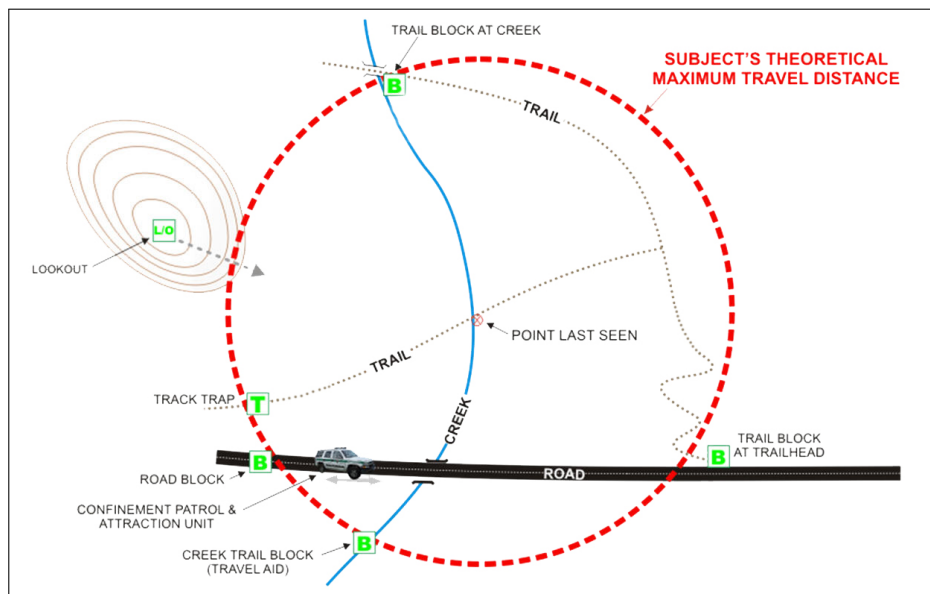


Figure 6.2. Physical Containment

Physical Containment is vital in searches involving subjects on foot, but may be impractical in searches for subjects on motorized vehicles, such as snowmobiles and ATVs, due to the enormous size of the possible search area.

Containment is a simple task that most people can do. However, teams need to be certain that the subject does not pass them without being detected. So they must stay focused even though they may experience many hours of boredom.

Some personnel dislike a containment assignment so it is important to stress its importance, and to point out that many times it is containment that “catches” the subject. Even so, it is wise to try to match tasks with an individual’s capabilities.

If there are insufficient personnel to do the containment then consider tapping into non-SAR resources, such as Sheriff's Office Patrol Volunteers or volunteer Community Emergency Response Teams (CERT). They require specific briefings detailing what to do and what information to collect. Although these personnel are generally not SAR trained and SAR does not fall within their normal duties, they are organized and recognized.

People assigned to a containment team are sometimes given additional tasks such as communication relay, weather spotter, and search team transportation.

While these physical containments are being deployed, virtual containments should also be considered. These are designed to eliminate the possibility that the subject was able to leave the search area. Virtual Containment includes

- Placing posters or signs at strategic locations such as trail heads, convenience centers, and other identified areas specific to the search.
- Periodically calling or texting the subject's cell phone, home phone, and voice mail to leave directions on what actions to take upon receipt.
- Leaving notes on cars or residences. If the subject lives alone, leave a note at their home saying that there is a search in progress for them.
- Checking with transportation companies.<sup>4</sup>
- Checking with hospitals or jails, etc.<sup>4</sup>
- Advising the media.

## Section 6.2 Attraction

Attraction—a tactic used by search teams to help locate the subject by drawing attention to themselves—goes hand-in-hand with containment. Whereas containment usually deals with putting resources on the boundary of the search area, attraction does not necessarily do that.

Attraction includes the use of

- **Calling the subject's name.** Silence must be kept for 10–30 seconds between calls in order to listen for a response. Previously identified “holler points” can be used. However, there are situations where one member of a team heard the subject responding while the other did not. Some searchers may be unaware that they have hearing loss.
- **Loud Sounds.** Whistles, horns, sirens, gunshots, public address (PA), etc. These may be heard over a considerable distance. Lost subjects may proceed to the sound if it is repeated or they may simply respond. Stationary sound attraction should be used in conjunction with a visual homing signal (for example, a flare) to give the lost subject a better sense of direction. Also the loud sound attraction points need to be stationary for long periods of time. It is frustrating for a subject to hear sounds being used for attraction and then start walking to it only for it to move every 15 minutes or so.

However, sounds should not be used to attract subjects across dangerous terrain, especially at night. Also loud sounds may be frightening to children and mentally-challenged individuals.

- **Visual Beacons (Daylight).** Smoke, signal panels, reflectors, etc.
- **Visual Beacons (Night).** Lights, fires, flares, etc.
- **Aerial Attractions.** Helicopters, fixed-wing aircraft, balloons, search lights/emergency lights.

<sup>4</sup> See Chapter 34 on page 278 for detailed suggestions.

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

- 6.1.** Give 5 examples of physical containment.
- 6.2.** Give 5 examples of virtual containment.
- 6.3.** Give 5 examples of attraction.
- 6.4.** What is the purpose of a trail block?
- 6.5.** What is the purpose of a track trap?
- 6.6.** Explain to a layman the meaning and significance of a Barrier.
- 6.7.** Explain to a layman the meaning and significance of a Likely Spot (attraction, magnet).
- 6.8.** In Figure 6.2 on page 74, if one more resource is available for containment, where should it be placed?
- 6.9.** On August 8 2009 at around 0900 hours, John Dink, a 35-year-old white male, was last seen wearing khaki pants, white T-shirt, and an unknown type running shoe and carrying a 16 oz. bottle of water. He went hiking from the First Water trail head in the Superstition Mountains, and his destination was Canyon Lake and back. At about 1324 hours he made a 911 call to the local police department advising them that he had run out of water, that he was about three miles into his hike, but that he was confused and advised he thought he was on the wrong trail. The GPS coordinates from his cell phone showed he was in the area of Second Water and Hackberry Spring, then phone contact was lost. Patrol located his vehicle at the First Water trail head at about 1500 hours and no further information was obtained from the vehicle. Search & Rescue was called out at about 1600 hours and a ground and air search was initiated.  
Use the map in Figure 6.3 on the next page to provide initial containment locations for the hasty search of John Dink, assuming that a helicopter is available for transportation. Canyon Lake is due north of the area shown on the map.

### Quizzes

- 6.10.** Containment is deployment of resources to strategic locations in the search area during which

part of the search? (a) Initial or hasty search. (b) Area Search. (c) Only on urban searches. (d) Applies to trail heads only.

- 6.11.** Containment applied early on in a search can assist the search effort in the following manner. (a) Determining the direction of travel. (b) Detecting movement. (c) Both determining the direction of travel and detecting movement.

- 6.12.** Lost person behavior should be developed early in the investigation. (a) True. (b) False.

- 6.13.** Aerial attractions such as helicopters, aircraft, search lights, and beacons can assist the search effort in what manner? (a) Provide entertainment. (b) Attract the media. (c) Attract the subject's attention. (d) All the above.

- 6.14.** E-mails, media releases, voice mail are considered which type of containment? (a) Random. (b) Last desperate effort. (c) Virtual. (d) Physical.

- 6.15.** When using Containment the subject is assumed to be (a) Mobile. (b) Immobile. (c) Responsive. (d) Unresponsive.

- 6.16.** When using Attraction the subject is assumed to be (a) Mobile. (b) Immobile. (c) Responsive. (d) Unresponsive.

- 6.17.** Containment is a simple task that most people can do. (a) True. (b) False.

- 6.18.** Which of the following is not an example of Containment? (a) Road patrol. (b) Smoke. (c) Lookouts. (d) Track traps.

- 6.19.** Which of the following is not an example of Attraction? (a) Lookout. (b) Smoke. (c) Siren. (d) Flare.

- 6.20.** Placing a poster at a trail head is an example of (a) Physical containment. (b) Virtual containment.

- 6.21.** In SAR, the letters "LPQ" and "LPB" are interchangeable. (a) True. (b) False.



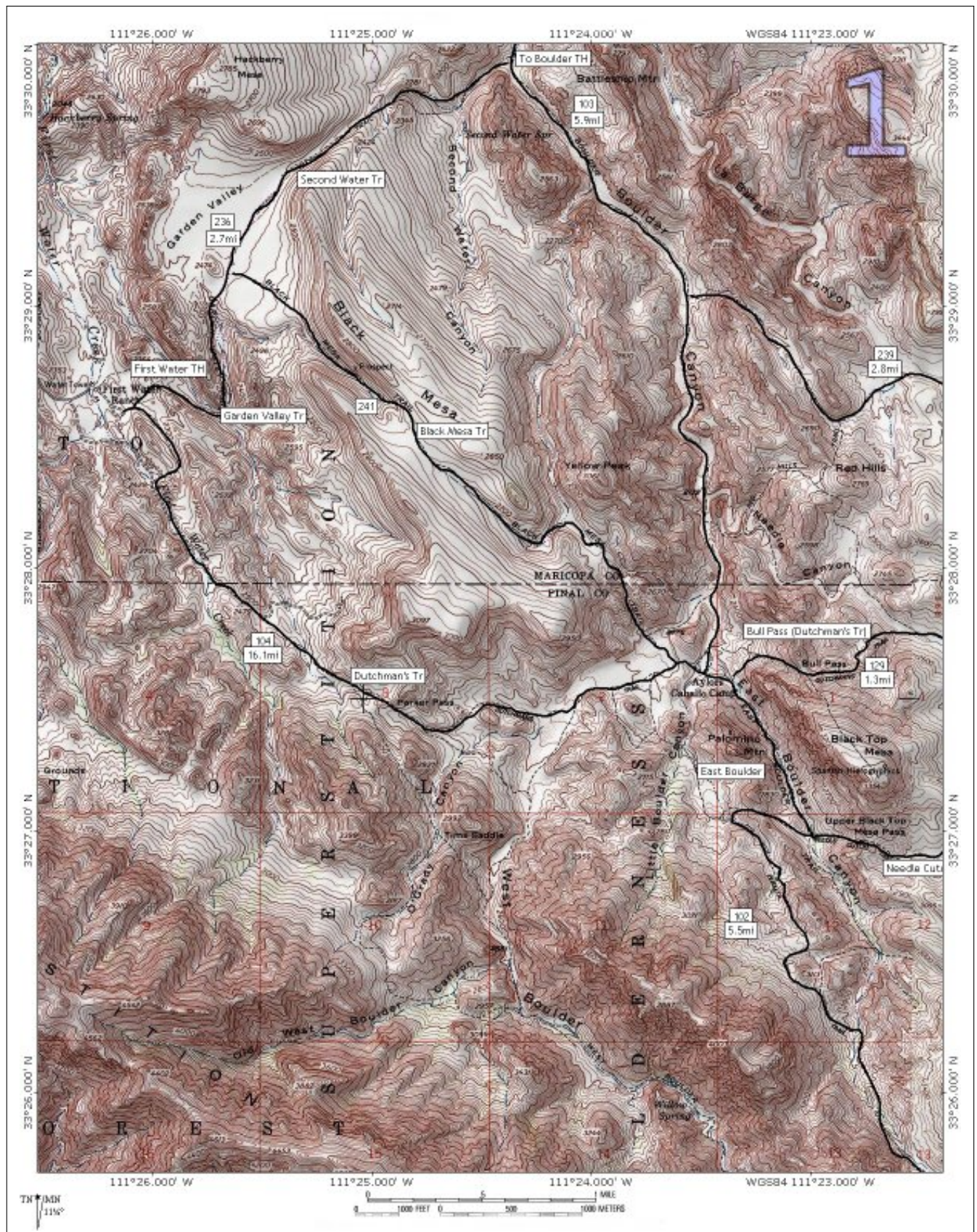


Figure 6.3. Superstition Mountains



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## CHAPTER 7

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### Call Out And Hasty Search

Section 7.1

Call Out and Deployment

Once the incident has been reported and the initial investigation indicates the need for a SAR response, the next issues facing the Initial Response Incident Commander is requesting resources for containment, attraction, and searching, and then deploying them. For most operations this call out entails notifying local search and rescue teams, which are primarily composed of dedicated volunteers. There are a variety of call-out systems in place from the phone tree, to pagers, to cell phone based notifications which send a text message, email, and push notification. Whichever call-out system is used it must be understood by those needing to make the notification. A back-up system should also be in place in the event that the primary system fails. The call-out message should include information about

- The nature of the incident.
- The staging area location.
- The preferred time of arrival.
- Any special equipment or expertise needed.

It is often sensible to have the resources arrive at staggered times to avoid chaotic congestion at check-in and the staging area, although this may be more crucial during the initial response than on a multi-operational period incident.

When resources are en route to the staging area, it is important that they can be contacted in case the incident ends before they arrive, so they can be canceled.

In some cases the travel time to an incident may be lengthy. In this case, it is prudent to plan to respond to the staging area and then have a rest period before those resources are deployed into the field. This issue is important to consider when ordering replacement personnel for subsequent operations.

Certain resources, such as SAR K9s and FLIR units, are better used at specific times of the day or night to maximize their effectiveness. It is important to identify these resources and plan for their use appropriately ensuring they have adequate travel time and rest if needed.

Once the resources have been requested, the next issue facing the Incident Commander is the deployment of resources. This sounds easier than it actually is. Having a strategy in place for deploying resources helps maintain and/or improve the morale of the searchers.

*Having a strategy in place for deploying resources helps maintain and/or improve the morale of the searchers.*

One issue that degrades searcher morale quickly is being called out to participate in a SAR operation and then having to wait long periods of time at the staging area for an assignment. It is best to avoid this by having strategy and tactics in mind so that assignments can be made fairly quickly.

*One issue that degrades searcher morale quickly is being called out to participate in a SAR operation and then having to wait long periods of time at the staging area for an assignment.*

In the same vein, the Incident Commander needs to think about how the resources are to be transported from the staging area into the field to avoid a situation like “*We had a lot of waiting to do when we got to the staging area. There was only one helicopter to insert the teams, and it could only take 2 passengers at a time. With each trip taking 20–25 minutes, and refueling after every 3 trips, it took quite a while. We sit here and think about how little sleep we got in order to make our 2 a.m. rendezvous to be here by 5 a.m.*”

While not often the case, having too many personnel arrive may unnecessarily complicate the initial response and may limit the options for successive operational periods. If there are enough personnel to complete the initial objectives then the excess personnel should be surveyed for their availability and prepare for a later operation. Some excess field personnel might be used effectively to help with the search management as a computer operator, a radio operator, or some other position. The Incident Commander might be able to delegate some tasks so that they can stay focused on the big picture.

If there are not enough personnel to accomplish the initial response objectives then it may be necessary to contact neighboring jurisdictions or other resources suitable for a search and rescue assignment to help conduct the operation. When using outside resources it is essential to conduct a quality briefing so that those personnel are aware of critical issues like the objectives of the operation, agency policy, communications, navigation information (coordinate format and map datum), and any special hazards that may be present.

Prior to deploying personnel in the field from the staging area it is important to assess the personnel and their equipment to ensure that they can complete the task assigned. Deploying poorly equipped searchers can degrade overall mission performance and create a safety problem.

Section 7.2  
**Hasty Search**

The hasty search is sometimes thought of as “Hood of the Truck” management (see Figure 7.1 on the next page). The hasty search is one of the initial actions following the preliminary report, the investigation and consequences of that report, and the containment of the search area. During the hasty search, trained SAR personnel are deployed to search routes and locations that are deemed high probability areas in which to locate the lost person or clues. As was pointed out earlier, it is important to note that **the term ‘hasty’ does not denote a search that is thoughtless or careless**, rather it is meant to denote a search that is initiated with highly qualified personnel relatively quickly after the initial report is made.

There are often “SAR hotspots” where searches are commonplace. For those hotspots it is wise to develop specific search pre-plans based on search history at that location. These pre-plans might include items such as area maps, information about confusing trail junctions, historical find locations, likely attraction points, effective resources and techniques for that area, combinations for locked gates in the area, contact information for land managers, and a list of technical experts that may be of assistance in those areas.



**Figure 7.1.** Incident Command Post during a hasty search

During the hasty search it is assumed that the subject may be mobile in the search area, however the subject may or may not be responsive. Appropriate tactics for the hasty search should be selected based on a review of the initial investigation, lost person behavior data, and an analysis of the terrain, weather, and any other environmental conditions.

There may be cases where a hasty search is appropriate but SAR volunteer resources should not be used or used with caution such as situations involving suicidal subjects, subjects with active warrants, criminal suspects including those where a second party is involved who is not involved in the criminal activity (kidnapping, AMBER alert, etc.). Hasty search strategy and tactics can be used in these cases but careful selection of the appropriate resource is critical after evaluating the nature of the incident.

Ideally hasty search teams

- Consist of 2 or 3 trained search personnel.
- Have an identified team leader.
- Have a knowledge of the search area.
- Are self-sufficient and well-equipped.
- Have a member with EMS training.

### Focus on High Probability Areas

Hasty search teams often are assigned to search those routes and locations with a high probability of containing the subject or clues, such as

- Initial Planning Point (PLS or LKP).
- Known or suspected route of the subject.
- Travel aids such as
  - Roads.
  - Trails (paying attention to trail sign-in registers both for the search subject and for potential witnesses that need to be interviewed).
  - Ridge lines.
  - Drainages, river banks, lake shores, dry washes.
  - Utility corridors.
  - Fence lines.
  - Railroad tracks.
- Known attractions such as
  - Buildings.

- Cultural or natural features.
- Areas of known hazard such as
  - Abandoned mines.
  - Wells.
  - Caves.
  - Cliffs.
  - Construction areas.
  - Open drains.
  - Exposed septic tanks/systems.

While conducting searches in these high probability areas, the hasty search teams should consider utilizing the appropriate search tactics based upon an evaluation of the conditions and the lost person behavior data.

- Some subjects, while legitimately lost, may not recognize that they are lost and therefore may not be considered cooperative subjects, such as small children and dementia patients.
- Some subjects may not want to be found by searchers but use searchers as a way to reorient themselves and self-rescue.
- Some subjects may be wary of contact with authorities as they may believe they are in trouble or will be billed for the cost of the search.
- Some subjects may have impairment of some senses such as hearing or sight.

All of these issues affect the tactics used to locate the subject.

## Hasty Search Tactics

Several common search tactics used in a hasty search are

- Verbal attraction (calling the subject's name and using whistles).
- Visual attraction (wearing bright colored clothing, using light sources).
- Sign cutting along travel aids, routes, and the perimeter of the initial search area.
- The use of SAR K9s.
- The use of Mounted SAR units.
- The knowledge and use of a Safety Code Word<sup>1</sup> for children.
- The use of specialized vehicles (ATVs, UTVs, Boats, Mountain Bikes, 4WD vehicles).
- The use of search aircraft. See Figure 7.2 on the next page.
- The use of specialized optics (spotting scopes, night vision optics, thermal imaging, FLIR).

## Brief

As with any SAR operation the hasty teams should be given a quality briefing<sup>2</sup> that includes maps of the area so that they maintain their situational awareness and are able to analyze terrain for searching. A discussion of the items in the Search Urgency Rating Chart<sup>3</sup> (age, medical condition, number of subjects, subject experience profile, weather profile, equipment profile, and terrain/hazards profile) with the hasty teams provides them with important information about the mission.

A verbal Incident Action Plan is most common during the initial response phase of the hasty search.<sup>4</sup> If the hasty search extends into the first full operational period, then a written IAP should

<sup>1</sup> A code word system designed to protect children from being lured into an unsafe situation by a stranger.

<sup>2</sup> Briefing is discussed in detail in Chapter 8 on page 87.

<sup>3</sup> See Table 33 on page 276.

<sup>4</sup> While the Incident Action Plan may be verbal, all plans and actions must still be documented.



**Figure 7.2.** Hasty search from a helicopter

be developed. For example, if the initial call was received at 1100 hours and the hasty search started at 1200 hours it might continue to 1800 hours. The first full operational period would then be from 1800 hours to 0600 hours. The initial part of the search from 1200 to 1800 hours is the Initial Response Operational Period—denoted by IR—and the period from 1800 to 0600 hours is Operational Period 1.<sup>5</sup> See Figure 7.1. Both the Initial Response and Operational Period 1 are likely to be a Route and Location Search.

**Table 7.1.** Example Operational Periods

Time	Length (hr)	OP
1200–1800	6	Initial Response (IR)
1800–0600	12	1
0600–1800	12	2
1800–0600	12	3
⋮	⋮	⋮

## Personal Preparedness

Members of the hasty teams need to be individually prepared for the mission in order for them to be efficient and safe. In general the teams should be prepared for 24 hours in the field unsupported. This means that individual personnel need to have the appropriate search equipment, food, water, and clothing suitable for the present and predicted conditions. A compass should also be carried in case the GPS receiver fails or is lost. The location of the Incident Command Post as a waypoint should be marked before leaving the area as should the point where dropped off.

<sup>5</sup> It may seem odd to call the first full operational period ‘Operational Period 1’, instead of using that for the Initial Response Operational Period. However, this is consistent with the convention often used in fire incidents, where ICS is used extensively. See Reference [Anon, page 3]. Because SAR coordinators might respond to a fire incident, this manual uses the fire incident convention to avoid possible confusion.

Different personnel and equipment are needed in the desert environment versus the winter mountain environment. Properly equipped teams are safer and more comfortable in the field and, in turn, perform at a higher level than poorly equipped teams.

The teams also need to have reliable communications equipment such as portable radios and/or cell phones to communicate with the Incident Command Post to be able to relay findings and receive updates. A GPS is another important tool for the hasty team to possess in order to report exact locations of clues and to navigate to important locations in the search area. Carrying some provisions for the subject of the search is also sensible as many of the search subjects may not be adequately prepared in terms of food, water, first aid, or clothing and that may have contributed to their situation.

While the hasty teams should be prepared for 24 hours in the field without support it is important to develop a work/rest plan for those teams to avoid fatigue-related injury or poor decision making. Generally the hasty teams should not be actively working on an assignment for more than 8 to 12 hours. Relief teams need to be planned for fairly early on in the hasty search. The teams in the field can “spike out”<sup>6</sup> while they are in their rest period and still be an attraction device.

## Check-In

Prior to deploying hasty teams in the field it is important that a personnel accountability system is established. This includes ensuring that all volunteer personnel have signed in on the AZDEMA Search and Rescue Sign-In Personnel Roster (see Figure 7.3), and non-volunteer personnel have signed in on an ICS 211 Check-In Form (see Section 36 on page 308).

SEARCH / RESCUE SIGN-IN PERSONNEL ROSTER									
DATE _____					DR# _____				
The following <b>Volunteer Personnel</b> listed on this Sign-in Roster were utilized on the Search or Rescue Mission # _____ for the Sheriff of _____ County.									
Search or Rescue Location/Name _____					Authorized Signature _____				
Please Print All Information									
Time		# Hrs	Name		ID No.	Unit/ Posse	Radio issued	Call Sign	Approx Miles
In	Out		Last	First					
			1.						
			2.						
			3.						
			4.						
			5.						
			6.						
			7.						
			8.						
			9.						
			10.						
			11.						
			12.						
			13.						
			14.						
			15.						
			16.						
			17.						
			18.						
			19.						
			20.						
Total Hrs >>			Page # _____ of _____			Total Miles >>>			

**Figure 7.3.** Search and Rescue Sign-In Personnel Roster

<sup>6</sup> A wildland fire term for camping in the field.



Hasty team composition should be identified and the leader of the team designated and recorded. A best practice is to note the hasty team name, its composition, its leader, and its assignment in the Win CASIE III Initial Note. A time interval should be established for the teams in the field to check in with the Incident Command Post to notify their status and location, maintaining accountability. An alternative to the periodic check-in call is the use of personnel tracking devices that can be monitored on a mapping software, such as amateur radio APRS or other commercial satellite tracking systems.



Figure 7.4. Check-In

## Prepare for Multi-Operational Period Search

It is important to note that the majority of searches are resolved in the hasty phase so training and preparing SAR personnel for these operations are critical. The location of clues and other evidence such as witness reports taken during the hasty phase can have a significant impact on planning for a multi-operational period search if the hasty search is not successful. Generally the hasty phase of a search lasts 12 to 24 hours or until it is believed that the subject of the search is no longer mobile, in which case the search transitions to an Area Search. Even after that point hasty tactics may still be employed, such as using a tracking team if a set of tracks is located during the search of a segment.

Planning for the Multi-Operational Period Search should not be neglected during the hasty search. It is easy to be talked into continuing for “just one more hour” to see what develops, but that is a dangerous practice. Once search teams are deployed in the field the incident command staff should begin thinking about what will happen if the hasty search is not successful. Determining the search area, segmenting that area, conducting a consensus, developing objectives, strategy, tactics, ordering resources, and compiling the Incident Action Plan (see Chapter 13 on page 130) take time. The goal of the Incident Commander should be to stay ahead of the search as much as possible and be ready to transition to an Area Search. Quality documentation of the actions and decisions made during the hasty search aids in this transition.

*Once search teams are deployed in the field the incident command staff should begin thinking about what will happen if the hasty search is not successful.*

## Media

Managing the media should also be considered during the hasty search. Sometimes the hasty search garners significant media attention especially if it involves interesting search subjects or unusual con-

ditions. It is easy to overlook the public information function during the hasty phase but the Incident Commander should be prepared for the media and be ready to use media interviews as opportunities to get the word out about the operation in a manner that the agency is comfortable with. Early media attention can be helpful in generating clues.

## Social Media

The increasing popularity of social media such as Facebook, Twitter, MySpace, and others as well as blog and comment sites on media outlets has implications for public safety agencies. Traditionally information about an incident was released to the public by an agency's public information staff. That still is the preferred method but with many paid and volunteer personnel having social media accounts some information about an incident is getting out to the public via these modes.

It is very important for all SAR personnel to realize that they are viewed as a representative of the agency for which they volunteer and are generally not authorized to release information on behalf of the agency. As a result it is critical that SAR personnel be aware of what information they choose to share on social media or blog sites. Information that is not released in the agency's official media release probably should not be shared in a social media post. If a search is ongoing there is generally an investigation ongoing as well. Releasing information that is not approved by the Incident Commander and released outside of the public information office may hamper the investigation. Some information is protected by law and posting photographs that can identify the subject of a SAR operation, especially if the subject was ill or injured, may violate the law and expose the individual and agency to legal action.

Often when reading a media report about a SAR incident someone involved in the incident may notice errors or omissions that present the operation in a negative light. It may be tempting to log into the comment section attached to the story on-line and post information that may correct or clarify the situation but that really is the job of the PIO and not the individual SAR member. Often the PIO will have a relationship with the reporter and can make contact to correct the record.

SAR personnel must remain professional and be a good representative of their agency and the profession. Refraining from posting comments or photos that could disparage the image of search and rescue or an agency is critical in that regard.

All personnel should familiarize themselves with their individual agency's policies about the use of social media and release of information to the media.

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

**7.1.** Discuss the following scenario and illustrate what actions you, as a Incident Commander would take. Your agency receives a report from passing dirt bike and ATV riders of a disabled vehicle on a remote forest road with two occupants. Additional information reveals that the vehicle and occupants have already spent one night at the location and have no food or water, and both occupants have medical problems (the female occupant is diabetic and depends on an in-

sulin pump which is nearly empty of insulin, and the male occupant has breathing problems and requires oxygen and his tank is nearly empty). The vehicle is described as a blue Ford Ranger two-wheel-drive pickup. Passing ATV riders have reported leaving granola bars and some fruit with the two occupants of the vehicle. In attempting to access the location, you find that your agency issued patrol vehicle is incapable of reaching the location due to the terrain.

## Quizzes

**7.2.** When calling out resources it is important that they are asked to arrive at the staging area at the same time. (a) True. (b) False.

**7.3.** When resources are en route to the staging area, it is important that they can be contacted. (a) True. (b) False.

**7.4.** Which of the following facts would impact the urgency level assigned to a report of a lost individual? (a) Temperatures in excess of 100 degrees in the daytime. (b) Insufficient or no water in possession. (c) Search subject wearing a T-shirt, shorts, and flip-flops. (d) All of the above. (e) None of the above.

**7.5.** If given a report that an overdue hunter is in an unknown area near a town or city, and her vehicle is described but no further information is available, would you (a) Summon resources to undertake an immediate search? (b) Deploy aircraft to perform aerial search operations? (c) Wait for additional information? (d) Do nothing?

**7.6.** You have been assigned to a report of a small child swept away in flood waters, but the report is delayed due to another agency's efforts to locate and save the child, which have proved unsuccessful. Weather is rainy and the cloud ceiling is alternating from being on the ground to maybe 500 feet. All rescue helicopters are grounded due to the conditions. Would you (a) Continue with ongoing ground search efforts along the river's banks? (b) Summon additional swiftwater rescue personnel to assist? (c) Summon helicopter assistance at first opportunity? (d) All of the above.

**7.7.** Cell phones can assist in providing locations of lost subjects. (a) True. (b) False.

**7.8.** Search subjects always respond to their name being called by searchers. (a) True. (b) False.

**7.9.** Small children are liable to respond to strangers when lost. (a) True. (b) False.

**7.10.** Hikers are more apt to carry flashlights and matches when on a short hike. (a) True. (b) False.

**7.11.** Family members always provide accurate information about their overdue or missing family members. (a) True. (b) False.

**7.12.** During the hasty search it is always assumed that the subject is responsive. (a) True. (b) False.

**7.13.** Ideally hasty search teams consist of 4 or 5 trained search personnel. (a) True. (b) False.

**7.14.** During a hasty search it is unnecessary to brief the teams. (a) True. (b) False.

**7.15.** Once search teams are deployed in the field the incident command staff should begin thinking about what will happen if the hasty search is not successful. (a) True. (b) False.

**7.16.** The operational period following the Initial Response is called (a) Operational Period 1. (b) Operational Period 2.

**7.17.** The Initial Response is Operational Period 1. (a) True. (b) False.

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## CHAPTER 8

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### Briefing Resources

In both hasty search operations and extended search operations the Incident Commander and staff have a plan that needs to be executed. The plan is executed by the available search personnel on scene. As such, those personnel need to be adequately briefed about the plan and how it is to be implemented. A quality briefing sets the tone for the operation and instills confidence in the Incident Management Team on the part of the searchers.

*A quality briefing sets the tone for the operation and instills confidence in the Incident Management Team on the part of the searchers.*

In some situations it is acceptable to brief all searchers together, especially if it is a relatively small incident and there is a relatively small number of searchers. If there is a large number of searchers on the scene it makes more sense to brief the team leaders and then have those team leaders brief their teams. In either case the briefing should generally follow the *Briefing Format for Emergencies* that was developed by Karl Weick following his review of the South Canyon wildfire.<sup>1</sup>

#### **Briefing Format for Emergencies**

1. Here's what I think we face.
  - Situation Summary/Description of the Problem/Incident Objectives.
2. Here's what I think we should do.
  - Strategy and Tactics/Assignments.
  - Communications Plan.
3. Here's why.
  - Thoughts behind the development of the plan (Lost Person Behavior, Influencing Factors).
4. Here's what we should keep our eye on.
  - Safety Statement (Communications, Weather, Aviation, Hazards).
5. Now, talk to me.
  - Solicit input from the searchers to make sure there are not better ideas or something missed.
  - Clear up any ambiguities.

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<sup>1</sup> See Reference [Weick].

This briefing format covers the components of an Incident Action Plan (IAP) whether it is only a verbal plan or whether it is a more formal written IAP.<sup>2</sup>

Generally in larger incidents where a formal IAP had been developed, the Planning Section Chief<sup>3</sup> runs the briefing with assistance from the other command staff and section chiefs. In smaller incidents, like a hasty search, the Incident Commander may well be filling several of the subordinate roles and may conduct the briefing. See Figure 8.1.<sup>4</sup>



**Figure 8.1.** Incident Commander briefing during small incident

When the plan is briefed the distractions to the participants in the briefing should be minimized, and should take place in a relatively quiet location mostly free of distractions, out of sight and earshot of media and family.

- The briefer should request that all participants turn off or turn down radios and turn off or silence cell phones.
- The incident management staff should be introduced followed by a description of the incident and the objectives.
- Some of the subject information provided during the briefing is confidential and may be protected by law, so it must remain within the personnel that need to know.
- It is also important to ensure that neither media nor family are present for the briefing so that a candid conversation about the tactics and strategy can be conducted.<sup>5</sup>
- The strategy and tactics and assignments should then be briefed. It is critical that the team leaders understand their assignments and how they are to carry out the specific tactics.
- The plan for communications and what to do if a searcher gets hurt should be covered.
- Often it is important to brief the team leaders on the reasoning and thought behind the development of the plan so that issues and situations that arise in the field, that may not have been thought about during the development of the plan, can be dealt with in the spirit of the plan.
- A discussion about safety and risk management is important to have with all of the team leaders and search personnel. Searchers must temper their desire to help someone in a dangerous situation with appropriate risk management. See Chapter 18 on page 170.
- The briefer should solicit feedback from the searchers and team leaders. This should not be a long discussion or debate but rather a chance to make sure everyone feels comfortable with the plan and can complete the plan as briefed.

<sup>2</sup> IAP is discussed in detail in Chapter 13 on page 130.

<sup>3</sup> The Planning Section Chief is discussed in Chapter 12 on page 116.

<sup>4</sup> The DPS medic in the tan flight suit is Bruce Harrolle who was killed on Oct 13, 2008 in a SAR accident in Sedona.

<sup>5</sup> In fact, whenever candid discussions take place, everyone should be cautious that they are not overheard.

- At the end of the briefing the participants should be reminded to turn on their radios and cell phones.

If only team leaders are briefed by the incident management staff then the same briefing format should be used when they brief their teams. The team leaders may not need to go into specifics about the overall operation but may choose to focus on their particular assignment.

It is important to remind search personnel to document their activities and to be prepared to debrief once the assignment is complete. This can include completing an ICS 214 Activity Log (see Figure 8.2 and Figure 36.26 on page 311), keeping a GPS on to develop a track log for download, or making notations and shading on the map so that accurate information about what has been searched and how well it has been searched can be verified.



**Figure 8.2.** Completing an Activity Log

### Briefing Resources Checklist

#### 1. Incident summary, including:

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>a) Incident history.</li> <li>b) Missing person profile and photo.</li> <li>c) Map showing IPP and current assignment.</li> <li>d) Navigation information (map datum, coordinates, true or magnetic north). This is discussed in detail in Chapter 15 on page 144.</li> <li>e) Actions to date.</li> <li>f) Clues found.</li> </ul> | <ul style="list-style-type: none"> <li>g) Terrain.</li> <li>h) Weather.</li> <li>i) Hazards and safety, including possible illegal activity discussed on page 91.</li> <li>j) Possible media presence.</li> <li>k) Possible family presence.</li> <li>l) Actions to take if the subject is found.</li> <li>m) Language to use if the subject is found.</li> <li>n) Rescue and medical plans.</li> </ul> |
|--|---|

#### 2. Assignment details.<sup>6</sup>

- a) Where to go, what to do, and what to document.
- b) Type of clues to look for. Review protocol for handling evidence.
- c) Document everything on an ICS 214 Activity Log form (see Section 36 on page 311).
- d) On the mission, photos taken of the subject—that can identify that subject—should not be distributed without the approval of the SAR coordinator and/or the subject.

#### 3. Interviewing people in the field (see Section 4.3 on page 63).

#### 4. Type of subject to base tactics on.

<sup>6</sup> During the initial response phase assignments are often given verbally and recorded by the IC on ICS 201 or in Win CASIE III. After that they are written on ICS 204 forms.



- a) Mobile or immobile.
  - b) Responsive or unresponsive.
5. Transport to and from their assignment.
  6. Personal equipment to take.
  7. Team equipment to take.
  8. Communications.
  9. Debriefing.
    - a) Where to return to.
    - b) Who to talk to.
    - c) What questions will be asked.



**Figure 8.3.** Not all hazards are stationary

### Briefing When Subject Has Dementia

Typically there is no need to brief resources on how to approach and converse with a lost subject who has just been found. However, if the subject suffers from dementia, then, additional briefing is required. The following suggestions were made by Teepa Snow at the 2009 Arizona SAR Conference in Heber, AZ.

1. Approach within visual range from the front, and stop 6 feet from the subject. Approaching from the back can produce anxiety.
2. Look friendly and make a “Hi!” sign with the hand.
3. Offer the hand making eye contact.
4. Approach from the front—moving slowly. Allow time for the subject to take in that someone is approaching.
5. Call the person by name and introduce self.
6. Keep shoulders and face out of their personal space.
7. Use a supportive stance—stand to the side to communicate. Standing right in front of the subject may feel confrontational.
8. Crouch down if they are seated or lying down. This helps them feel less threatened.
9. Wait for their response before continuing.
10. Make positive statements like
  - “Let’s try ...”.
  - “Do this ...”.
  - “Could you please help me ...”.
11. Keep your voice calm, low, and slow.
12. Keep it short and simple.
13. Give simple choices—“this or that”.



14. Use objects—show them—don't just say it!
15. Break task/movement down—one step at a time.
16. Ask to 'try' or to 'help'.
17. Use empathetic statements like
  - "You look busy."
  - "It looks like you are tired."
  - "It sounds like you are upset."
 and wait for their response.

## Illegal Activities

Many times during the course of their duties, SAR professionals encounter illegal or suspicious activities. Each situation presents its own hazard. Illegal marijuana growing operations are known to be occupied by armed individuals and/or booby trapped. Chemicals from clandestine meth labs are often dumped in remote areas. They are known to contain dangerous chemicals that are hazardous if inhaled or explosive if handled inappropriately. Some remote areas are often transited by individuals illegally entering the country or smuggling illegal drugs. These individuals are commonly known to be armed. SAR professionals may also encounter persons acting suspiciously or deceptively about their activities. Caution should be exercised and personal safety is of the utmost importance. Any suspicious or suspected activity must be immediately reported to the Incident Commander and handled following team policies and procedures.

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

- 8.1.** Why is it important, during the resource briefing, to draw attention to the possible presence of media in the area?
- 8.2.** Why is it important, during the resource briefing, to draw attention to the possible presence of the subject's relatives in the area?

### Quizzes

- 8.3.** Resources are always briefed by the Incident Commander. (a) True. (b) False.
- 8.4.** Sometimes team leaders brief their team, after being briefed themselves. (a) True. (b) False.
- 8.5.** Media and family should be invited to the briefings of resources. (a) True. (b) False.
- 8.6.** Briefing resources should take place out of sight and earshot of media and family. (a) True. (b) False.

- 8.7.** During the briefing, resources should be told where to return to, who to talk to, and what questions will be asked when they finish their assignment. (a) True. (b) False.
- 8.8.** It is important for a team leader to understand their specific team's assignment. (a) True. (b) False.
- 8.9.** Why is it important for each team leader to understand their assignment? (a) Be able to brief their team and answer team questions. (b) Ensures all team members are up to the given task. (c) Enables the team to develop a plan to tackle the task given. (d) Answers (a) and (b) only. (e) Answers (b) and (c) only. (f) All of the above.
- 8.10.** If only team leaders are briefed is it important to use the same briefing format when they brief their team. (a) True. (b) False.
- 8.11.** Why is it important to brief search teams prior to their assignment? (a) To instruct each team of their specific assignment. (b) To address hazards. (c) To address tactical considerations.

(d) To give a summary of previous tasks, if applicable, and how they relate to this specific assignment. (e) All of the above.

**8.12.** Which of the three answers most accurately reflects why it is important to brief a team leader on current and future weather conditions? (a) To ensure their team has all necessary equipment.

(b) To ensure the team has equipment and clothing to aid the subject. (c) To confirm that the search segment can be covered given the current and future weather conditions.

**8.13.** There is no need to brief resources on how to approach and converse with a lost subject who has just been found. (a) True. (b) False.

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## CHAPTER 9

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# Debriefing Resources—Route and Location Searches

Just as important as telling the searchers what they need to do with a briefing, is knowing what they have done. The process of gleaned the information from the searchers after their assignment has been completed is called debriefing. During the debriefing process many critical items are learned such as the area covered and how well it was covered, the hazards in the area, the communications difficulties, and suggestions for future efforts in that area.

*During the debriefing process many critical items are learned.*

Debriefing is a task that is carried out by an experienced searcher or incident management team member in the Planning Section, so that the critical information is collected. It should take place in a relatively quiet location mostly free of distractions, out of sight and earshot of media and family. The debriefer sits down with the team leader and discusses the assignment that was just completed. This debriefing should be documented and any relevant materials collected from the team leader such as the team's map with all notations, and any ICS 214 Activity Logs (see Figure 36.26 on page 311). If the team was using GPS in a tracking capacity, then the track log should be downloaded. If possible witnesses were interviewed during their assignment then this should be reviewed. If clues were located during the search then those should be discussed and if collected they should be turned in during the debriefing. If relevant photographs were taken then those should also be shared with the debriefer. It is good practice to log the clues located by using the program Clue Manager that is discussed in Section A.1 on page 358.

### Debriefing Resources Checklist

1. Who was involved in the debriefing?
2. What was their assignment?
3. What time did they begin?
4. What did they accomplish?
5. How likely were they to have seen the missing person?
6. What time did they finish?
7. Any difficulties or areas they could not search adequately?
8. Any clues found?
  - a) Where?

- b) What?
- c) What did they do?
- d) Where is it now?
- 9. Any hazards observed in the area?
- 10. Any communications problems?
- 11. Any comments? For example, what would the team suggest if this task was done again: type of resource, how to search.

A useful form for recording debriefing information is the ICS 204B SAR Debriefing Form<sup>1</sup> shown in Figure 9.1.<sup>2</sup> Once completed this needs to be included as part of the incident documentation.

<b>SEARCH AND RESCUE DEBRIEFING FORM</b> <small>(ICS 204 SAR Supplement B)</small>						
INCIDENT NAME: _____						
DATE:	TEAM #	ASSIGNMENT #	OP. PERIOD			
STATE RESOURCE TYPE AND TACTICS UTILIZED:						
STATE EXPLICIT COVERAGE OF THE AREA SEARCHED:						
STATE CLUES LOCATED, EVENTS, HAZARDS AND IDENTIFY ALL ON AN ATTACHED MAP:						
COMMUNICATIONS ISSUES:						
RECOMMENDATION FOR FUTURE EFFORT:						
<b>SEGMENT SPLITTING</b>						
IDENTIFY AREAS THAT WERE NOT THOROUGHLY SEARCHED OR SEARCHED WITH DIFFERENT POD'S THAT NEED TO BE SPLIT.						
<i>THE PLANS SECTION WILL ASSIGN A NUMBER TO THE SPLIT SEGMENTS. AS THE TACTICAL TEAM LEADER YOU MUST ACCURATELY DEPICT BOUDARIES.</i>						
ARE YOU SPLITTING YOUR SEGMENT? _____ HAVE YOU IDENTIFIED SEGMENT BOUNDARIES TO THE PLANS SECTION? _____ HAVE YOU DRAWN YOUR COVERAGE ON AN ATTACHED MAP? _____						
STATE ESTIMATED COVERAGE OR POD FOR EACH SEGMENT SEARCHED DURING THE ASSIGNMENT. BE SURE TO IDENTIFY THE SEGMENT BY NUMBER.						
SEGMENT NUMBER	LIVE RESPONSIVE	NON- RESPONSIVE	CLANDESTINE GRAVE SITE	FOOTPRINT	_____	_____
SIGNED TEAM LEADER: _____ DATE: _____						

**Figure 9.1.** ICS 204B SAR Debriefing Form

<sup>1</sup> This form is contained in the program ICS-SAR, described in Section A.4 on page 360. Similar debriefing forms in ICS-SAR are the *Task Assignment Form* and the *ICS 204A* form.

<sup>2</sup> All sections of this form that request “POD” information do not apply to Route and Location Searches, so can be ignored at this stage.



**Figure 9.2.** Not all hazards are visible

The results of the debriefing shapes future search efforts and may alter tactics. The searchers in the field are really the eyes and ears of the Incident Management Team. While the incident management team can look at the map, at GOOGLE Earth™, and other imagery there is no substitute for actual close-up and on-the-ground observations about the search area. The potential for the search area to retain foot tracks and other search clues cannot be determined by looking at maps or imagery. Searchers should take the debriefing session seriously as it has tremendous potential to enhance search operations and provide a better understanding of what is happening on the ground.

*Searchers should take the debriefing session seriously.*

Caution should be exercised when debriefing a relatively inexperienced team leader as there is the tendency to not want to disappoint the incident management staff. An inexperienced team leader may be reluctant to state that the assignment was not fully completed or address any other problems encountered during the search. It is important that the debriefer set the proper tone and explain that the point of the debriefing is to gather the information that resulted from the assignment and that this is not a competition. Honest appraisals of what the team was able to accomplish are most important. After all, the goal of the operation is to locate a lost person not to see who can cover the most assignments in the shortest period of time.

A discussion about debriefing following assignments in Area Searches is covered in Chapter 31 on page 261.

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

- 9.1.** What is the reason for debriefing resources?
- 9.2.** Who should conduct the debriefing of resources?
- 9.3.** Why should caution be exercised when debriefing a relatively inexperienced team leader?

### Quizzes

- 9.4.** Debriefing resources shapes future search efforts and may alter tactics. (a) True. (b) False.
- 9.5.** What is the ICS 214 form used for? (a) Scratch paper. (b) Record details of unit activity. (c) Record the resources allocated to the incident. (d) Prioritize hazards, safety, and health issues.

**9.6.** The media and family members are encouraged to attend a team's debriefing when they have finished their assignment. (a) True. (b) False.

**9.7.** Debriefing a resource that has just completed its assignment is a task that can be carried out by anyone. (a) True. (b) False.

**9.8.** During debriefing, inexperienced team leaders may be reluctant to state that their assignments were not fully completed. (a) True. (b) False.

**9.9.** During the debriefing process many critical items are learned such as the area covered and how well it was covered, the hazards in the area, the communications difficulties, and suggestions for future efforts in that area. (a) True. (b) False.

**9.10.** A team's assignment is not finished until it is debriefed. (a) True. (b) False.

**9.11.** Data collected during the debriefing is used by the Incident Management Team to develop future search assignments. (a) True. (b) False.

**9.12.** In what respect can debriefing a returning resource assist in the planning process? (a) No need to search the area again. (b) If no debrief takes place, the planning of future search efforts could be problematic. (c) None of the above.

**9.13.** Emphasizing the importance of debriefing a search team is crucial because (a) There is no substitute for real-time on-ground observations. (b) Clues and tracks cannot be determined from a map. (c) The searcher's observations of the terrain, vegetation, and so on, is an important part of any future search and planning process. (d) All of the above.

**9.14.** It is important to conduct a debriefing in writing by utilizing a form such as ICS 204B because (a) The form aids in eliciting details from the team leader. (b) The team leader can address issues and problems encountered during the search. (c) The form becomes part of the permanent record. (d) Additional clues not radioed in might be listed on the team's ICS 214. (e) All of the above.

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## CHAPTER 10

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### Incident Conclusion

At some point the incident is concluded. This may be due to

- The subject being located.
- A suspension of active search efforts with the subject not being located.

In either case planning for the conclusion of the incident should be done ahead of time.

Working with the family of the subject to identify their needs—whether it be a joyous reunion with a loved one, providing information about the investigation, providing emotional support if the subject is found deceased, or preparing them for the suspension of active search efforts—is vital.

*Working with the family of the subject to identify their needs is vital.*

Establishing a demobilization plan for resources is essential to ensure that all resources are rested before returning to their home base.

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#### Section 10.1

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### Subject Located

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Once the subject is located the work of the search and rescue team is not necessarily over.

If the subject is found alive an evacuation plan must be formulated and executed. Ideally a rudimentary evacuation plan has been established during the initial planning process including knowing where the evacuation equipment is and which personnel are available to support the evacuation. Some subjects are able to walk out under their own power after receiving support from the SAR team. Other subjects need medical care and assistance to be removed from their situation.

Unfortunately some subjects are located deceased. In this case the SAR team should protect the scene and defer to the agency with jurisdiction to determine the next course of action. Finding the subject deceased dramatically reduces the urgency of the incident, so the operation can slow down. Involving a Family Liaison and Crisis Intervention Counselors is often very beneficial when dealing with family members who have just lost a loved one.

The team that located the subject should report their location, an assessment of the subject's condition, and the most appropriate evacuation method. A careful examination of maps of the area should be made to determine the best evacuation route.



Care should be taken to make a risk assessment of the evacuation plan. While the use of a helicopter may speed things up and make the work much easier, the additional risk may not be justified. Conversely, if there are relatively few personnel to do a litter-carry in rugged terrain then it may be worth the risk of using a helicopter to minimize the exposure of the rescuers and the patient to potentially dangerous situations. Some tools for making a risk assessment are presented in Chapter 18 on page 170.



**Figure 10.1.** Subject located alive—evacuated by litter

The coordinates of the found subject need to be documented.

### Interviewing a Subject Found Alive

If the subject is found alive then a post-incident interview with the found subject should be conducted to determine what happened. Debriefing the found subject is one of the most important things to be done on successful searches.

*Debriefing the found subject is one of the most important things to be done on successful searches.*

Unfortunately at this point in the mission, people are tired, distracted, and eager to return home, and as a result the appropriate emphasis is often not put on this task. The interview should occur as soon as possible after the subject is rescued, but not before they have a medical evaluation and appropriate treatment. Frequently the interview can take place at the incident location, but sometimes it has to be done after the subject has left the incident for medical treatment, either at the hospital or at the subject's residence.

The subject debriefing should strive to gather a complete and fairly thorough understanding of the subject's actions, activities, thinking, analysis, and assumptions in a more or less chronological order.

The purpose of this meeting is for the Incident Management Team to

- Determine the effectiveness of the search effort.
- Learn what worked and what did not.
- Understand how the lost subject behaved during the search.
- Identify which investigative information was helpful, and which was not.
- Identify whether the scenarios on which the search strategies and tactics were based coincided with what actually happened.
- Improve the knowledge of lost person behavior in the appropriate jurisdiction.

- Evaluate the effectiveness of the search objectives, strategies and tactics (what was the IMT doing and thinking while the subject was doing what they were doing, and why did the searchers not find them at that point?).
- Add accurate information to the statistical database for search area determination.
- Identify additional preventative SAR actions which can be implemented to prevent future incidents from occurring.
- Identify additional training needs for SAR managers and responders.
- Identify strategies and tactics that worked well and why.
- Identify strategies and tactics that might need improvement.
- Create new case studies with which to train search managers.

The interview should take place

- After the subject has been stabilized.
- After the subject has been reunited with family, either by phone or in person.
- In a quiet secure area, with only the subject and with a few members of the Incident Management Team, such as the Incident Commander, the Operations Section Chief, and Planning Section Chief.
- Without any outside disturbances.
- In a friendly atmosphere, with no blame being assigned to the subject.

If possible the interview should be recorded and should always be documented in writing for future reference. A good summary of the debriefing can be invaluable in conducting the After Action Review, discussed on page 104.

The interview should start by telling the subject how pleased they are at the outcome. They should then explain the reason for the meeting, and ask the subject to describe what happened in their own words and at their own pace, as they remember it. During this process the subject should cover the following points, if appropriate.

- How and where did they get lost?
- What were they doing when they got lost?
- Once lost did they follow anything (drainage, wash, trail, landmark, ...)?
- At what stage did they stop moving and decide to wait to be found?
- How much water and food did they have with them?
- Did they find and drink water? Was the water purified?
- Did they encounter any wildlife?
- Did they see or hear a helicopter?
- Did they see or hear searchers?
- How did they respond to seeing or hearing searchers or aircraft?
- Did they use their cellphone, and where was coverage non-existent?
- Did the cellphone battery run out?

If the subject was hiking, then they should also cover the following points.

- When did they start hiking?
- What was their intended route?
- Why did they go off-trail?
- How long after they started hiking did they realize they were lost?
- How long after they started hiking did they decide to stop hiking and wait to be found?
- Did missing trail markers or too many trail crossings lead to their becoming lost?
- Did they become fatigued and try to find a shorter route back?

When the subject has finished, all of the previous points that were not covered during the narrative should be raised. Additional questions that could be asked are

- Did they have a map/compass/GPS and are they familiar with them?
- What could the searchers have done to find them quicker?
- Hypothetically, if they were unconscious during the search, do they think the searchers would have found them?
- Did the subject have any survival training? If so what?
- Once lost what did they do to increase their chances of survival?
- What did they do to increase their chances of detection?

Finally, they should be reminded of any medical advice given to them.<sup>1</sup>

However, be aware that occasionally not all subjects are totally candid with the interviewer. Some people find it difficult to be honest with Law Enforcement, which is confirmed when the evidence or clues are inconsistent with the narrative. Do not forget this!

### Section 10.2 Subject Not Located

On occasion the subject of the search is not located by the search efforts. This presents a set of difficult decisions for the Incident Commander and the Agency Administrator (AA).<sup>2</sup>

#### Determining to Transition to Limited Continuous Search

A search cannot continue indefinitely. Sometimes, even the most well-run searches fail to locate the missing person. One of the most difficult decisions that the IC and the IMT have to make is the decision to transition to a Limited Continuous Search, described on page 102. While the decision to transition is not “cut and dried”, there are several situations that can help the IMT determine when suspension should be considered. These include:

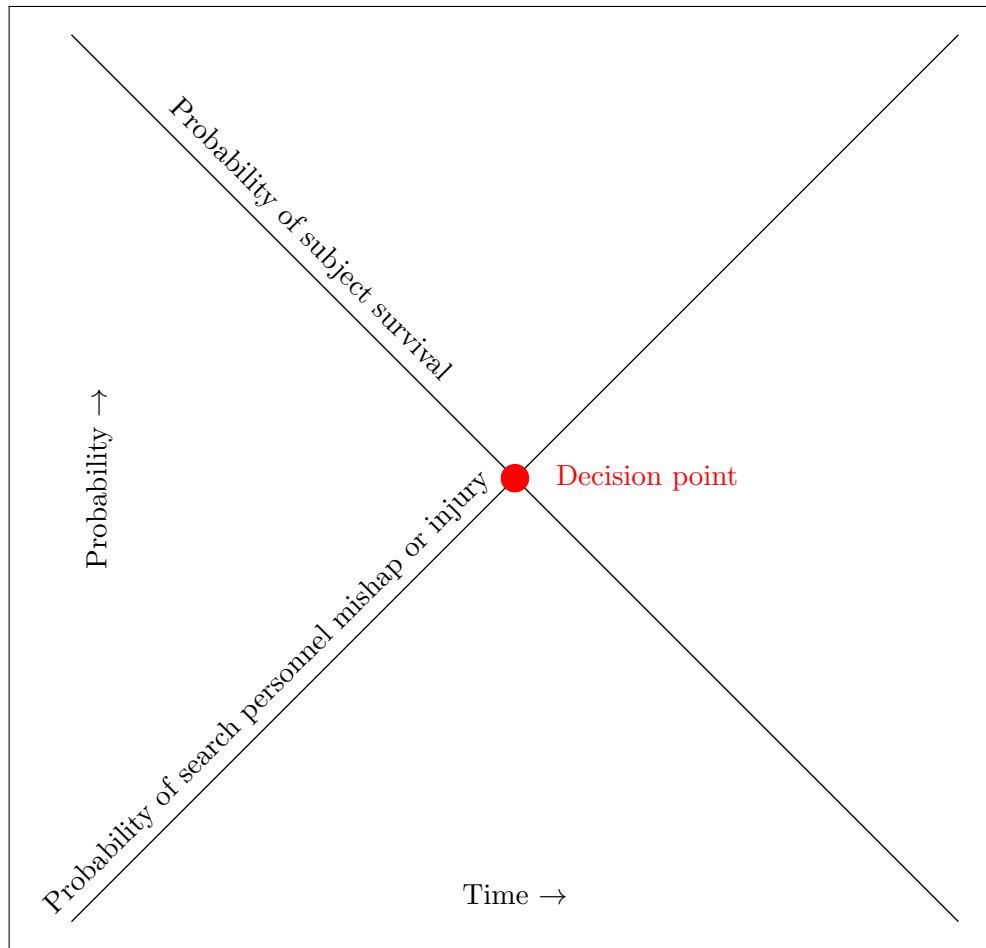
- The conditions make searching unsafe for SAR personnel.
- The available resources are exhausted, and additional, experienced resources are not readily available.
- The probability of significant search personnel mishap or injury exceeds the probability of subject survival. See Figure 10.2 on the next page.
- The missing person’s chances of survival are significantly diminished.
- Higher priority missions develop that are drawing resources from this incident.
- The investigation strongly indicates that the subject is not in the search area.
- The *ROW* (the probability that the subject is out of the search area) indicates that a transition is warranted.

Putting a time limit on a search—such as 3 days, and then reaching it—is not, by itself an acceptable reason to transition to a Limited Continuous Search. Numerous other factors must be evaluated and considered together before making the decision to transition.

*Putting a time limit on a search—such as 3 days, and then reaching it—is not, by itself an acceptable reason to transition to a Limited Continuous Search.*

<sup>1</sup> If the subject found and drank unpurified water in the field, then they should be advised of the possible repercussions and treatment.

<sup>2</sup> The Agency Administrator is the chief executive officer (or designee) of the agency or jurisdiction that has responsibility for the incident. The designee might be the person to whom the IC reports. Usually the Agency Administrator is not on scene. In Arizona, the Agency Administrator of an incident that occurs in a county is the Sheriff of that county. If the incident occurs on NPS land then the Agency Administrator is the superintendent of that park.



**Figure 10.2.** Probability of search personnel mishap or injury vs probability of subject survival, as a function of time

Because the decision to transition is so difficult, a consensus process, involving the IMT members and the AA, is often used to make the final decision.

Usually the IC makes the decision to evaluate whether to transition the search incident when one or more of these situations exist. At that point, all pertinent information about the incident should be gathered for consideration by the IMT and AA.

This information includes, but certainly is not limited to:

- Subject survivability tables and data tailored to the missing person’s profile and situation. For example, see Section 32.3 on page 274.
- Current *POAs* and *CPODs* for each search segment and the *ROW*.
- Extent of physical coverage of each segment and any areas that have not been actively searched (“holes in the search area”).
- Hazard locations and severity of each.
- Unresolved clues.
- Investigative information related to possible criminal activity.
- Current resource status and condition.
- Potentially available resources—number, kind, type, and location.
- Equipment problems.
- Short and longer range weather forecasts.
- Political or family pressures to continue the search (this information is usually provided by the IC).
- Financial information (cost of search to date, funding availability for continuing efforts).

- Other information considered critical to making the decision to transition the search.

A matrix such as that shown in Table 10.1, can be used to evaluate the IMT's conclusions on essential elements of the decision.

**Table 10.1.** Transition to Limited Continuous Search Matrix

Factor	Comments	For	Against
Survivability			
Search Area Coverage			
Likelihood in the ROW			
Hazards			
Unresolved Clues			
Investigative Information			
Resources condition			
Additional resources availability			
Equipment condition/function			
Predicted weather			
Financial considerations			
Political considerations			
Other considerations (list)			

The decision to transition a search incident then depends upon the IMT's and AA's assessment of how each factor individually affects whether or not to transition, as well as whether the combination of factors supports transitioning the search incident.

It is important to ensure that this process and the matrix, as well as pertinent information relating to the decision making process, is documented for the incident file. The IC ensures that the AA concurs with the decision. The IC and the AA make the announcement to the incident personnel, and the incident demobilization plan is implemented. Demobilization may not be immediate, because there may be some follow-up actions needed to complete field search assignments and the investigation of any unresolved clues.

The Incident Commander must gather the relevant data about the operation and make a recommendation to the Agency Administrator that the search be suspended. Suspension does not necessarily mean closed.

An effort should be made to collect DNA samples from parents, siblings, or descendants for submission to the CODIS Missing Person Database. These samples may be of use if unidentified human remains are located in the future that could be related to the search subject that was not found. A consent form must be signed by the donors of the DNA material and submitted with the samples that are to be included in the Missing Person Database (see Figure 10.3 on the next page). When unidentified remains are located and DNA is collected from those remains the profile can be uploaded into the Missing Person Database and a query is run once a week against standards that are in the database.

Additionally there is a Missing Persons Database called 'NamUs' is online at [www.findthemissing.org](http://www.findthemissing.org). An agency or an individual can enter missing person information into the database for comparison to other cases.

These tasks might be conducted by the Incident Investigator assigned to the case or by the SAR Coordinator.

### Limited Continuous Search Mode

The concept of Limited Continuous Mode is the state of the incident where there is no active searching but if clues are discovered they are investigated and, if warranted, active searching is resumed. In

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NATIONAL MISSING PERSONS PROGRAM

**Missing Person and Family Reference Sample Information Form**

Name of Missing Person: \_\_\_\_\_  
Last First MI

Missing Person's Date of Birth: \_\_\_\_\_ Age when missing: \_\_\_\_\_ Approx. Height: \_\_\_\_\_  
Sex of Missing Person: ☐ Female ☐ Male Medical Anomalies (scars, marks, tattoos, medical devices, etc.): \_\_\_\_\_

Race: ☐ African American ☐ Asian ☐ Caucasian ☐ Hispanic ☐ Native American ☐ Other (Please Specify) \_\_\_\_\_

Are dental records available? ☐ Yes ☐ No  
Date of Last Contact: \_\_\_\_\_  
Location of Last Contact: \_\_\_\_\_

Family Member Providing Reference Sample: \_\_\_\_\_  
Last First MI

Sex of Family Member: ☐ Female ☐ Male  
Race: ☐ African American ☐ Asian ☐ Caucasian ☐ Hispanic ☐ Native American ☐ Other (Please Specify) \_\_\_\_\_

Relationship of Family Member to Missing Person: \_\_\_\_\_  
Note: The most useful family reference DNA samples are from close blood relatives such as the missing person's biological mother, father, children, brothers, or sisters (indicated on chart below with an asterisk). However, close maternal relatives of the missing person allow for the analysis of both nuclear and mitochondrial DNA. If you have any questions regarding the selection of family members for reference sampling please call 1-800-753-3147.

**CIRCLE BOX BELOW INDICATING RELATIONSHIP TO MISSING PERSON**

Any of the shaded boxes represent a potential maternal relative. In addition, if the missing person is female, any of her children are also considered a maternal relative.  
\* Primary Donor for nuclear DNA

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NATIONAL MISSING PERSONS PROGRAM

**Consent for Collection, Testing and CODIS Entry Form**

Name of Missing Person: \_\_\_\_\_  
Last First MI

Family Member Reference Sample: \_\_\_\_\_  
Last First MI

Relationship to Missing Person: \_\_\_\_\_ NCIC No.: \_\_\_\_\_

I understand that the answers provided on this form are correct to the best of my knowledge. I fully understand that my answers are critical to the process of identifying my missing family member.

I freely and voluntarily consent to provide oral swab samples for DNA analysis and entry into the Combined DNA Index System (CODIS) database, maintained by the FBI under authority of Title 42, United States Code, Section 14132. Law enforcement agencies having online access to the missing persons database may search against my DNA profile for potential matches. I understand that the information I have provided is protected by the Privacy Act notices for the National DNA Index System and the FBI's Central Records System as most recently published in the Federal Register. I also understand that my sample will be destroyed and my DNA profile will be removed from the CODIS database once my family member has been positively identified.

I authorize the appropriate law enforcement agent listed below to collect these samples for the sole purpose of identifying my missing family member. I have witnessed my swab samples being collected, and a barcode label with my name has been attached to each swab handle. The swabs were then placed in the sample collection pouch and sealed.

Signature of family member or legal guardian giving consent: \_\_\_\_\_ Date: \_\_\_\_\_

I, on \_\_\_\_\_ at \_\_\_\_\_ a.m./p.m. have verified the identity of the individual who is providing the DNA sample. I then collected four swab samples from this individual, attached a label with his/her name to each swab, placed them in a sample collection pouch and then sealed the pouch.

Law Enforcement Agent collecting DNA swab samples: Print Name \_\_\_\_\_  
Signature \_\_\_\_\_

I understand that I am not required or obligated to provide a DNA sample, and that my consent to have a DNA sample taken is knowingly and voluntarily made. I further consent to the use of my DNA profile in the anonymous population database to aid in statistical inferences. The database will not contain any of my personal information, and the DNA profile cannot be associated with me as a donor.

Signature of family member or legal guardian giving consent: \_\_\_\_\_ Date: \_\_\_\_\_

Figure 10.3. Missing person DNA consent

Limited Continuous Mode the agency keeps the information about the case available to those working or recreating in the area.

If a search is suspended in an area where hunting takes place, then the investigating agency could work with a Game and Fish Department to send mailings to hunters who have drawn tags in the area so that they are alert for any potential clues while in the area. Posting flyers at land management agency offices where people are picking up a permit for use in the area can also be valuable. Finally there are many areas where biological, archaeological, or geological research is taking place. Researchers can be contacted to advise them about the missing person in the event that while doing field work they find a clue. Some carnivorous animals are tracked with satellite or radio collars and those animals may be attracted to a deceased person. Checking with researchers involved in that activity may also yield some clues.

When transitioning from active searching to Limited Continuous Mode it is important to involve the family, stake-holders, and any other pertinent external influence in the decision. If the family has been kept informed of the status of the search through regular briefings and meetings with the Incident Management Team as well as being consulted for their input into the operation, then it may be easier to obtain their concurrence that the incident should be suspended. The assistance of a Family Liaison Officer can be invaluable during an incident.

Political and media pressures also need to be addressed in the decision to suspend a search. Providing accurate information about the status of the search effort, the environmental conditions, and the factors that played into the decision to suspend, may alleviate some of that pressure. Briefing the family and other external influences about what happens next is important.

While a search is underway the conditions may deteriorate to the point that it is no longer safe to search. At that point the search may be suspended until conditions improve. While active searching



may be suspended it is worth considering whether it is safe to maintain containment and attraction points in the event that the subject is mobile and trying to reach a point of safety.

### Section 10.3 After Action Review

Following every search and rescue incident an After Action Review, AAR, should be conducted. An AAR is a tool designed to evaluate an incident in order to improve performance by supporting strengths and correcting weaknesses.

On small scale incidents the AAR may be informal and conducted around the hood of a vehicle or at the Incident Command Post, see Figure 10.4, while on larger and more complex incidents a more formal setting may be appropriate a short time after the incident is concluded.



**Figure 10.4.** Informal AAR

The goal of each type of review is the same. Important aspects of the AAR are determining

- What worked well.
- What did not work well.
- What should be done the next time.

The AAR is not the place to point fingers or place blame, rather it should be a point of learning so that improvements can be made and successful tactics are remembered.

A convenient pocket reference card was developed by Ken Phillips at Grand Canyon National Park. On one side of the card is the *Briefing Format for Emergencies* (described on page 87) and on the other side is the format for an After Action Review.

### After Action Review

What was planned?

- Objectives and expected actions.

What actually happened?

- Identify effective and non-effective performance.
- Review any non-SOP actions or safety concerns.

Why did it happen?

- Discuss reasons for ineffective or unsafe performance.
  - Concentrate on WHAT, not WHO, is right.

What can we do next time?

- Determine how to apply lessons learned next time.

The software program ICS-SAR, described in Section A.4 on page 360, includes a document called “After Action Review” that contains detailed tips and tactics for conducting a successful AAR.

On a small-scale incident the content of the After Action Review may not be documented but on large or more complex incidents it should be thoroughly documented, together with sharing the lessons learned from the search with others.

The basis of search management is lessons learned from past searches. Much of the success in the profession of search and rescue comes from learning from each other. Sharing the lessons learned and the near misses helps everyone.

*The basis of search management is lessons learned from past searches.*

## Section 10.4

### Demobilization

After a search team’s assignment is completed or the incident is concluded, the searchers are eager to head home. Unfortunately it is often the trip home after a mission that results in searchers being injured or killed in traffic accidents. See the Case Study on page 174. The Incident Management Team should formulate a demobilization plan that allows the search resources time to rest before leaving. Many volunteers are opposed to being forced to stay and rest, but it should be explained to them that the demobilization plan is designed for their safety. The demobilization plan should also contain a reminder to cancel resources en route.

## Section 10.5

### Critical Incident Stress Management

Incident Commanders need to consider the mental health in addition to the physical health of the searchers. While many search and rescue incidents end with the successful find or rescue of the subject, some result in finding the subject deceased, seriously injured, or not finding the subject at all. Additionally, it is possible that a searcher could have been injured or killed on an incident. These situations can create critical incident stress for the searchers and the incident management team. One way to deal with critical incident stress is to include a Critical Incident Stress Debriefing as part of the debriefing process. Trained Critical Incident Stress Management teams exist in many agencies and can be

requested to respond to the scene or to another location to assist the personnel involved in the critical incident. First responders have higher rates of PTSD and depression than the public at large and have a higher rate of suicide. That may be due to first responders being exposed to more critical incidents than the general public. One tool recently developed to aid first responders in assessing their own mental health following incidents is an app called “First–First Responder Health” which is freely available on the Apple App Store. This app allows responders to assess their stress prior to responding and create a mission log to keep track of their mood and stressors following an incident. The app also provides links to resources to help first responders deal with mental health issues. Resources tailored to backcountry responders are also available through Responder Alliance at <https://www.responderalliance.com/>.

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

- 10.1.** Discuss the types of conditions that might occur to cause the search to be suspended.
- 10.2.** Discuss why interviewing a subject that is found alive is important.
- 10.3.** Explain the concept of Limited Continuous Mode.
- 10.4.** Discuss the goals of an After Action Review.

### Quizzes

- 10.5.** If the missing person is found, the first priority is to ensure that all persons are accounted for. (a) True. (b) False.
- 10.6.** Finding the subject deceased increases the urgency of the incident. (a) True. (b) False.
- 10.7.** If the subject is found alive, a demobilization plan is not required. (a) True. (b) False.
- 10.8.** If the subject is located, the team that found them should (a) Report their location. (b) Assess the subject’s condition. (c) Suggest an appropriate means of evacuation. (d) All of the above.
- 10.9.** The preferred method for evacuating a found subject is by helicopter. (a) True. (b) False.

**10.10.** The final decision to suspend a search is made by (a) The Incident Commander. (b) The Agency Administrator. (c) The family.

**10.11.** The state of the incident where there is no active searching, but if clues are discovered they are investigated and active searching is resumed is called (a) Suspended. (b) Ongoing. (c) Limited Continuous Mode. (d) Closed.

**10.12.** When transitioning from active searching to Limited Continuous Mode it is important to involve (a) The family. (b) The media. (c) The local politicians. (d) All of the above.

**10.13.** A goal of the After Action Review after a subject has been found deceased is to (a) Assign blame. (b) Console the family. (c) Control the media. (d) Find out what did not work well.

**10.14.** The Incident Management Team should formulate a demobilization plan that allows the search resources time to rest before leaving. (a) True. (b) False.

**10.15.** Debriefing the found subject is not important. (a) True. (b) False.

**10.16.** A good summary of the interview with the subject can be invaluable in conducting the After Action Review. (a) True. (b) False.

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# CHAPTER 11

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## Documentation of Initial Actions

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### Section 11.1 Why Document?

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There is no argument—paperwork is a pain. However, documentation must not be neglected during the initial response.

*Documentation must not be neglected during the initial response.*

Careful documentation is critical in all phases of a search, including the initial response, for the following reasons.

- **Change of Incident Commander.** If the Incident Commander changes, the incoming Incident Commander must be appraised of all the searches conducted, of all the investigative information developed, and of the various scenarios that were discussed (and possibly eliminated) at the start of the search. This is particularly important if the hasty search goes beyond the Initial Response Operational Period.
- **Briefing.** Before a search team goes into the field, it needs to be briefed, so the team members understand their assigned task.
- **Debriefing.** After a search team comes out of the field, it needs to be debriefed to see how well the members performed their assigned task, and to identify the nature and location of any clues or hazards. This needs to be documented so that subsequent teams assigned to the same area are fully aware of the situation.
- **Search Status.** Having complete documentation of all aspects of the incident gives the Incident Commander the full picture when deciding whether to continue the search as is, or to escalate, de-escalate, or suspend the search.
- **Clues.** Clues need to be documented to ensure that they are not overlooked. If a clue becomes a piece of evidence in a criminal investigation, then the person who found it may be called to testify in court. Good documentation of the circumstances surrounding the discovery of the clue is essential.
- **Statistics.** Documentation is the basis for Lost Person Behavior statistics, the cornerstone of many searches.
- **Training.** Good documentation is invaluable for pinpointing the strengths and limitations of resources and plans, and can form the basis for future focused training.

- **Learning Tool.** Scrutinizing high-quality documentation is an excellent learning tool and resource for the inexperienced Incident Commander.
- **Table Top Exercises (TTXs).** Good documentation can be the foundation of realistic table top exercises.
- **Cold Case.** A subject may be found years after the search has been suspended. Careful documentation of the original search allows it to be reconstructed to assess whether the subject was in the search area and, if so, why the subject was not detected.
- **Legal.** Documentation serves an important legal purpose. In the event of a lawsuit, the documentation may be among the first items reviewed. It should be a contemporaneous record of the operation. It should be written at or as close to the time of the incident as possible, thus constituting the most timely record of the operation. A contemporaneous document is usually more reliable than an Incident Commander's memory when sitting on a witness stand months or years after the incident.

*Documented information reduces confusion and misunderstanding.*

All sensitive documents should have a cover sheet for security reasons.

## Section 11.2 What to Document?

The “acid test” for the adequacy of documentation is whether the search managers, after the search is over, can describe all significant events that occurred during the incident. At a minimum the following should be documented.

1. The **Initial Report** (from dispatcher or reporting party) about what has happened, discussed in Section 4.2 on page 55. Document using the Initial Note in Win CASIE III (see Section A.7 on page 364).
2. The **Initial Lost Person Questionnaire** discussed on page 55.
3. The **Source** of all LPB characteristics and statistics used.
4. The **Search Urgency** using the Search Urgency Rating Chart shown in Table 33 on page 276 or by using Win CASIE III.
5. Possible **Scenarios** as described on page 66.
6. **Briefing** of resources as described on page 89.
7. **Debriefing** of resources as described on page 93.
8. **Clues** found.

*The “acid test” for the adequacy of documentation is whether the search managers, after the search is over, can describe all significant events that occurred during the incident.*

## Section 11.3 How to Document?

There are three complementary ways of documenting the initial response—using Predefined Forms, such as the ICS Forms; using Software such as the Initial Note feature of Win CASIE III, or Clue

Manager to track clues (see Section A.1 on page 358); and using Visual Aids, such as maps. These ideas are discussed in turn.

## Predefined Forms

There are a large number of predefined SAR forms available. Many can be downloaded from the web. The software program ICS-SAR<sup>1</sup> gathers a wealth of documents relevant to ICS and SAR in one place.

While most forms are completed by hand, some are completed electronically. In the former case, this requires that either the forms be printed before a search starts, or a printer be on scene, and, in addition, there needs to be a place to store the documents, such as an accordion file. In the latter case, a suitable method for organizing the electronic documents must be adhered to. A popular one is to create a folder with the name of the search, and possibly the incident number, either in My Documents, on the Desktop, or on a flash drive. Then, in that folder create subfolders named “IR”, “OP1”, “OP2”, .... See Figure 11.1. Subsequently store all forms (except those generated by Win CASIE III), in the appropriate subfolder. Such documents might include the IAP for the upcoming OP, investigative information, photos, etc.



**Figure 11.1.** Organizing electronic documents

From the point of view of the initial response, the following forms and checklists are useful.

1. **Lost Person Questionnaire.**
2. **ICS 201.** The Incident Briefing form provides the Incident Commander (and the Command and General Staffs assuming command of the incident) with basic information regarding the incident situation and the resources allocated to the incident. It also serves as a permanent record of the initial response to the incident. See Section 36 on page 288.
3. **ICS 214 Activity Log.** The Activity Log is used to record details of unit activity including strike team activity. See Section 36 on page 311.
4. **Scenario Record Sheet.** This sheet helps document the various scenarios considered at the start of the incident. See Figure 5.2 on page 69.
5. **Investigation Questions.** This checklist helps make a list of further information needed, who should get the information, when requested, the response, and when a response was received. See Figure 35.1 on page 284.
6. **Briefing Forms.** See Chapter 8 on page 87.
7. **Debriefing Forms.** See Chapter 9 on page 93.
8. **Clue Report and Clue Log.** These are blank forms for reporting individual clues and for logging all clues.

## Software—Win CASIE III and the Initial Note<sup>2</sup>

The software Win CASIE III contains a very simple text editor, specifically designed for SAR incidents. During a hasty search it is used to create an Initial Note, which contains a large number of

<sup>1</sup> See Section A.4 on page 360.

<sup>2</sup> During the hasty search and initial response phase of a search, the more recent application IRO (Initial Response Organizer) is the software of choice.



templates. These templates are used in two different ways: they serve as reminders to the Incident Commander/Win CASIE III operator of the events to be documented, and they save the Incident Commander/Win CASIE III operator the chore of typing frequently used phrases. If the incident ends during the hasty search phase, then the Initial Note can be imported into a more feature-rich word processor, such as Microsoft® Word, for final massaging. It can also be appended to the ICS 201 form.

The best way to demonstrate the Initial Note is to supply a document from an actual search—see the example on page 364.

## Section 11.4

**Visual Documentation—Maps and Photos**

As the saying goes “*a picture is worth a thousand words*”.

*A picture is worth a thousand words.*

This is true in the visual documentation of search activity. It is often easier to explain the status of the situation with visual aids rather than text, especially when dealing with family members and agency administrators that may not have extensive search management knowledge. Visual aids are also invaluable to the search incident management staff and the searchers in order to quickly see what has happened and what is happening (see Figure 11.2). Much of the search planning done involves terrain analysis so maps and aerial photos are very useful.



**Figure 11.2.** Map on hood of Incident Commander’s vehicle at the scene of a search

When a search begins a map is one of the first items consulted in the search planning process. The IPP is immediately added to the map (using the letters “IPP-PLS” or the letters “IPP-LKP”, depending on how the IPP was determined). As the search progresses the locations of many other items are added—incident facilities, clues, segments, hazards, communication sites.

Traditionally paper maps, primarily topographic maps and aeronautical charts, were used to manage search operations. Increasingly computer-based mapping software systems are being used. The most common of these include SARTopo and Terrain Navigator Pro

These basic programs allow the user to visualize USGS topographic maps on the computer and place a variety of symbols on the map that can then be printed for field searchers or used in presentations to media, families, or agency briefings, with minimal training and experience with the software. These programs are extremely useful for SAR personnel and easily transportable on a laptop computer. More complex and powerful Geographic Information System (GIS) programs like ArcGIS and Global Mapper, are increasingly being used in search management. There are some free open-source GIS programs

available, including Geographic Resources Analysis Support System (GRASS). These systems, whether commercial or free, require a highly-trained operator. Many government agencies have a GIS department and may be able to supply a technical expert for the incident to prepare and analyze geographic information. An image of a map of the search area can be included in Win CASIE III's Audit Trail.

In addition to the topographic map sources there are other sources of geographic information that are becoming increasingly popular including GOOGLE Earth™ (see Figure 11.3) and Microsoft® Bing Maps. These sources provide aerial or satellite imagery that can be helpful in planning a search operation.



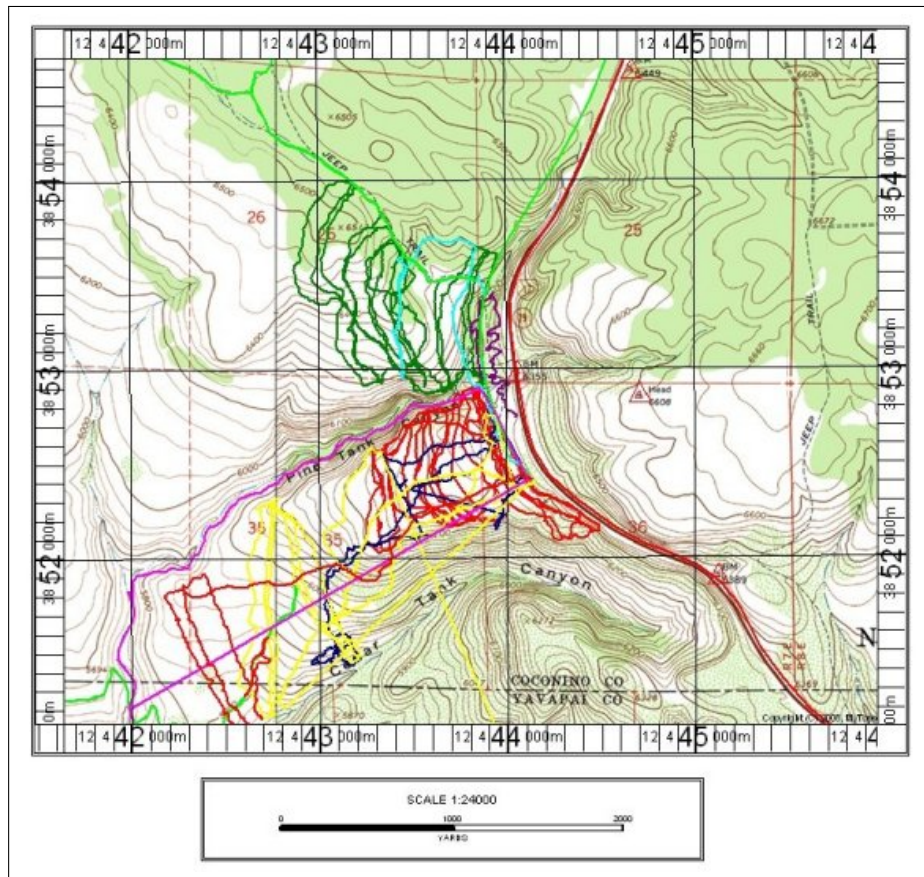
**Figure 11.3.** GOOGLE Earth™ image of Fort Valley near Flagstaff

There are some basic standard map symbols in use in incident and search management (see Figures 39.1 to 39.2 on pages 350–351). Many computer GIS programs have emergency management symbols included and available for use. It is important to use the standard symbols especially when working with multiple agencies. Standard symbols allow quick identification of the marks on the map.

When using maps, overlays or layers are commonly used. If a paper map is used it is useful to have acetate overlays to organize information. Each day of search activity can be documented on individual overlays. Clues can have a separate overlay. Acetate overlays, while effective, can be cumbersome. GIS systems, and to some extent other mapping software, can create many different layers with different information that can be turned on or off in order to visualize the information that is of interest.

When search teams return from an assignment a map should be used to debrief them and that map should be collected and included in the documentation. Many searchers carry Global Positioning System (GPS) units and, if they are left on to create a track while the team is searching then those tracks can be downloaded onto a GIS program and overlaid on the map providing an accurate account of where the search teams searched (see Figure 11.4 on the next page).<sup>3</sup> This is a very useful method of corroborating debriefing information.

<sup>3</sup> The most common formats for saving, exporting, and importing GPS tracks are GPX and KML. Those formats allow for the most versatility in using the data in a variety of mapping software.



**Figure 11.4.** GPS tracks overlaid on map generated with Terrain Navigator Pro

If a search incident management team expects to download GPS tracks it is important to have a variety of common GPS cables on hand as part of the incident command team's equipment (see Figure 11.5).



**Figure 11.5.** GPS connected to laptop running Terrain Navigator Pro

**Incident Command Team Visual Documentation Suggested Equipment**

- Topographic maps of search area (can be purchased USGS maps or custom topo maps generated from a GIS program).
- Planimetric maps such as USFS, BLM, or other road maps, for overview of area, roads, and property ownership information.
- Acetates for overlay.
- Dry erase markers of various colors for overlay.
- Tape (for posting maps and securing overlays).
- Laptop computer with Win CASIE III and map software or GIS program.
- Portable printer.
- Printer paper.
- Extra printer ink cartridges.
- Common GPS interface cables (for downloading GPS tracks).
- Extension cord and multiple outlets to provide power for computer and printer.
- Power inverter to provide power to computer and printer if in a vehicle.
- Paper and pencil.

In addition to maps there are other visual aids important to search documentation. Photos of the search subject and clues found in the field are important to include in the documentation in order to brief searchers and authenticate clues. Photos of the search area can be used to brief the family on the complexity of the search in the event that the family is not familiar with the search terrain. Media outlets may also ask for images of the search operation and, if appropriate, releasing some images can give the Incident Management Team some control over the information and images.

**Media Coverage**

Many SAR operations receive media coverage. It is important to monitor this coverage to see what message is getting out to the public. Newspaper articles should be collected and if possible television news stories should be recorded and included in the incident file. Public perception of how the incident is being managed is important. The media coverage also provides important historical information for review later.



## Exercises/Quizzes

**Talking Points, Check Your Understanding, and Exercises**

**11.1.** Explain why documentation is important in a SAR incident.

**11.2.** Explain what should be documented in a SAR incident.

**11.3.** Explain how the Initial Note helps to document a SAR incident.

- 11.4.** (a) Bud Weiser, a 5-year-old male, is reported missing by his stepfather, Sam Adams, from their camp ground in Byers Lake, Alaska, at 07:00. This is Bud's first camping trip, and neither he nor Sam have been to this area before. Sam thinks his step-son got up in the night to use the facilities, but he did not return. Bud always wears a blue baseball cap, day and night. Sam has a photo of Bud. Bud is in good health. It is summer and the temperatures are predicted to be between 40°F and 60°F for the next week with clear skies.
- (b) You are the search manager and are also the Win CASIE III operator. You know the immediate area very well, and are aware of the dangers of the lake and that grizzly and black bears were sighted in the area two days ago.
- (c) Open Win CASIE III. Open an Initial Note and incorporate into it these details together with the Lost Person Behavior characteristics of Bud.

This is continued in Exercise 11.5.

**11.5.** This is a continuation of Exercise 11.4.

- (a) Assess the Urgency Rating of this incident and add it to the Initial Note by cutting and pasting.
- (b) Estimate the Distance Traveled by someone like Bud. (Assume that the terrain is similar to Nova Scotia.) Do not add this information to the Initial Note. You will need it for the following item.
- (c) Estimate the Circular Search Area and add it to the Initial Note.
- (d) You have a helicopter, two canoes, and two hasty ground teams. At 09:30 you deploy all

your resources immediately along likely trails, drainages, ridges, and lake banks. Enter the deployment information into the Initial Note.

- (e) While the search is in progress, look through the Investigation list and discuss which items might apply to this incident.

This is continued in Exercise 11.6.

**11.6.** This is a continuation of Exercise 11.5.

- (a) At 10:00 you check on the status of each team, all of whom report in. Enter this into the Initial Note.
- (b) The subject was found in good health at 10:30 by one of the hasty teams about a mile from the camp ground. He was able to walk out without assistance. Enter this information into the Initial Note.
- (c) Save the Initial Note. Do **NOT** delete it.

This is continued in Exercise 26.7 on page 232.

**Quizzes**

**11.7.** The recommended place to store documents during a SAR incident is (a) In a box. (b) In an accordion file. (c) Spread on a table in the Incident Command Post. (d) In the trunk of IC's vehicle.

**11.8.** A popular place to store electronic documents is in a single folder in My Documents, on the Desktop, or on a flash drive. (a) True. (b) False.

**11.9.** During a hasty search, careful documentation is unimportant. (a) True. (b) False.

**11.10.** Documentation is the basis for Lost Person Behavior statistics. (a) True. (b) False.

**11.11.** Documenting clues in one place is important. (a) True. (b) False.

**11.12.** As long as the incident is documented, it is unimportant when it is done. (a) True. (b) False.

**11.13.** Using predefined forms, such as the ICS forms, is the only way to document a SAR incident. (a) True. (b) False.

**11.14.** The Initial Note is a predefined form.  
(a) True. (b) False.

**11.15.** When adding the location of the IPP to a map, the letters used are (a) “IPP”. (b) “IPP-PLS”. (c) “IPP-LKP”. (d) “IPP-PLS” or “IPP-LKP”.

**11.16.** The red symbol  $\otimes$  entered on a SAR incident map indicates the location of (a) The IPP. (b) The Incident Command Post. (c) The staging area. (d) A hazard. (e) No parking.

Everyone needs to get on board with ICS. Since most of our SAR missions are fairly simple and short term, we can get away with a lot. It's the long-term, complex operations where ICS is critical to our effectiveness. We all need to practice on the simple operations to be ready for the more challenging operations.

Chuck McHugh

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## CHAPTER 12

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# ICS—Incident Command System

### Background

This chapter is a brief introduction to the Incident Command System. For a more in depth understanding, either attend the ICS 100, 200, and 300 courses, or study Reference [Deal].<sup>1</sup> The software program ICS-SAR, see Section A.4 on page 360, is also a good source of information.

*Homeland Security Presidential Directive 5* requires that all federal agencies develop an Incident Command System (ICS) to facilitate a national, coordinated response to domestic emergencies.<sup>2</sup> A corresponding directive from then State of Arizona Governor Napolitano was issued stating that ICS will be used by all state agencies to manage all-hazard incidents, which includes SAR incidents.

According to Ken Hill,<sup>3</sup> *“The first function to break down in the search for a lost person is the management function, and when this happens it affects virtually every component of the search operation, most especially and unfortunately its outcome. When the [Incident Commander] loses control of the incident, confusion reigns, tempers flare, the media gets hostile, and the search becomes a protracted and painful ordeal.”*

Symptoms that the management of a SAR incident is malfunctioning include

- Lack of accountability (including unclear chain of command and supervision).
- Poor communication (including radio and terminology problems).
- Lack of an orderly, systematic planning process.
- Being reactive rather than proactive.
- Lack of documentation detailing what has been done.

These problems can be mitigated by using the Incident Command System (ICS).

*Problems with managing a SAR incident can be mitigated by using the Incident Command System.*

### ICS Overview

An ICS organization is modular and flexible.

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<sup>1</sup> Some ICS courses are available online. See <http://www.training.fema.gov/is/crslist.asp>.

<sup>2</sup> See [http://www.dhs.gov/xabout/laws/gc\\_1214592333605.shtm#content](http://www.dhs.gov/xabout/laws/gc_1214592333605.shtm#content).

<sup>3</sup> Part of this chapter is based on the ideas of Ken Hill (Reference [Hill 1]). Used with permission.



- It develops in a top-down fashion. Initially there is usually only the Incident Commander in the organization, but as the incident becomes larger and more complex, the size of the organization grows. Then, as the incident winds down, the organization shrinks. So the organization expands and contracts as needed.
- The incident objectives determine the organizational size.
- Only functions/positions that are necessary are filled. The responsibilities of unfilled functions/positions are assumed by the immediate superiors.
- There is an orderly line of authority within the ranks of the incident management organization (Chain of Command).
- Every individual has one, and only one, designated supervisor to whom they report (Unity of Command).

The ICS provides consistent and efficient guidelines for the management of an incident, so that

1. The roles and functions of the **Incident Management Team**, are clearly defined and coordinated ensuring that search management is a team effort.
2. **Sound Management Principles** are specified and used permitting leaders to maintain control of the incident.
3. **Common Terminology** is provided allowing people to communicate effectively.
4. All actions taken on behalf of the lost subject are goal-directed rather than resulting from isolated decisions: that is, they are driven by operational objectives, thereby contributing to an overall **Incident Action Plan** for finding the subject.
5. All decisions, clues, and activities are **Documented**. ICS provides a comprehensive set of forms for keeping a written record of the incident. See Chapter 36 on page 287. These forms are available in ICS-SAR, (see Section A.4 on page 360), and Win CASIE III (see Section A.7 on page 363).

These concepts are discussed in turn. However, to quote Paul Anderson, “*in practice ICS is not as organized as it appears, and it often takes more than one Operational Period before all components of the system are synchronized.*”

### 1. Incident Management Team (IMT)

The Incident Management Team is the overhead team responsible for managing the search and devising an Incident Action Plan for finding the lost person. There are five basic functions that must be performed during the incident. See Figure 12.1, which shows the ICS Structure, and Figure 12.2 on the next page, which shows the Incident Management Team.

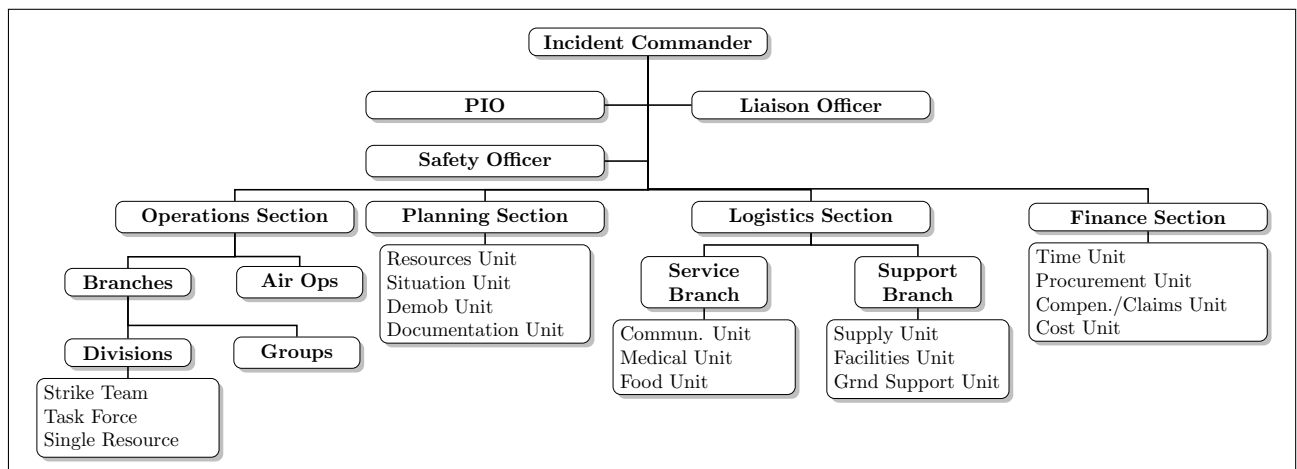


Figure 12.1. ICS Structure

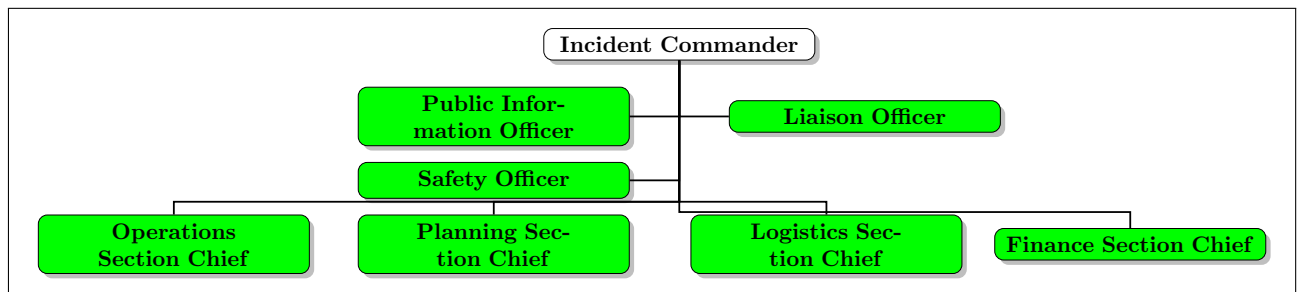


Figure 12.2. The Incident Management Team

a) **The Command Function**

Although search management is a team effort, someone has to be responsible for leading the overhead team and overseeing all on-scene activities. The person who performs this function is called the Incident Commander.<sup>4</sup> They set the Incident Objectives and ensure that other members of the overhead team implement those objectives. While they supervise the performance of other search functions (for example, decisions concerning search tactics), they do not become overly involved with any particular function, because this detracts from their ability to maintain “the big picture” on the incident. The Incident Commander delegates authority, but not responsibility.

*The Incident Commander delegates authority, but not responsibility.*

As needed, the Incident Commander delegates some authorities to the Command Staff: the Public Information Officer, the Safety Officer, and the Liaison Officer. See Figure 12.3.

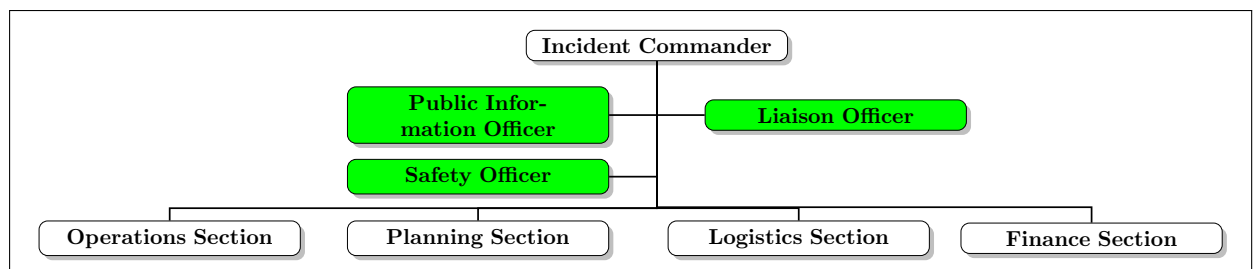


Figure 12.3. The Command Staff

- i. **Public Information Officer (PIO).** The PIO is responsible for interfacing with the public and media and/or with other agencies with incident-related information requirements.<sup>5</sup> The PIO should provide a briefing to incident personnel about handling media interactions including how media releases will be handled and what is and is not acceptable to the IMT with regard to social media posts by individuals on the incident.
- ii. **Family Liaison Officer (FLO).** The FLO is becoming a critical addition to the Incident Management Team. The Family Liaison Officer serves as a point of contact between the family of the SAR subject and the IMT. The FLO can aid the IMT in communicating the status of the mission to the family and relaying concerns of the family back to the IMT. This position is especially important when the mission may be transitioning to a Limited Continuous Search or after the subject of the search has been located deceased. Position specific training is beginning to appear including a book titled “When Accidents Happen” and a course by Moose Mutlow.

<sup>4</sup> A Job Action Sheet for the Incident Commander can be found in Table 38.2 on page 338.

<sup>5</sup> A Job Action Sheet for the Public Information Officer can be found in Table 38.6 on page 346.

- iii. Safety Officer (SO). The SO monitors incident operations and advises the Incident Commander on all matters relating to operational safety, including the health and safety of emergency responder personnel.<sup>6</sup>
- iv. Liaison Officer (LOFR). The LOFR is the point of contact for representatives of other governmental agencies, nongovernmental organizations, and/or private entities.

b) **The Planning Function**<sup>7</sup>

Searching for a lost person involves gathering information (lost person data, witness reports, clues, weather forecasts, etc.) and, based on that information, acquiring and applying search resources (ground searchers, helicopters, dogs, etc.) to specific areas of the search. The Planning Section Chief performs this function (in consultation with the Operations Chief and approved by the Incident Commander).<sup>8</sup> They take the Incident Objectives (for example, “Contain the subject to within an area of 8 square miles.” “Search high probability areas with a high probability of detecting the subject.” “Find the subject before nightfall.”) set by the Incident Commander and translates them into an operational strategy, including an assessment of the resources necessary to implement the strategy. For example, in an Area Search they are responsible for segmenting the search area on a map and—based on a review of the behavior of past lost persons of a similar type—assigning probabilities that the subject is located within each segment; they decide where to set up containment points for keeping the subject from leaving the area; and they keep a careful record of the extent to which different segments of the search area have been searched.

*The Planning Section Chief takes the Incident Objectives set by the Incident Commander and translates them into an operational strategy, including an assessment of the resources necessary to implement the strategy.*

Generally, the Planning Section Chief is in charge of both documentation (keeping accurate records of search progress) and investigation (acquiring the information necessary to conduct a successful search).

As needed, the Planning Section Chief delegates some authorities to the Resources, Situation, Demob, and Documentation Unit leaders.

- i. Resources Unit Leader. The Resources Unit ensures that all assigned personnel and other resources have checked in at the incident. This unit keeps track of the current location and status of all assigned resources and maintains a master list of all resources committed to the incident.
- ii. Situation Unit Leader. The Situation Unit collects, processes, and organizes ongoing situation information. It prepares situation summaries, develops projections and forecasts of future events related to the incident, and prepares maps and gathers and disseminates information and intelligence for use in the IAP.
- iii. Demobilization Unit Leader. The Demobilization Unit develops an Incident Demobilization Plan that includes specific instructions for all personnel and resources that require demobilization.
- iv. Documentation Unit Leader. The Documentation Unit maintains accurate and complete incident files, including a complete record of the major steps taken to resolve the incident. It

<sup>6</sup> A Job Action Sheet for the Safety Officer can be found in Table 38.7 on page 348.

<sup>7</sup> The 300-page PDF book “Find ’Em: A Guide for Planning the Missing Person Incident Response” written by Paul Anderson, Aaron Dick, David Lovelock, and Greg Stiles, is devoted entirely to the Planning Function. It is available from <http://www.saraz.org/SARAZNew/> at no cost.

<sup>8</sup> A Job Action Sheet for the Planning Section Chief can be found in Table 38.3 on page 340.

provides duplication services to incident personnel; and files, maintains, and stores incident files for legal, analytical, and historical purposes.

c) **The Operations Function**

The Operations Section Chief makes tactical decisions<sup>9</sup> about how to apply available resources to implement the search strategy set by the Planning Section Chief.<sup>10</sup> For example, if the Planning Section Chief wants a certain degree of coverage in a particular segment, the Operations Section Chief decides whether to use grid searchers, trackers, dog teams, aircraft, or some other search resource in order to complete the search strategy. They prepare the assignments and commit searchers to the field.

*The Operations Section Chief makes tactical decisions about how to apply available resources to implement the search strategy set by the Planning Section Chief.*

As needed, the Operations Section Chief establishes Divisions and Groups. Divisions are associated with physical or geographical areas of operation within the search area, for example, “Division A consists of Segments 1 through 7”. Groups are associated with functional areas of operation for the incident, for example, the Medical Group or the Investigative Group.

d) **The Logistics Function**

Logistics is an important supportive function. Someone has to ensure that searchers are fed and have a place to rest, that adequate transportation is available, that a communications system is established, that helicopters have a place to land, that medical services are available for injured searchers, and that order is maintained at the search base. Anything that is necessary to support the search incident is provided and supervised by the Logistics Section Chief.<sup>11</sup>

*Anything that is necessary to support the search incident is provided and supervised by the Logistics Section Chief.*

e) **The Finance/Administration Function**

The Finance/Administration Function is responsible for managing all financial aspects of the incident. Not all incidents require a Finance/Administration Section. The Finance/Administration Section Chief processes workers compensation claims, contracts, payment for paid personnel, and equipment time-keeping. These functions are very important and while the Finance Section Chief is not seen on many incidents the Incident Commander is responsible for making sure that these issues are handled. While less likely in a SAR incident the Finance/Administration Section Chief can have significant influence over strategy and tactics based on the money available for the incident.

## 2. Sound Management Principles

As applied to search and rescue, ICS specifies a number of guidelines for optimal management of the search incident. Some of these include:

- **Operational Periods (OP).**

The number of hours for which search managers can remain effective, rational decision-makers is limited. Normally, the quality of thinking processes begins to wane after 8 hours of duty and

<sup>9</sup> A Job Action Sheet for the Operations Section Chief can be found in Table 38.4 on page 342.

<sup>10</sup> Strategy involves the “big picture”—the overall plan, and how those plans will achieve the goals and objectives. A tactic is an action that leads to the execution of the strategy. For example, a strategy might be to search particular segments. The search technique used to search a particular segment is a tactic. For an in depth discussion of the difference between Objectives, Strategies, and Tactics, see the document “Objectives, Strategies, and Tactics in Search and Rescue”, which can be downloaded from <http://www.saraz.org/SARAZNew/> under the Documents menu.

<sup>11</sup> A Job Action Sheet for the Logistics Section Chief can be found in Table 38.5 on page 344.

becomes severely impaired after 12 hours. The usual full operational period therefore consists of 12-hour shifts, with an overlap of approximately one hour at shift changes so that the next overhead team can be adequately briefed. In other words, the work shift is longer than the Operational Period. In urban searches the Operational Period is sometimes set at 8 hours, rather than 12. The start and length of the second and subsequent operational periods should be proposed by the Planning Section, confirmed by the Logistics Section, and given final approval by the Incident Commander. The operational period is the period of time scheduled for completion of a given set of actions called for in the IAP.

- **Manageable Span of Control.**

The number of people that a manager can effectively supervise is limited, especially during a SAR incident. ICS recommends that the number of supervised people is between 3 and 7, with 5 suggested as an optimum. When the number becomes larger than this, it is time to delegate authority to assistants, to whom the manageable span of control also applies. The size of the current organization and that for the next operational period are determined through the incident planning process.

*ICS recommends that the number of supervised people is between 3 and 7, with 5 suggested as an optimum.*

- **Decision by Consensus and Consultation.**

In search management, the basic tenet is “Never Plan Alone”. Consultation requires discussion, and discussion facilitates a rational and systematic approach to search planning, where ideas are analyzed and reevaluated through dialogue. For example, although the Incident Commander has sole responsibility for establishing the incident objectives, they consult with members of the overhead team before doing so. Similarly, the Planning Section Chief draws upon all available expertise when assigning priorities to different segments of the search area.

- **Being Proactive Rather than Reactive.**

A proactive search manager anticipates events before they occur and is fully prepared to cope with emerging problems or difficulties. Bad weather, injuries, accidents, equipment failures, and the depletion of resources are planned for rather than merely reacted to. Most importantly, search managers must have at their disposal a preplan, which guides many of the decisions that have to be made during a search emergency. A good preplan anticipates such problems and suggests optimal courses of action for each.

- **Resource Management.**

Resources at an incident must be managed effectively. Maintaining an accurate and up-to-date picture of resource utilization is a critical component of incident management.

*Maintaining an accurate and up-to-date picture of resource utilization is a critical component of incident management.*

Resource management includes processes for:

- Ordering resources.
- Dispatching resources.
- Categorizing resources. For example, there are three ways to temporarily organize resources: as single resources, as strike teams, or as task forces.
  - ◇ **Single Resources.** As the name implies, a single resource is an individual piece of equipment, or group of individuals, with an identified supervisor. Examples of a single resource are: a helicopter with pilot, an air scent dog with handler, a UAV with “pilot”, an ATV with driver, a hasty search team with leader.

- ◇ **Strike Teams.** A strike team consists of resources of the same kind with common communications and a leader. Examples of a strike team are: an 8-man team created from four 2-man hasty teams to search a segment, or two horses and their riders.
- ◇ **Task Forces.** A task force consists of resources of different kinds with common communications and a leader. An example of a task force is two ground search teams and a mounted patrol to search a segment and provide containment at the segment boundary.
- Tracking resources. The status of a resource that is checked-in but not checked out, falls into one of three categories.
  - ◇ Assigned. Currently working on an assignment under the direction of a supervisor.
  - ◇ Available. Ready for immediate assignment and has been issued all required equipment.
  - ◇ Out-of-Service. Neither available nor ready to be assigned (for example, maintenance issues, rest periods).

The physical process of keeping track of resources can be done in various ways, using

- ◇ **Physical T-Cards.** This consists of two objects: a rack, containing many slots, and color-coded index cards shaped like a T. The racks columns are frequently thought of as “Checked In”, “Assigned”, “Available”, “Out Of Service”, and “Checked Out”. The cards fit in the slots with just the top of the card showing. The color determines the kind of resource. When a resource checks-in, they fill in an appropriate T-Card. The purpose of T-Cards is to give a visual state of the search. See Figure 12.4.



**Figure 12.4.** T-Card Rack

There are disadvantages when using T-Cards in a SAR incident.

- A T-Card rack is not always available.
- It takes time to fill in a T-Card.
- In the typical ICS setting, there are seven kinds of T-Cards: Aircraft, Crew, Dozer, Engine, Helicopter, Miscellaneous, and Personnel, which are not SAR oriented.
- In order to record the status of the search at the current time, the rack must be photographed.
- ◇ **Electronic T-Cards.** The software SAR T-Cards, see Section A.5 on page 361, avoids most of the disadvantages of the physical T-Cards, but requires a computer.

If neither of these resources is available, then their use can be improvised either by using different colored sticky notes, such as Post-it® notes, stuck on a flat surface, or by using a magnetic board.

- **Common Terminology**



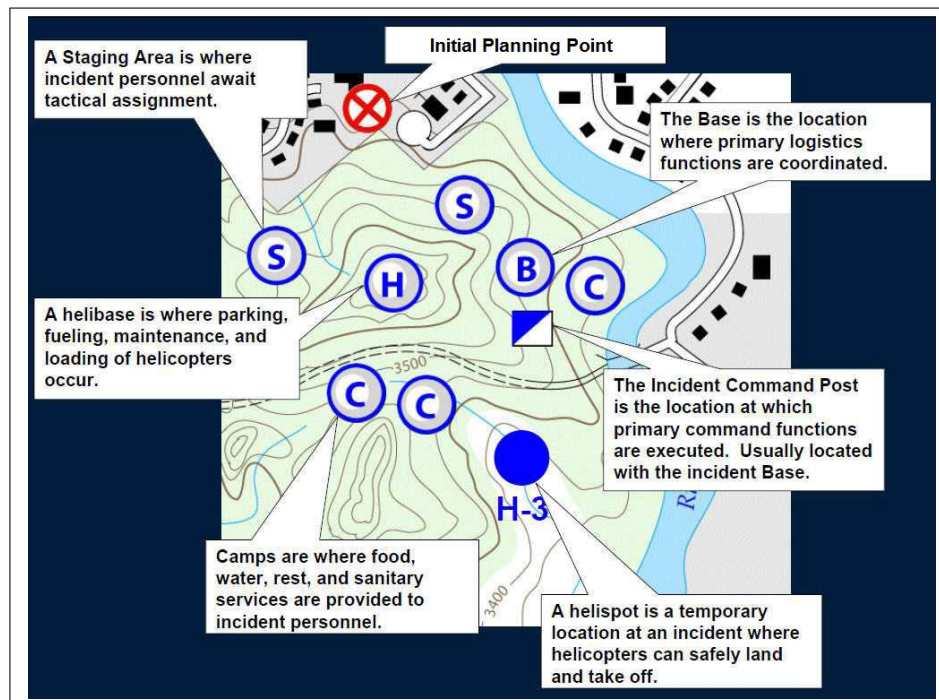
For effective management, everyone must speak the same language. A number of central terms basic to ICS have already been introduced, such as “Incident Commander” and “Operational Period”. Others follow.

- Position Titles. At each level within the ICS organization, individuals with primary responsibility have distinct titles, as do their assistants. See Table 12.1. Titles provide a common standard for all users, and also make it easier to fill ICS positions with qualified personnel. ICS titles often do not correspond to the titles used on a daily basis.

**Table 12.1.** ICS Position Titles

Organizational Element	Position Titles	Support Position Titles
Incident Command	Commander	Deputy
Command Staff	Officer	Assistant
General Staff	Chief	Deputy
Branch	Director	Deputy
Division or Group	Supervisor	—
Unit	Leader	Assistant

- Incident Facilities. Common terminology is used to designate the facilities in the vicinity of the incident area that are used in the course of incident management activities. See Figure 12.5.<sup>12</sup> These include
  - ◇ Incident Command Post (ICP), where the Incident Commander oversees the incident.
  - ◇ Staging Areas, where resources are kept while waiting to be assigned.
  - ◇ Base, where primary logistics functions are coordinated and administered.
  - ◇ Camps, where resources may be kept.
  - ◇ Helibase/Helispot, where helicopter operations are conducted.



**Figure 12.5.** Incident Facilities

<sup>12</sup> Downloaded from <http://training.fema.gov/EmiWeb/IS/ICSResource/assets/incidentfacilities.pdf>.

The terms “base camp” and “rendezvous” which are sometimes used in SAR, are not in the ICS vocabulary, and their use should be discouraged.

- Resource Descriptions. Major resources—including personnel, facilities, and major equipment and supply items—used to support incident management activities are given common names and are “typed” with respect to their capabilities, to help avoid confusion. ICS identifies resources as tactical or support resources.
    - ◇ Tactical Resources. Personnel and major items of equipment used in the operation.
    - ◇ Support Resources. All other resources required to support the incident (for example, food, communications equipment, supplies).
- In English, the expressions “type of resource” and “kind of resource” could be used interchangeably. Not so under ICS. The word “Kind” describes what the resource is, while the word “Type” describes its capability. For example, a helicopter is a kind of resource.
- Divisions and Groups are ways of partitioning an incident into manageable pieces. A Division is a geographical region established using boundaries. For example, if there were 12 regions to search, that exceeds the span of control, then the search area could be divided into two Divisions, called Division A and Division B, each containing 6 regions. A Group is a collection of people established by function, that is, what it does. For example, the Medical Group consists of the following people, or the Investigative Group consists of the following people.
  - SAR Buzzwords. More specific to SAR are the following important words that everyone involved with the management of a SAR incident should understand: Place Last Seen (PLS), Last Known Position (LKP), and Initial Planning Point (IPP), which have already been introduced, together with words that are to be introduced in later chapters: Consensus, Probability of Area (POA), Rest of the World (ROW), Probability of Detection (POD), and Cumulative Probability of Detection (CPOD).
  - Plain Language. The use of plain language, rather than 10-codes, in an emergency response is the ICS norm. However, if a subject is found deceased or injured it might be prudent to have agreed-upon language for these situations in case relatives inadvertently overhear sensitive radio traffic.

### 3. Incident Action Plan

All operational and logistical decisions are guided by reference to the Incident Action Plan (IAP), prepared by the overhead team for the next Operational Period. There is only one incident action plan per operational period, regardless of the number of agencies having jurisdiction or the number of different resources involved in the search. Basically, the IAP provides a framework for search strategy and tactics, keeps managers informed of the status of search resources, and encourages the overhead team to be proactive rather than reactive. Chapter 13 on page 130 is devoted to this, but here is an overview.

The most important components of the IAP are covered by adhering to the following order.

- What must be done? Identify the Incident Objectives by completing the ICS 202 form, see Section 36 on page 292. Incident objectives can be prioritized by
  - Life and Safety. Objectives that deal with immediate threats to the safety of the public and responders are the first priority.
  - Incident Stabilization. Objectives that contain the incident to keep it from expanding, and objectives that control the incident to eliminate or mitigate the cause are the second priority.
  - Property/Environmental Conservation. Objectives that deal with issues of protecting public and private property, or damage to the environment, are the third priority.
- Who is responsible for doing it? Create an organization chart of the overhead team by completing the ICS 203 form, see Section 36 on page 295.
- Who does what? Assign the resources by completing multiple ICS 204 forms, see Section 36 on page 298.

- A safety message is a critical component in the IAP. The safety message covers safety issues that may arise during the incident based on the objectives, the resources used, the weather, the location of the incident, and fatigue related issues. This is included in the ICS 204 form.
- How do we communicate with each other? Create a communications plan by completing the ICS 205 form, see Section 36 on page 300.
- What is the procedure if a searcher is injured? Create a medical emergency plan by completing the ICS 206 form, see Section 36 on page 305.
- Where is it happening? Create a map of the search area.

The Incident Action Plan is updated during the current Operational Period for the next Operational Period.

Every incident, large or small, requires some form of an IAP. For most incidents that are small, the IAP is developed by the Incident Commander and verbally passed on to subordinates and assigned resources.

*Every incident, large or small, requires some form of an IAP.*

#### 4. Documentation

All decisions, schedules, plans, forecasts, clues, reports, and investigative results should be documented in such a way that they are immediately accessible and legible. The “acid test” for the adequacy of documentation is whether the search managers (specifically, the Planning Section Chief), after the search is over, can describe all significant events that occurred during the incident. ICS provides most of the forms necessary for thorough documentation of the incident (see Chapter 36 on page 287).

### Unified Command

The primary difference between the single command structure and the UC, Unified Command, structure is that in a single command structure the Incident Commander is solely responsible for establishing incident management objectives and strategies. In a Unified Command structure, the individuals designated by their jurisdictional authorities jointly determine objectives, plans, and priorities and work together to execute them.

Figure 12.6 on the next page shows an example of a Unified Command ICS organization for an incident involving multiple jurisdictions.

While Figure 12.6 is an excellent command structure for most multiple-jurisdiction searches, it may be inadequate for searches involving missing or abducted children because of the possible criminal aspect of the incident. In this case, the magnitude of the event is too large for both the criminal case and the search to fall under the Planning Section Chief, who is concentrating on the search for the missing child. The structure outlined in Figure 12.7 on page 127 separates the criminal scenario from the search. The left-hand branch is the traditional single-command structure whose major objective is to find the missing child. The right-hand branch shows the structure of the criminal investigation. Liaison officers go back and forth between the two branches. This Unified Command Chart was developed by Yavapai County, AZ, working with a Child Abduction Response Team. The users in this group included members of the FBI CART Team (Child Abduction Response Team), Department of Corrections, Probation and Parole Departments, CPS (now known as Department of Child Services), US Marshals, and Investigative and Search teams in Yavapai County.

While this works well when all units understand and use ICS, it can cause problems if a unit does not do this. For example, if the Criminal Investigations Coordinator wants a particular region searched for evidence, they might ignore the UC structure and try to commandeer a ground resource under the command of the SAR Coordinator, without consulting that Coordinator.

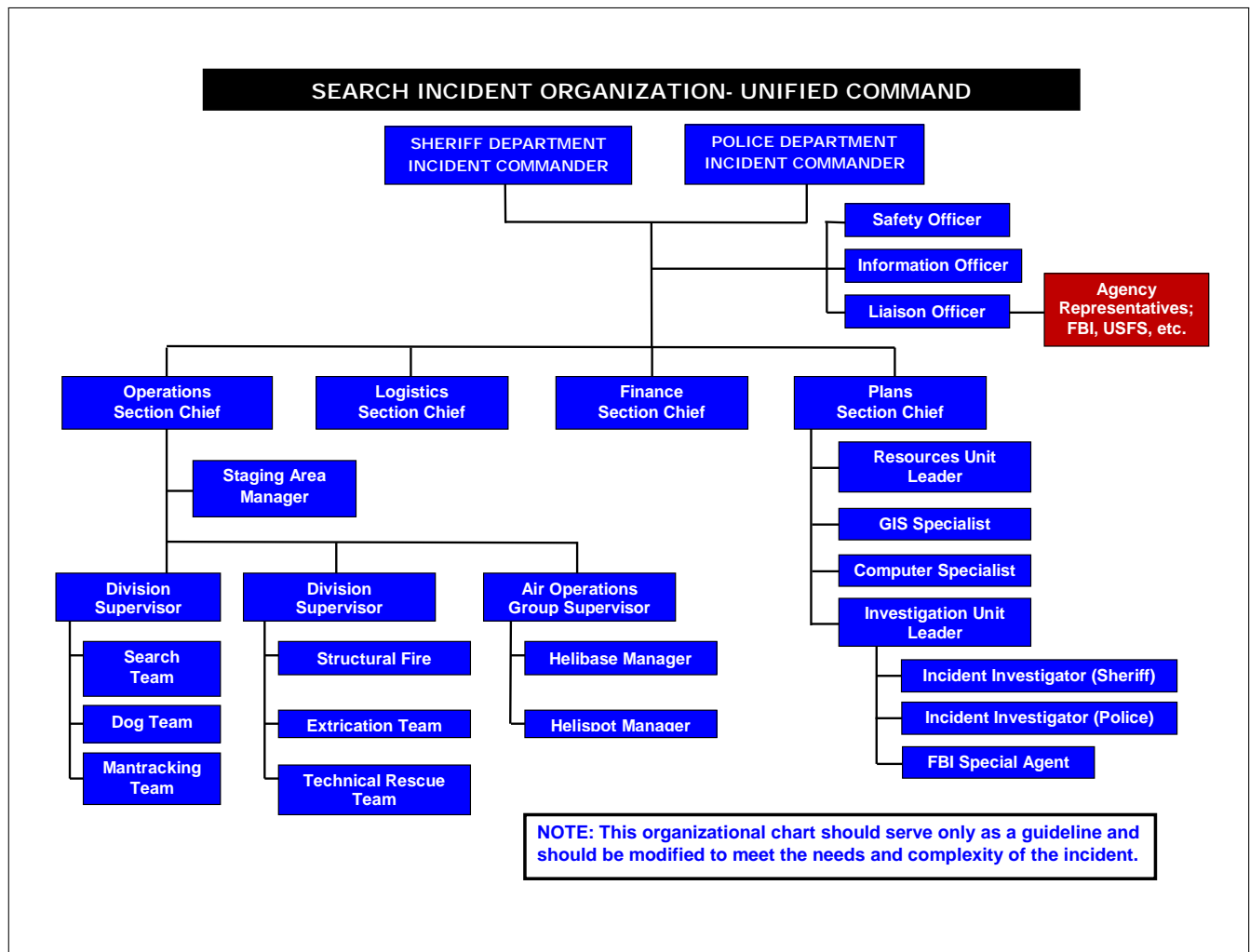


Figure 12.6. Unified Command

Note, these organizational charts serve as guidelines. They should be modified to meet the needs and complexity of the incident.

*Note, these organizational charts serve as guidelines.  
They should be modified to meet the needs and complexity  
of the incident.*

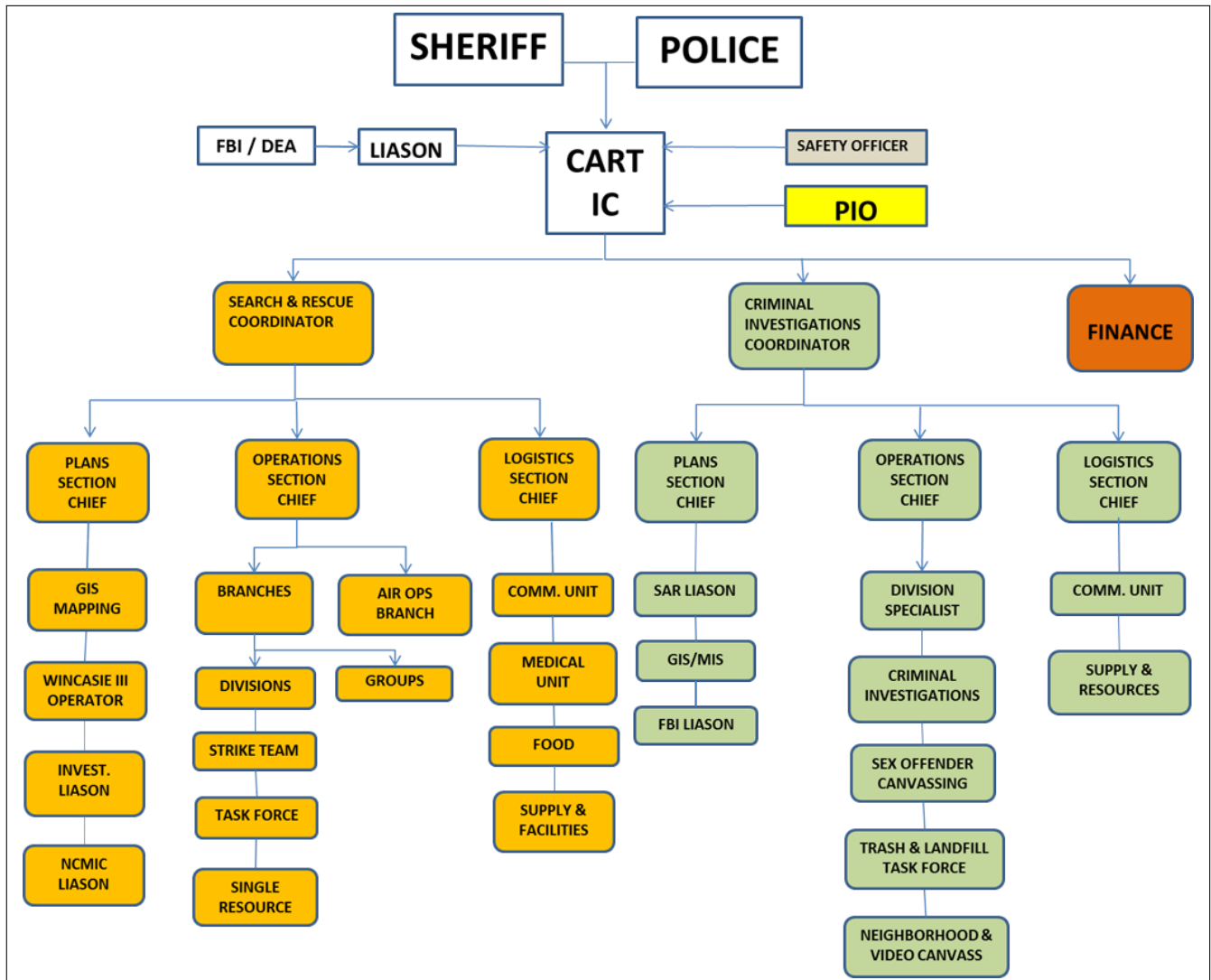


Figure 12.7. Unified Command for Missing or Abducted Child

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

**12.1.** Discuss the symptoms that indicate that the management of a SAR incident is malfunctioning.

**12.2.** Identify the five main functions of the ICS management structure.

**12.3.** Explain the roles of the Public Information Officer (PIO), the Safety Officer (SO), and the Liaison Officer (LOFR).

**12.4.** Explain the roles of the Planning Section Chief (PSC) and the Operations Section Chief (OSC).

**12.5.** Give examples of a Single Resource, a Strike Team, and a Task Force.

**12.6.** Identify the three categories into which the status of a resource, that is checked-in but not checked out, falls.

**12.7.** Describe to a layman what T-Cards are, how they are used, and their advantages and disadvantages.

## Quizzes

**12.8.** The ICS term that means that each individual involved in an incident has only one designated supervisor is called (a) Unified Command. (b) Unity of Command. (c) Unity of Planning. (d) Span of Control.

**12.9.** Under ICS, the General Staff consists of (a) The SO, PIO, and LOFR. (b) SO, PIO, and LOFR, and all the Section Chiefs. (c) All the Section Chiefs. (d) The IC and all the Section Chiefs.

**12.10.** Under ICS, which Section is responsible for check-in? (a) Operations. (b) Planning. (c) Logistics. (d) Finance.

**12.11.** Under ICS, what is the person in charge of a Unit called? (a) Chief. (b) Officer. (c) Leader. (d) Director.

**12.12.** Under ICS, which Unit is responsible for check-in? (a) Resource Unit. (b) Situation Unit. (c) Documentation Unit. (d) Ground Support Unit.

**12.13.** Resources may be Out-Of-Service because (a) Of mechanical failure. (b) Of the environment. (c) They are resting. (d) All of the above.

**12.14.** Which ICS Section develops the tactical assignments and organization, and directs all tactical resources? (a) Operations. (b) Planning. (c) Logistics. (d) Finance.

**12.15.** The general rule for Span Of Control in ICS is one supervisor to (a) 1 to 3 subordinates. (b) 3 to 7 subordinates. (c) 7 to 10 subordinates. (d) None of the above.

**12.16.** Span of Control relates to (a) How the Incident Commander controls the incident. (b) How the Governor interacts with the Incident Commander. (c) How we communicate with each other. (d) The number of individuals or resources that one supervisor can manage effectively.

**12.17.** Under ICS, the Command Staff consists of (a) The SO, PIO, and LOFR. (b) SO, PIO, and LOFR, and all the Section Chiefs. (c) All the Section Chiefs. (d) The IC and all the Section Chiefs.

**12.18.** Under ICS, the term PIO refers to the (a) Principal Information Officer. (b) Primary Information Officer. (c) Public Information Officer. (d) Private Information Officer.

**12.19.** What is the name of the facility from which the Incident Commander oversees all incident operations? (a) Base. (b) Staging Area. (c) Camp. (d) Incident Command Post.

**12.20.** Under ICS, the Incident Management Team consists of (a) The SO, PIO, and LOFR. (b) The IC, Command Staff, and General Staff. (c) All the Section Chiefs. (d) The IC and all the Section Chiefs.

**12.21.** Under ICS, Base Camp is the name of the facility within the general incident area (a) That is equipped and staffed to provide food, water, sleeping areas, and sanitary services. (b) Where resources report and are briefed when they arrive on scene. (c) Where the Incident Command Post is located. (d) Base Camp is not used in ICS.

**12.22.** Under ICS, Rendezvous is the name of the location (a) Where resources team up before going into the field. (b) Where resources report and are briefed when they arrive on scene. (c) Where the Incident Command Post is located. (d) Rendezvous is not used in ICS.

**12.23.** Under ICS, which section chief is responsible for staging? (a) Operations Section Chief. (b) Planning Section Chief. (c) Logistics Section Chief. (d) Finance Section Chief.

**12.24.** Under ICS, what is the difference between the Kind and Type of a resource? (a) None. (b) Kind describes what the resource is. Type describes its capability. (c) Kind describes the resources capability. Type describes what the resource is. (d) The terms Kind and Type are not used under ICS.

**12.25.** Which ICS Section provides support, resources, and all other services needed to meet the incident objectives? (a) Operations. (b) Planning. (c) Logistics. (d) Finance.

**12.26.** Which ICS Section prepares and documents the Incident Action Plan to accomplish the incident objectives, collects and evaluates information, maintains resource status, and maintains documentation for incident records? (a) Operations. (b) Planning. (c) Logistics. (d) Finance.

**12.27.** Under ICS, the term that means that there is an orderly line of authority within the ranks of the organization, with lower levels subordinate to, and connected to, higher levels, is called (a) Unified Command. (b) Unity of Command. (c) Chain of Command. (d) Span of Control.

**12.28.** An essential method for ensuring the ability to communicate is by using (a) Standard or common terminology. (b) Radio codes. (c) Jargon. (d) None of the above.

**12.29.** Transfer of Command moves the responsibility (a) For incident command from one Incident Commander to another. (b) For planning from one Planning Section Chief to another. (c) For operations from one Operations Section Chief to another. (d) For logistics from one Logistics Section Chief to another.

**12.30.** Transfer of Command occurs (a) When a more senior person arrives on scene. (b) When a more qualified person assumes command. (c) At 06:00 and 18:00 hours.

**12.31.** Every Incident Action Plan must have the elements ‘What must be done?’, ‘Who is responsible for doing it?’, ‘What is the procedure if someone is injured?’, and (a) How do we order resources? (b) How do we get resources into the field? (c) How do we communicate with each other? (d) None of the above.

**12.32.** Who has complete responsibility for the management of a SAR incident? (a) The Governor of the State. (b) The Incident Commander. (c) The most senior officer present. (d) The Agency Administrator. (e) The Sheriff of the associated county or the Superintendent of the associated National Park.



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## CHAPTER 13

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### IAP—Incident Action Plan

An IAP contains the general objectives reflecting the overall incident strategy and specific action plans for the incident.

Section 13.1

#### Why is an IAP Needed?

As stated in numerous places on the web, *“the Incident Action Plan (IAP) is a very important component of the ICS because it reduces freelancing and ensures a coordinated response. At the simplest level, an IAP has four elements.*

- *What do we want to do?*
- *Who is responsible for doing it?*
- *How do we communicate with each other?*
- *What is the procedure if someone is injured?”*

As far as a SAR incident is concerned, these four elements require the following to be in an IAP.

- The length and start time of the full-length operational periods, as opposed to the initial operational period. (Incident Commander)
- Identify the incident objectives, that is, where the Incident Commander wants to be at the end of the incident. (Incident Commander)
- Identify strategies—the general approach to accomplish the objectives. (Plans)
- Identify tactics—the methods developed to achieve the strategies. (Operations)
- An organization list with ICS chart showing the Incident Management Team. (Plans)
- Assignment lists with specific tasks. (Plans)
- A Safety plan to prevent responder injury or illness. (Safety Officer)
- A Communications plan. (Logistics)
- A Logistics plan containing, for example, procedures to supply equipment, food, . . . (Logistics)
- A Medical plan, containing the procedures for the care of injured resources. (Logistics)
- A map of the search area. (Plans)

Some of these items, such as the Medical plan, can be created ahead of time.

A written IAP usually contains the following items.<sup>1</sup>

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<sup>1</sup> There is a FEMA/EMI Independent Study course on ICS forms and IAP components, “IS-201: Forms Used for the Development of the Incident Action Plan”. It is a good review for those charged with putting together Incident Action Plans. <http://training.fema.gov/EMIWeb/IS/is201.asp>.

- A Cover Sheet, preferably a different color for each Operational Period.
- ICS 202, Incident Objectives.
- ICS 203, Organization Assignment List or ICS 207, Incident Organization Chart.
- ICS 204, Assignment List, developed from an ICS 215. One form for each assignment. Remember to create an ICS 204 for the investigations unit.

*Remember to create an ICS 204 for the investigations unit.*

- ICS 205, Incident Radio Communications Plan.
- ICS 206, Medical Plan.
- ICS 208, Safety Message/Plan.
- ICS 220, Air Operations Summary, if required.
- Maps.

A sample IAP can be found in Chapter 37 on page 321.

An IAP is prepared during the current Operational Period for the next Operational Period—and there is only one IAP per Operational Period. The IAP must be prepared, reproduced, and distributed in time for the Operations Briefing (discussed on page 136), which usually occurs about 30 minutes before the start of a new Operational Period.

During the Initial Response Operational Period two decisions are made that generally persist throughout the rest of the incident: the length and starting time of the first full Operational Period (Operational Period 1), and the incident objectives.

### The Length and Starting Time of the First Full Operational Period

Unlike the initial response, which can be any length, it is common for the length of a full SAR Operational Period to be 12 hours. When determining the starting time, the sunrise, sunset, and the weather should be factored in. It may be a mistake to make full operational periods coincide with the work shifts of the SAR coordinators. For example, during a summer desert search when sunrise is 0530, and the anticipated high is 120 °F, then, no matter what the work shift hours of the Incident Commander, 0530 might be a good time to start the Operational Period, requiring resources to assemble at 0500 for the Operations Briefing.

### The Incident Objectives

The incident objectives are determined by the Incident Commander, and are not limited to a single operational period but cover the entire incident. The incident objectives should be such that when all of them are accomplished the Incident Commander should either have found the lost subject or should seriously consider suspending the mission.

*The incident objectives are not limited to a single operational period but cover the entire incident.*

Objectives should be reviewed and validated at the beginning of each planning cycle during the IC/UC Meeting described on page 134. If an objective is no longer valid, then it should be dropped or revised. The initial incident objectives are usually written for a Route and Location Search. They may need to be adjusted if that search becomes an Area Search. Some of the objectives remain the same

such as “providing for the safety of incident personnel and the public” but the factors by which success or progress are measured may change.

Incident objectives must allow flexibility in strategy so that the Operations Section Chief has great latitude in deciding the tactics to achieve the objectives over the course of the incident. Any objective that specifies the strategy or tactics to be used during a specific Operational Period is not an incident objective.

Good incident objectives should also have the following SMART characteristics.

1. **Specific.** The wording must be precise and unambiguous in describing the objective.
2. **Measurable.** The design and statement of the objectives should make it possible to conduct a final accounting as to whether objectives were achieved.
3. **Action Oriented.** The objective must be an action that describes the expected accomplishments.
4. **Realistic.** Objectives must be achievable with the resources that the agency (and assisting agencies) can allocate to the incident, even though it may take several operational periods to accomplish them.
5. **Time Sensitive.** The time-frame should be specified.

Here are some examples of good incident objectives that follow the SMART characteristics.

- *Provide for the safety of all incident personnel and the public during each operational period.*
- *Continue investigation into the subject and circumstances of disappearance throughout the incident.*
- *Locate the subject by the end of the operational period and take appropriate actions.*
- *Provide timely and accurate public information to agency, family members, and the media in each operational period.*
- *Provide timely and accurate information to all remote camps and personnel to ensure that all members of the team have accurate and up-to-date information, as necessary.*
- *Attain a 60% CPOD in Segments 1—5 by 1800 hrs on May 3, 2011, weather permitting.*
- *Establish containment at the junction of trails 123 and 456 by 1400 hrs on May 2, 2011, and maintain throughout the incident.*
- *Maintain normal operations on Mount Lemmon highway throughout the incident.*

The incident objectives are entered on the ICS 202 form, shown on page 292, in box 3, “Objective(s)”.

## Who Prepares IAP?

Generally the existing literature on IAPs assumes that during the initial response most of the ICS positions are filled, whereas in SAR that is seldom true. During the Initial Response, it is not uncommon for the Incident Commander to prepare the bulk of the IAP alone, because, at this stage of a search, the Incident Commander is frequently the entire Incident Management Team.

However, once an Incident Management Team is in place, the IAP is prepared by the Planning Section Chief with input from the appropriate sections and units of the Incident Management Team.

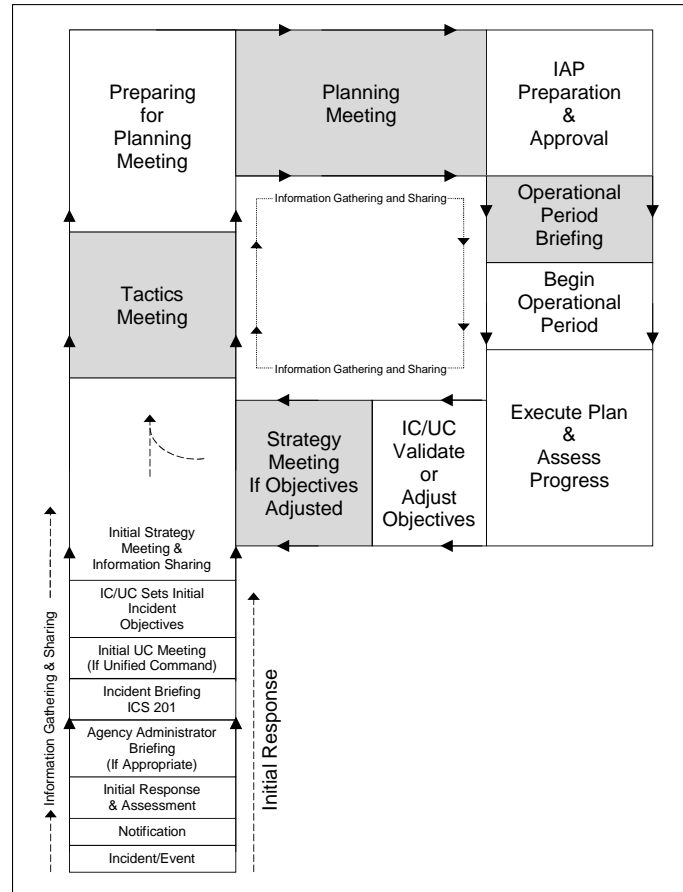
In a SAR incident, a written IAP plan is usually not necessary for the initial response. However, Multi-Operational Period searches, whether they be Route and Location or Area Searches, require a written IAP. Thus, during the initial response, and usually between the time the searchers are sent into the field and when they return, an IAP needs to be written for the first full Operational Period, Operational Period 1. Part of that plan identifies the members of the incoming Incident Management Team for Operational Period 1, and one of their tasks is to create an IAP for Operational Period 2.

If the IAP does not identify an incoming Incident Management Team then the Incident Commander continues to create an IAP alone, which may not be prudent.

## Section 13.2

# Preparing an IAP

A specified planning process has been developed as part of the Incident Command System to facilitate the development of an IAP in an orderly and systematic manner by the Incident Management Team. The Planning P, see Figure 13.1, outlines the planning process required to develop an IAP, assuming an Incident Management Team is in place.



**Figure 13.1.** The Planning P

The leg of the “P” represents the steps taken in the initial response phase of a SAR mission. During this phase the Incident Briefing Meeting is held, if there is a new Incident Commander coming in. It is designed so that the incoming IC/UC understands the incident and response well enough to prepare a formal IAP for the first full Operational Period. This is usually summarized on the ICS 201 form, which plays the role of the initial response IAP and briefing tool, and is in force until the response ends or the ICS 201 is superseded by a formal IAP. A possible agenda for the Incident Briefing Meeting follows.

### Possible Incident Briefing Meeting Agenda

1. Initial objectives.
2. Current organization.
3. Current situation.
4. Resources deployed, en-route and ordered.
5. Facilities established.
6. Current and planned actions.

The region above the top of the leg of the “P” in Figure 13.1 on the previous page represents successive Operational Periods, characterized by a series of meetings: the IC/UC Meeting, the Tactics Meeting, the Planning Meeting, and the Operations Briefing, leading to a new Operational Period when the entire process is repeated after the Execute Plan and Assess Progress step has been taken.

In order to create the IAP in time for the Operations Briefing, a strict timetable needs to be adhered to. Assuming that the first full Operational Period runs from 0600—1800 (and then 1800—0600), Table 13.1 shows a possible timeline for a 24-hour period.

**Table 13.1.** Possible IAP Timeline

Time	Event
0600	New Operational Period
0730	IC/UC Meeting
0830	Tactics Meeting
1030	Planning Meeting
1500	IC approves IAP for 1800 start
1730	Operations Briefing
1800	Operational Period Change
1930	IC/UC Meeting
2030	Tactics Meeting
2230	Planning Meeting
0300	IC approves IAP for 0600 start
0530	Operations Briefing
0600	New Operational Period

## IC/UC Meeting

The purpose of the IC/UC Meeting is to prepare the ICS 202 Form for the next Operational Period by evaluating the current actions and priorities. In order to do this, they have to assess the current objectives by answering the following questions.

- Is the incident stable or is it changing in size and complexity?
- Are the current objectives effective?
- What are the current strategies and tactics?
- What are the safety issues?
- What is current status of resources?
- Are there sufficient resources?

The Incident Briefing Form (ICS 201 Form, see Section 36 on page 288) and/or Incident Status Summary Form (ICS 209 Form) are reviewed by the Planning Section Chief, Incident Commander, Operations Section Chief, and other appropriate Incident Management Team members. The Incident Commander must update the current objectives if warranted.

## Tactics Meeting

The purpose of the Tactics Meeting<sup>2</sup> is to prepare the Operational Planning Worksheet (ICS 215 Form) for the next Operational Period.

<sup>2</sup> The Tactics Meeting is sometimes called the Strategy Meeting or the Pre-Planning Meeting.

Prior to the Tactics Meeting, the Planning Section Chief reviews the ICS 202 Form and the Incident Briefing Form (ICS 201 Form) and/or Incident Status Summary Form (ICS 209 Form) and provides the strategies necessary to satisfy the objectives.

The Tactics Meeting is scheduled and conducted by the Planning Section Chief. The length of the meeting is usually held to 15—20 minutes.

The Operations Section Chief provides the direction on how resources will be deployed to satisfy the Incident Commander's objectives. This blueprint of tactical deployment for the next Operational Period is developed and revised before the Planning Meeting where formal deployment of resources and assignments are finalized.

## Planning Meeting

The purpose of the Planning Meeting is to review and validate the IAP and to identify the resource requirements.

In preparing for the Planning Meeting the Planning Section needs to analyze the ICS 215 Form developed in the Tactics Meeting, and to review the Incident Action Plan Safety Analysis Form (215A) completed by the Safety Officer.

The purpose of the Planning Meeting is to present the draft IAP to the larger Incident Management Team community.<sup>3</sup> The gathering should include all the Command and General Staff positions. Unit leaders may attend as required. The Agency Executive or their representative may be present. Representatives from assisting and cooperating agencies may also be at the meeting. The Planning Section Chief facilitates the discussion and makes sure the required parties are present. This meeting should last no longer than thirty minutes.

A possible agenda for the Planning Meeting is on the next page.

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<sup>3</sup> It is not uncommon, on a large incident, for the IAP to be published in back-to-back booklet form.

## Possible Planning Meeting Agenda

1. Introductions and Ground Rules (Planning Section Chief)
  - Welcome.
  - Turn cellular telephones, pagers, and radios off.
  - Introductions all around.
  - Propose meeting time limit of 30 minutes.
2. Review Current Objectives (Incident Commander)
  - Go over point by point if needed.
  - Seek group consent.
3. Intelligence Update (Planning Section Chief)
  - Weather. Local 24 and 48 hours.
  - Subject profile and circumstances.
4. Operational Picture (Operations Section Chief)
  - Review search area map.
  - Discuss past operational period work.
    - Clues found, terrain difficulties. etc.
    - If appropriate, current segment *POA* and *CPOD*.
  - Discuss tactics for next operational period.
    - Identify Division/Group supervisors.
    - Go over specific tasks, locations, and resources assigned.
    - Special logistical concerns.
  - Use the ICS 215 as a reference during the briefing.
5. Safety (Safety Officer)
  - Review ICS 215A.
  - Identify any special or unusual safety concerns.
  - Confirm their support for the plan.
6. Command and General Staff Round Robin (Planning Section Chief)
  - Solicit input from other Incident Management Team members: Logistics, Finance, Information, Liaison.
  - Confirm their support for the proposed plan.
7. Solicit General Comments (Planning Section Chief)
  - Incident Commander.
  - Agency Executive.
  - Others.
  - Confirm support for the proposed plan.
8. Announcements (Planning Section Chief)
  - Next Tactics and Planning meeting times.
9. Closing Questions or Comments (Planning Section Chief)
  - Turn cellular telephones, pagers, and radios back on.
  - Thank You.

## Operational Period Briefing

The Operational Period Briefing (sometimes referred to as the Shift Change) is conducted at the beginning of each Operational Period. It is facilitated by the Planning Section Chief, and is designed to present the IAP to the resources. It should be concise. A possible agenda for the Operational Period Briefing is on the next page.



### Possible Operational Period Briefing Agenda

1. Planning Section Chief reviews IC/UC objectives and recent changes to IAP, that is, pen and ink changes.
2. IC/UC provides remarks.
3. Situation Unit Leader conducts Situation Briefing.
4. Operations Section Chief discusses current response actions and accomplishments.
5. Operations Section Chief briefs personnel on their assignments.
6. Logistics Section Chief covers transport, communications, and supply updates.
7. Financial Section Chief covers fiscal issues.
8. Safety Officer covers safety issues.
9. Public Information Officer covers public affairs and public information issues.
10. Planning Section Chief solicits final comments and adjourns briefing.

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

**13.1.** Explain why “Contain the subject” is a poor incident objective.

**13.2.** Explain why “Attain a 60% *CPOD* in Segments 1–5 by using grid searchers” is a poor incident objective.

### Quizzes

**13.3.** Under ICS, IAP stands for (a) Important Action Place. (b) Incident Area Plan. (c) Incident Action Plan. (d) Independent Activities Period. (e) Integrated Action Plan.

**13.4.** A written IAP usually contains the following ICS forms: 202, 203, 204, 205, and 206. (a) True. (b) False.

**13.5.** An IAP has to be written. (a) True. (b) False.

**13.6.** Full operational periods should coincide with the work shifts of the SAR coordinators. (a) True. (b) False.

**13.7.** The IAP incident objectives are determined by the Incident Commander, and cover the entire incident. (a) True. (b) False.

**13.8.** IAP objectives should be reviewed and validated during the (a) IC/UC Meeting. (b) Tactics Meeting. (c) Planning Meeting. (d) Operations Briefing.

**13.9.** Any objective that specifies the strategy or tactics to be used during a specific Operational Period is not an incident objective. (a) True. (b) False.

**13.10.** Once an Incident Management Team is in place, the IAP is prepared by the Operations Section Chief with input from the appropriate sections and units of the Incident Management Team. (a) True. (b) False.

**13.11.** Multi-Operational Period searches, whether they be Route and Location or Area Searches, require a written IAP. (a) True. (b) False.

**13.12.** The purpose of the IC/UC Meeting is to prepare the ICS 202 Form for the next Operational Period. (a) True. (b) False.

**13.13.** The purpose of the Tactics Meeting is to prepare the Operational Planning Worksheet (ICS 215 Form) for the next Operational Period. (a) True. (b) False.

**13.14.** The purpose of the Planning Meeting is to review and validate the IAP and to identify the resource requirements. (a) True. (b) False.

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## CHAPTER 14

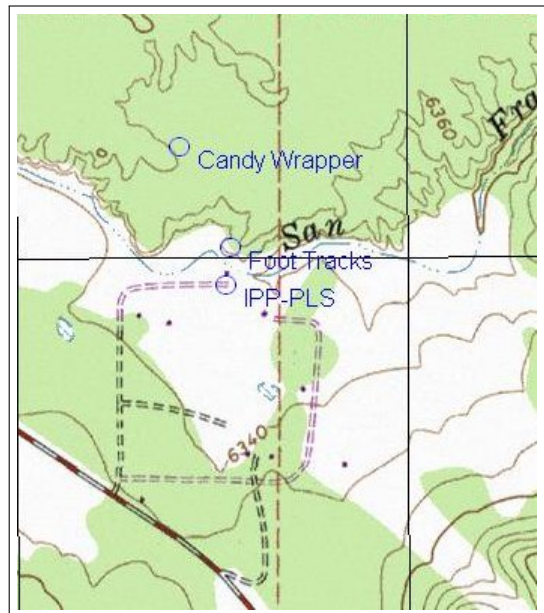
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### Clues

Although there may be only one subject of a search, that subject is constantly generating clues. Documenting, investigating, and authenticating the clues is a critical task.

The absence of clues in the area of a search is also a clue in itself. A distinct absence of clues may indicate the need to reevaluate the initial information and the location of the search for the missing person.

The location of clues and their pattern in conjunction with terrain analysis can provide important search tactic information (see Figure 14.1). Searchers, especially hasty teams, should be clue aware so that important clues in the field are not overlooked. While in most cases search incidents are not related to criminal activity that does occur. The clues found during a search that are important to the search can also be evidence in a criminal investigation.



**Figure 14.1.** Part of a map generated with Terrain Navigator Pro showing location of clues

Clues come in a variety of forms:

- Physical.
- Electronic.
- Witness reports.
- Investigative information.

**Physical** clues include foot tracks (see Figure 14.2), a blood trail, an abandoned vehicle, a campsite, items of dropped clothing (see Figure 14.3), a candy wrapper, and a note.



**Figure 14.2.** A foot track located on a search for a missing 2-year-old



**Figure 14.3.** Clothing dropped by the subject of a search in cold weather

**Electronic** clues include cell phone data (see Chapter 16 on page 156 for additional information on Cell Phones), email, web site visits, other computer forensic information, satellite emergency notification devices (SEND) information, other emergency beacons, and permit information.

**Witness reports** are also very important clues and should be evaluated by a trained interviewer.

**Investigative information** can also be considered clues and include use-permit information from a land management agency, financial information, criminal history, law enforcement database information, and medical history.

Information derived from the reporting party and documented in the Initial Response Checklist (shown on page 55) or the Lost Person Questionnaire (shown on page 55), can give information about the clues to expect. Proper briefing of the searchers about the types of clues to look for can increase their success in finding those clues.

*Proper briefing of the searchers about the types of clues to look for can increase their success in finding those clues.*

The briefing should include a reminder to employ **all** senses during a search: smell, sight, sound, and touch, in order to follow and/or detect the sign left by the missing person. Specific instructions should be given on how to treat clues. For example, probe found feces with a stick to get clues pertaining to the diet; check fly activity around the feces to indicate its age—a few flies may indicate it is fresh; check the color of found urine—a dark color is a possible indication that the missing person is becoming dehydrated. During the briefing, resources should be reminded of some of the factors that influence the clue-awareness of a searcher: inexperience, inattention, preconceived ideas or beliefs about the missing person, lack of sleep, fatigue, ego, fear, stress, mental and physical state, and not actively looking.

Once a clue is discovered by a searcher a decision must be made as to how to handle the clue. At a minimum the location, preferably GPS derived, should be relayed to the incident command so that it can be placed on a map. The location should also be flagged with the date, time, type of clue, and the name of the team that found it written on the flagging tape (see Figure 14.4 on the next page). The team should also photograph the clue. Because of the increased popularity of cell phones

with integrated cameras, it is possible for the team to photograph the clue and send that photo to the incident command. Depending on the nature of the clue the team may be asked to collect the clue and bring it in, or they may be asked to leave it in place for an investigator to examine and/or collect the clue. Some clues may have value for the collection of biological (DNA) or fingerprint evidence and so need to be handled with care to preserve that material.



**Figure 14.4.** Foot tracks protected at the scene of a search for a missing 2-year-old

Searchers are likely to find many clues during a search. Some of those clues can be ruled out quickly. For example, a search subject who has been missing for 12 hours may be known to drink a particular brand of soda. If a team finds a soda can of that variety, but it is sun-faded and filled with dirt, then it is unlikely that the can is related to the subject. Other clues may be fresh and not have specific identifying information. Those clues require more work to authenticate.

Some clues have specific information that allows relatively easy authentication such as a prescription bottle in the subject's name, a receipt containing credit card numbers, or a trail register signed by the subject. Some clues, such as foot tracks, quickly degrade with time and weather. Those types of clues need to be protected from further decay so that they can be processed and properly documented. If a team or individual is in doubt about a clue it should be reported so that the incident managers can make the decision. If possible, assigning a dedicated investigator to handle the investigation and authentication of clues can be of great help because some clues, once investigated, lead to more questions and additional clues.

In most cases the investigator should be a law enforcement officer. Law enforcement has access to specialized databases and resources that can be used to investigate and authenticate clues. More information about the role of the investigator can be found in Chapter 4 on page 54.

Keep in mind that if a search clue becomes a piece of evidence in a criminal investigation then the person who found it may be called to testify in court. Good documentation of the circumstances surrounding locating the clue is essential. In the field a searcher should make notes on the ICS 214 Activity Log (see Section 36 on page 311) and that Activity Log should be turned in to the Incident Management Team for inclusion in the incident file.

*If a search clue becomes a piece of evidence in a criminal investigation then the person who found it may be called to testify in court.*





- Date and Time Located
- Operational Period
- Paperwork Cross Reference
- Team that Located the Clue
- Person that Located the Clue
- The Type of Clue Found
- Clue Location/Coordinates
- Detailed Clue Description
- Photo and Photographer
- Image Location
- Instructions to Team
- Action Taken
- Clue Resolved
- Authenticity of Clue
- Prepared By
- Date and Time Prepared

Clue Manager starts a new collection of clues for each incident. The collection can be sorted by clues that are resolved and those that are as yet unresolved so that no clues are overlooked. This record of clues should be included in the incident documentation at the end of the search.

On an Area Search clues are also entered into Win CASIE III which, based on the authenticity and the potential influence to the *POA* of each segment, alters the *POA*'s and impacts the allocation of search resources.<sup>3</sup>

Remember that a search can be likened to a puzzle and clues are pieces to the puzzle. The job of the search team is to find the pieces to the puzzle and put them together to solve the puzzle. Every clue is important and could be the critical piece that drives the search to a conclusion.

*Every clue is important and could be the critical piece that drives the search to a conclusion.*

Finally, the clue logs and reports should be passed on to the incoming IMT.

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

**14.1.** Give an example of a physical clue that is not mentioned in this manual.

**14.2.** Give an example of an electronic clue that is not mentioned in this manual.

**14.3.** Give an example of a clue, which is not mentioned in this manual, that quickly degrades with time and weather.

**14.4.** Give an example of a clue, which is not mentioned in this manual, that can be ruled out quickly.

### Quizzes

**14.5.** The absence of clues in the area of a search is not helpful information. (a) True. (b) False.

**14.6.** Investigating every clue is important. (a) True. (b) False.

**14.7.** Proper briefing of the searchers about the types of clues to look for can increase their success in finding those clues. (a) True. (b) False.

**14.8.** Once a clue is discovered by a searcher (a) The location should be relayed to the incident command. (b) The location should be flagged. (c) The team should photograph the clue. (d) The team should do all of these.

**14.9.** One concern with clue forms is that there may be many clues developed and, if there is no

<sup>3</sup> *POA*'s are discussed in detail in Chapter 26 on page 225.

good accounting system in place, then a clue may be overlooked or lost. (a) True. (b) False.

**14.10.** In what way could the assistance of an investigator help in the interpretation of clues? (a) Clues can lead to more clues. (b) Makes it easier to authenticate a clue. (c) Allows further follow up and investigation into the clue. (d) All of the above.

**14.11.** Assigning an investigator to a search is beneficial when interpreting and authenticating clues. (a) True. (b) False.

**14.12.** During a search, if evidence is located as a result of a criminal investigation, the searchers will never appear in court. (a) True. (b) False.

**14.13.** What is the recommended method to document a multitude of clues during a search? (a) Use a yellow pad. (b) Use a spreadsheet. (c) Use Clue Manager. (d) Wing it. (e) All of the above.

**14.14.** Using Clue Manager during a search is helpful because it can (a) Sort information by clues. (b) Sort clues by resolved, unresolved, and pending. (c) Help ensure that no clue is overlooked. (d) All of the above.

**14.15.** There is a minimum number of clues that need to be found before a search can be suspended. (a) True. (b) False.



Even Noah got no salary for the first six months partly on account of the weather and partly because he was learning navigation.

*Mark Twain*

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# CHAPTER 15

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## Navigation

Increasingly computer based mapping programs, Geographic Information Systems (GIS), and Global Positioning Systems (GPS), are being used in SAR operations. These technologies have greatly enhanced the ability to maintain situational awareness, to document search activity, to help with search planning, and to provide accurate navigation information for use by teams in the field. As with most technologies there are some subtle issues that create significant problems if not properly understood. Map datum and coordinate formats were not a critical issue until the advent of GPS and mapping software.

This chapter does not aim to discuss backcountry navigation, but rather to address several issues that cause confusion and errors in navigation information, namely Map Datums, Coordinate Systems, and Compass Bearings.<sup>1</sup>

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### Section 15.1

### Map Datums

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There are several different map datums available in the United States. It is important to understand and know the datums used on an incident and to make sure that the GPS units employed on that incident match those used by everyone else.

Simply stated the map datum is a mathematical model of the size and shape of the earth. The problem is that not all map datums agree. Suppose one cartographer believes that the earth is shaped like a very large football and devises a mathematical model to identify locations on the earth based on this notion, while another cartographer believes that the earth is shaped like a soccer ball and devises a mathematical model for locations based on that notion. A particular point on the earth would have significantly different descriptions depending on which of these models is used. These two models help to pinpoint the issue with map datums.

The most common map datums in use in the United States are called NAD27 (North American Datum 1927), NAD83 (North American Datum 1983), and WGS84 (World Geodetic System 1984).<sup>2</sup> Most earlier paper topographic maps and U.S. Forest Service maps use the NAD27 datum. However, newer versions of those maps use the NAD83 datum. Aeronautical charts use the WGS84 datum. For SAR use, NAD83 and WGS84 are functionally equivalent.

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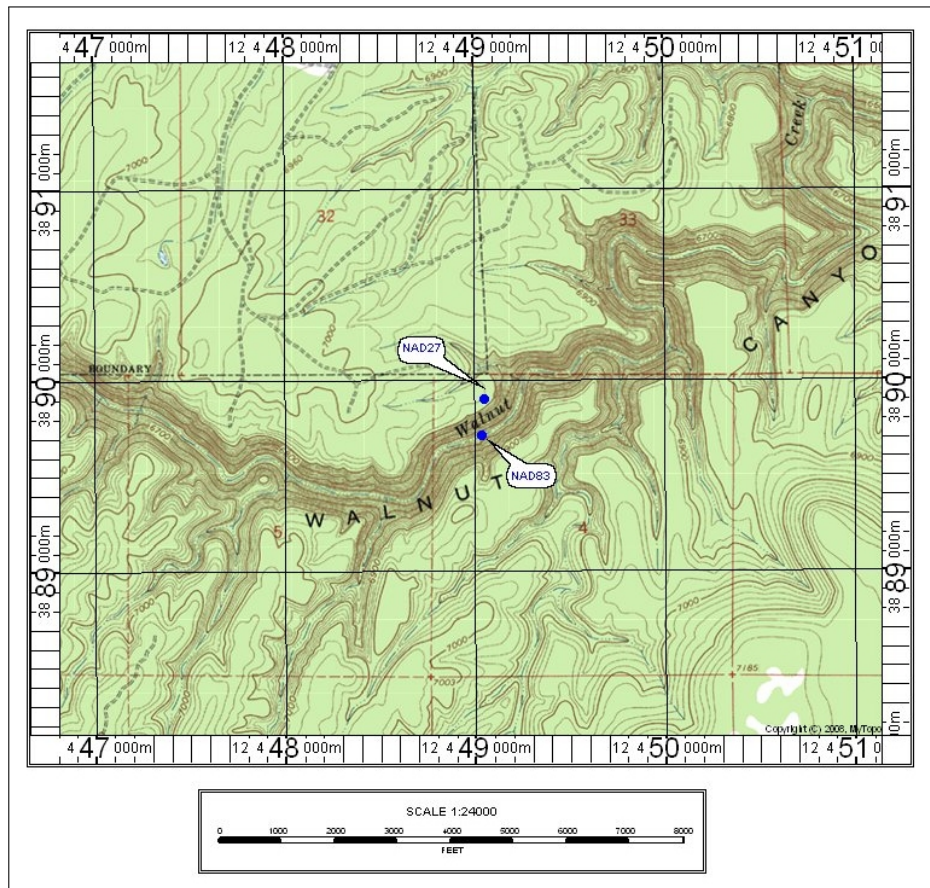
<sup>1</sup> For an introduction to backcountry navigation, see the Navigation chapter in the text “Arizona Basic Search and Rescue” that can be downloaded from <http://www.saraz.org/documents/AZBasicSAR.pdf>.

<sup>2</sup> NAD27, NAD83, and WGS84, are also called NAS-C, NAR-C, and WGE, respectively.

*For SAR use, NAD83 and WGS84 are functionally equivalent.*

Historically, ground units using paper topographic maps used NAD27 because this was the datum used on topographic maps, while aircraft used WGS84 as that was the datum used on aeronautical charts. That created some errors in transferring information about the locations of objects during SAR missions. Now, with computer based mapping software programs such as SARTopo, (in December of 2021 the SARTopo and CalTopo servers were merged. CalTopo and SARTopo are now synonymous) MyTopo Terrain Navigator, and National Geographic Topo, incident personnel can print maps in their choice of datums. This allows the incident management team to match the datum to accommodate the most users. NAD83 (WGS84) is now the most common map datum as the new USGS U.S Topo maps, the new USFS Forest Maps, and aeronautical charts are constructed with that datum.

Datum shifts<sup>3</sup> can cause significant errors especially in canyon or mountainous terrain. Generally, the errors in Arizona are between 0.05 and 0.15 miles, if a location is given in one datum, say NAD27, and plotted or entered into a GPS in a different datum, say NAD83. While those distances do not seem substantial, in rugged terrain it may have significant consequences. An example of this can be seen in Figure 15.1, where a datum shift in UTM<sup>4</sup> between NAD27 and NAD83 causes significantly different access problems potentially requiring specialized personnel and equipment to make access depending on which location is correct. One location is on top of the canyon and could easily be accessed by vehicle, while the other location is in the bottom of a rugged canyon and might need technical equipment for access.



**Figure 15.1.** A datum shift in UTM between NAD27 and NAD83

<sup>3</sup> A datum shift is where a coordinate is given in one datum and then plotted on a map or entered into a GPS that is set to a different datum without correction.

<sup>4</sup> UTM is described on page 149.

## Map Sources/Map Visualization

The combination of SARTopo and the Avenza Maps app (available in the Apple App Store and Google Play—additional information about the app is available at [www.avenzamaps.com](http://www.avenzamaps.com)), for smartphones and tablets has made coordinating and sharing maps between responders more convenient. The SARTopo program is online at [www.sartopo.com](http://www.sartopo.com) and a desktop application is available for offline use. SARTopo also has an app (called CalTopo) available for use on smartphones and tablets. Some of the features of SARTopo are freely available and additional features are available with different subscription levels for individuals and team subscriptions. New features are being added to SARTopo on a regular basis and the training page (<https://training.caltopo.com/>) has extensive information about the features. Some of the useful features, depending on the subscription level, include the ability to create search segments and search assignments, import GPS tracks and waypoints, plot cellular forensics information, review weather information, SMS location links that can be sent to a subject, and the ability to share maps. Maps may be shared by providing a unique URL for the map to an aiding agency or a sharable link with differing levels of editing permissions. Additionally, with a Team Subscription, an Event Map can be created for mutual aid responders or spontaneous volunteers that need to have access to an incident map for a specified amount of time. Those responders can also add markers and create a track log to indicate where they have been.

Maps that are created in SARTopo can be printed as a geo-referenced PDF document with a QR code in the lower right corner of the map (see Figure 15.2). Using the Avenza Maps app on a smartphone or tablet the QR code can be scanned and the geo-referenced PDF can be used on the phone or tablet. When a searcher is in the area covered by the map and the locations services are enabled on the phone or tablet, the searcher can see their location on the map. This feature can help ensure that the searcher or search team are in the right location to conduct their assignment. Additional maps including National Park and National Forest visitor maps can be purchased and downloaded into the Avenza app for use on incidents.

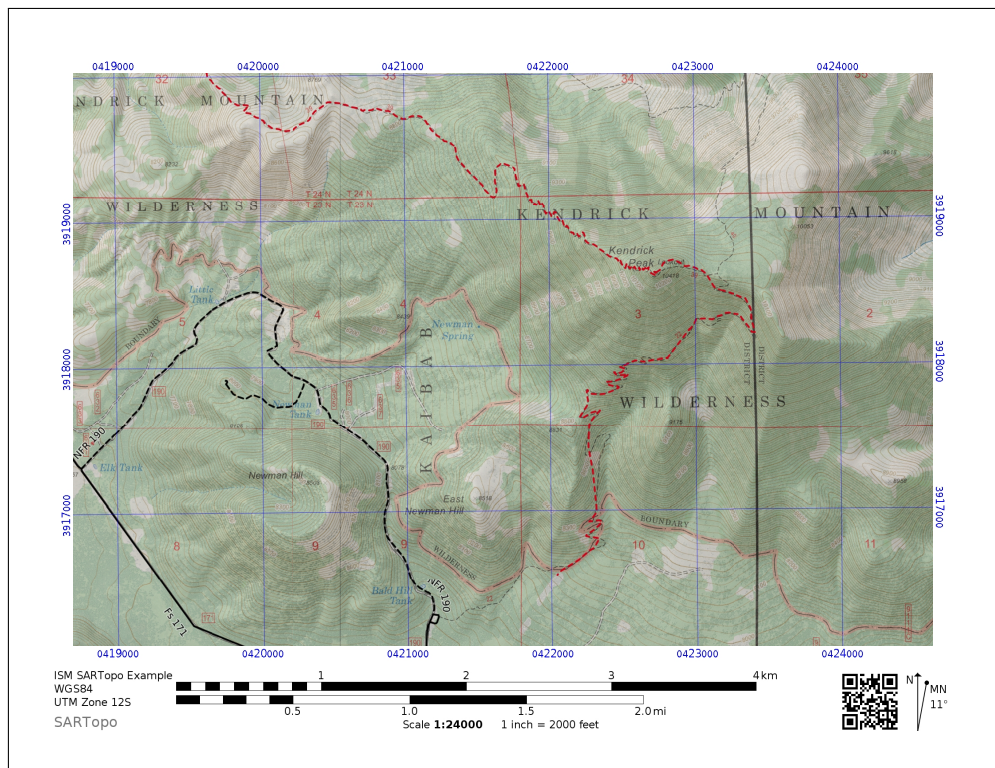


Figure 15.2. Map created in SARTopo

There is an offline version of SARTopo called SARTopo Desktop. The availability of some features on SARTopo Desktop varies depending on the level of subscription. Discounted subscriptions for first responders and SAR teams may be available. If a map is created in SARTopo online including custom features such as markers, range rings, polygons, . . . , the data can be transferred to SARTopo Desktop if it is anticipated that there may be a loss of internet connectivity. To transfer the information a KML or GPX file can be exported from the online version and then imported into SARTopo Desktop. Map base layers can be downloaded from the Desktop App while you have connectivity for use when in an offline environment.

Recently, real-time situational awareness applications have become available. Examples include the Team Awareness Kit (TAK), Emergency Response Manager (ERM), and SARTopo. The real-time location information for team members allows for the IMT to have better accountability and to make decisions about team movements more quickly. All of these applications can use data from team members' cell phones to track them on the map. Some of the applications can also use other devices to track team members, such as satellite emergency notification devices, APRS, and mesh radios.

These applications can import or display a mission map and changes or additions to the map can be pushed out to all team members so that they have the latest actionable data. Team members can also annotate the map and, with some of the applications, can take and post photos with geolocation information.

TAK, ERM, and SARTopo have the ability to send a teammate, or a subject, a location link that allows the subject to share their location on the mission map.

The TAK application has versions for Android, iOS, and Windows, and a TAK server can be set up by a savvy team member for free, or a team can utilize a company such as PAR Government Systems to stand up a TAK server. TAK has a variety of plugins that can be added including the ability to fly small unmanned aerial systems. A log feature is also available to take and share notes about a mission.

ERM and SARTopo require a subscription to utilize the situational awareness features.

These applications are improving and making responses more efficient but should be backed up with a paper map in the event of a technology failure.

## Section 15.2

### Coordinate Systems

There are several different coordinate systems that are commonly used by SAR personnel.

- Latitude/Longitude<sup>5</sup>
- UTM (Universal Transverse Mercator).
- USNG (U.S. National Grid).
- GARS (Global Area Reference System).
- Public Land Survey System (Township/Range).

### Latitude and Longitude

*Latitude and Longitude*, Lat/Long, is a coordinate system designed to identify a location on a 3-dimensional object, such as the earth.<sup>6</sup> There are three different formats, or units, for expressing a location in Latitude and Longitude.

- Degrees Minutes Seconds—hddd mm ss.s, which stands for hemisphere, degrees, minutes, seconds and decimal seconds.

<sup>5</sup> The technical name for this coordinate system is Geodetic. The coordinates consist of latitude, longitude, and height.

<sup>6</sup> Today we take the calculation of latitude and longitude for granted. This was not always the case. See Reference [Sobel].



- Degrees Decimal Minutes—hddd mm.mmm, which stands for hemisphere, degrees, minutes, decimal minutes.
- Decimal Degrees—hddd.ddddd, which stands for hemisphere, decimal degrees.

Hemisphere is either North or South for latitude and can alternatively be notated as a positive number for the northern hemisphere and a negative number for the southern hemisphere (for example, 35.3452 degrees for northern hemisphere or  $-35.3452$  degrees for southern hemisphere). Latitude is measured from the equator 90 degrees north to the north pole and 90 degrees south to the south pole. Hemisphere is either East or West for longitude. It too can be notated using positive and negative numbers with negative numbers for the western hemisphere and positive numbers for the eastern hemisphere. Longitude is measured from the Prime Meridian 180 degrees east and 180 degrees west to the International Date Line.

Minutes (') and seconds (") are between 0 and 60.

For example, the coordinates of Tucson International Airport in each of these coordinate systems are

- Degrees Minutes Seconds. Latitude: N  $32^{\circ} 7' 15.73''$ , Longitude: W  $110^{\circ} 56' 14.52''$ .
- Degrees Decimal Minutes. Latitude: N  $32^{\circ} 7.2622'$ , Longitude: W  $110^{\circ} 56.2420'$ .
- Decimal Degrees. Latitude: N  $32.12104^{\circ}$ , Longitude: W  $110.93737^{\circ}$ .

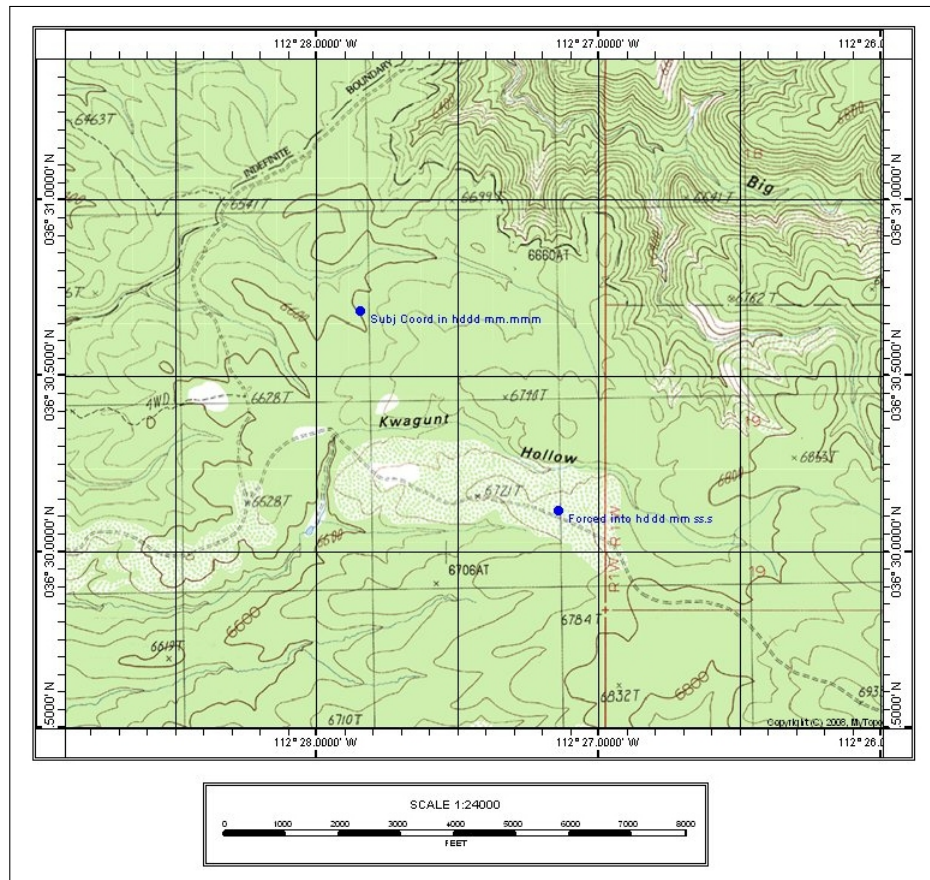
Measuring a quantity without specifying the units leads to many problems. For example, stating that the temperature is 80 degrees is confusing if the units (either Fahrenheit or Celsius) are not identified. ( $80^{\circ}F = 27^{\circ}C$ ,  $80^{\circ}C = 176^{\circ}F$ ). So, too, different coordinate formats (units) can be the source of confusion and location errors if the numbers reported in one format are forced into a different format more familiar to the person receiving the coordinates (without correcting them), as can be seen in Figure 15.3 on the next page.

### Case Study—Maryland State Police Trooper 2 Accident

Coordinate forcing was a significant problem in an emergency response in the Maryland State Police Trooper 2 accident on September 27, 2008.<sup>7</sup> In this incident the Trooper 2 helicopter crashed on approaching Andrews Air Force Base with the crew and two auto-accident patients on board. The aircraft was equipped with position tracking equipment and the Maryland State Police dispatch center (SYSCOM) was able to monitor the location. Once it was noted that the aircraft was missing the last known coordinates were determined and SYSCOM relayed the location to Prince George's County Communications Center by reading the coordinate as "three eight five two one seven, north was seven six five two two six." The SYSCOM personnel did not indicate the format of these coordinates. Prince George's County dispatchers plotted the coordinates in the format that they were most used to, which was decimal degrees (hddd.ddddd), giving N  $38.5217^{\circ}$ , and W  $76.5226^{\circ}$ . Prince George's County sent emergency crews to that location, which was 30 miles southeast of the actual accident site. The coordinates relayed by SYSCOM were in fact in degrees minutes seconds (hddd mm ss.s) format, namely, N  $38^{\circ} 52' 17''$ , and W  $76^{\circ} 52' 26''$ . If the SYSCOM personnel had identified the coordinate format or if the Prince George's County dispatcher had asked what the format was, then the confusion about the location would not have occurred and emergency crews could have located the accident much more quickly. Furthermore, the Maryland State Police personnel that responded to the incident, excluding the SYSCOM personnel, were unfamiliar with latitude and longitude coordinates, which contributed to the difficulty in locating the accident site.

Coordinate format confusion is a serious problem and can be easily mitigated by reading the coordinates correctly, for example N  $38^{\circ} 52' 17''$ , and W  $76^{\circ} 52' 26''$  should be read as "*North Thirty Eight Degrees Fifty Two Minutes Seventeen Seconds and West Seventy Six Degrees Fifty Two Minutes*

<sup>7</sup> See Reference [NTSB 1].



**Figure 15.3.** Location error when one Lat/Long format is forced into a different Lat/Long format

*Twenty Six Seconds*". Reading the coordinate in this way allows the receiver to determine the format, thereby eliminating any misunderstandings. Increasingly, the notation for the hemisphere (North, South, East, and West) in Latitude/Longitude coordinates is using positive numbers for the Northern and Eastern hemispheres and negative (–) numbers for the Southern and Western hemispheres.

Even so, sometimes the Lat/Long numbers are not correctly recorded, and the Incident Commander may have to use common sense to resolve the issue. For example, an OME employee called about a body recovery case in Pinal County, but the coordinates given placed the body in the Silver Bell Mountains in Pima County. Looking at the deputy's report the body was said to be located in Lost Dutchmen State Park. The Incident Commander changed the 32° to 33° and left the rest of the numbers unchanged. This placed the body in the Lost Dutchmen State Park as the report indicated. Attention to details is important.

## Universal Transverse Mercator

*Universal Transverse Mercator*, UTM, is a rectangular grid coordinate system designed for a flat 2-dimensional object such as a paper map. UTM divides the globe into 60 longitudinal zones that are 6 degrees wide and are numbered from 1 to 60, and divides the globe into 20 latitude bands that are 8 degrees wide and are labeled with letters C to X.<sup>8</sup> The UTM system uses meters as its measurement unit. There are three components to a UTM coordinate: the Zone, the Easting, and the Northing. The Zone refers to the longitudinal zone number and the latitudinal band letter. The Northing is the number of meters north of the equator (for areas in the northern hemisphere). The Easting number is

<sup>8</sup> The letters I and O are not used to avoid confusion with the numbers 1 and 0. There is a separate system for the polar areas call Universal Polar Stereographic (UPS).

based off of the central meridian of the UTM Zone which is given the value of 500,000 to avoid negative numbers. The Zonal boundary will not be 0 meters but the Easting value will always increase as you move to the east. Arizona is fortunate to lie mostly within Zone 12 but there is a small sliver of Arizona along the western part of the state that is in Zone 11. If you were traveling, for example, on I-40 headed west as you enter the Kingman area near Andy Devine Boulevard you could watch your GPS change from Zone 12 to Zone 11. When you neared the Zonal Boundary between Zone 12 and Zone 11 the value of the Easting in Zone 12 would be approximately 0226932 meters and as you crossed into Zone 11 the Easting value would be 0773069. Just as the Zonal boundary Easting value at the west end of the Zone will never be 0 the Easting value at the east end of the Zone will never exceed 999,999 meters.

The important point to using UTM is to remember that the coordinate is always read to the right and then up (easting then northing). It is helpful to remember the ZEN (Zone Easting Northing) of UTM when reading the coordinate. It is a good habit to always include the Zone and Latitudinal Band designator (that is, 12S) when giving a UTM coordinate especially when working near the western part of Arizona.

A typical UTM coordinate is *12S 0456908 3845897* and is read as “Zone Twelve S, Easting Zero Four Five Six Nine Zero Eight and Northing Three Eight Four Five Nine Eight Seven”. Because UTM is a rectangular coordinate system, it is more uniformly marked on most topographic maps (every 1000 meters, one kilometer). It is easy to use in the field and is becoming more popular with recreational users, including SAR. Even without a map tool—a tool to accurately determine the coordinates of a location from a map—it is fairly easy to estimate the coordinates of a particular location.

## U.S. National Grid

*U.S. National Grid*, USNG, is a recently-introduced grid coordinate system that has been designed for public safety, commerce, and the general public. This grid system is an alpha-numeric point reference system that is overlaid on a UTM numerical grid system. The stated purpose of USNG is to provide an inter-operable coordinate system for use by civilian and military authorities during emergency or disaster response. USNG and Military Grid Reference System (MGRS) are functionally equivalent when using NAD83 or WGS84 map datums.

Similar to UTM, the coordinates in USNG are read to the right then up. The principal difference between UTM and USNG is that USNG uses a 100,000 meter Grid Zone Designator (GZD) which replaces the first two digits in the UTM Easting and Northing coordinate strings. For example the location in UTM “*12S 0453609 Easting 3892176 Northing*” would be expressed in USNG as “*12SVD5360992176*”. The “04” and “38” in the Easting and Northing respectively have been replaced by GZD “VD”, see Figure 15.4 on the next page.

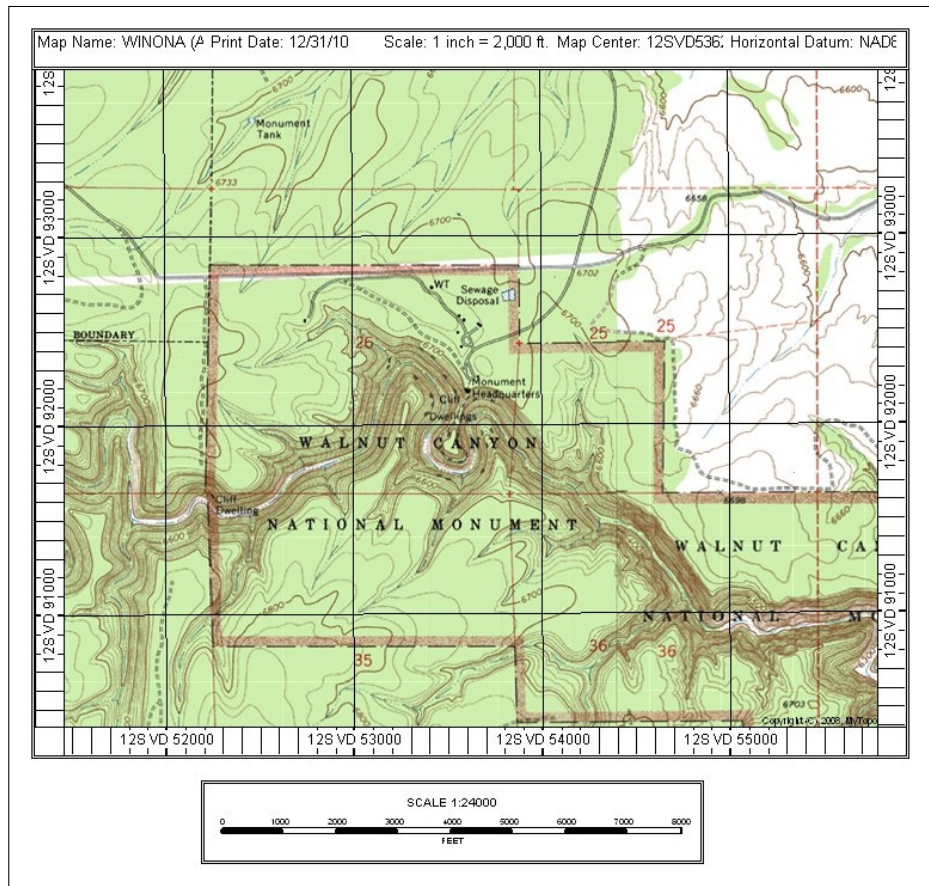
USNG has different levels of resolution. A location can be described in USNG in 1 meter, 10 meter, 100 meter, or 1000 meter resolution. Using the example coordinate “12SVD5360992176”, the 1 meter resolution is “12SVD5360992176”, the 10 meter resolution is “12SVD53609217”, the 100 meter resolution is “12SVD536921”, and the 1000 meter resolution is “12SVD5392”. The resolution can be determined by counting the number of digits after the GZD.

More information about USNG can be found at <https://usngcenter.org>.

## Global Area Reference System

*Global Area Reference System*, GARS, is a standardized area reference system based on Latitude and Longitude for use by military and civilian SAR. GARS divides the globe into 30-minute by 30-minute cells which are designated with a five-character coordinate, for example 013BH. The first three digits indicate a 30 minute wide longitudinal band and the last two characters indicate a 30-minute wide latitudinal band. Each cell is subdivided into 15-minute quadrants which are numbered west to east starting at the northwest. So a particular cell would have a coordinate such as 013BH4. A 15-minute





**Figure 15.4.** Example of a topographic map with USNG coordinate system

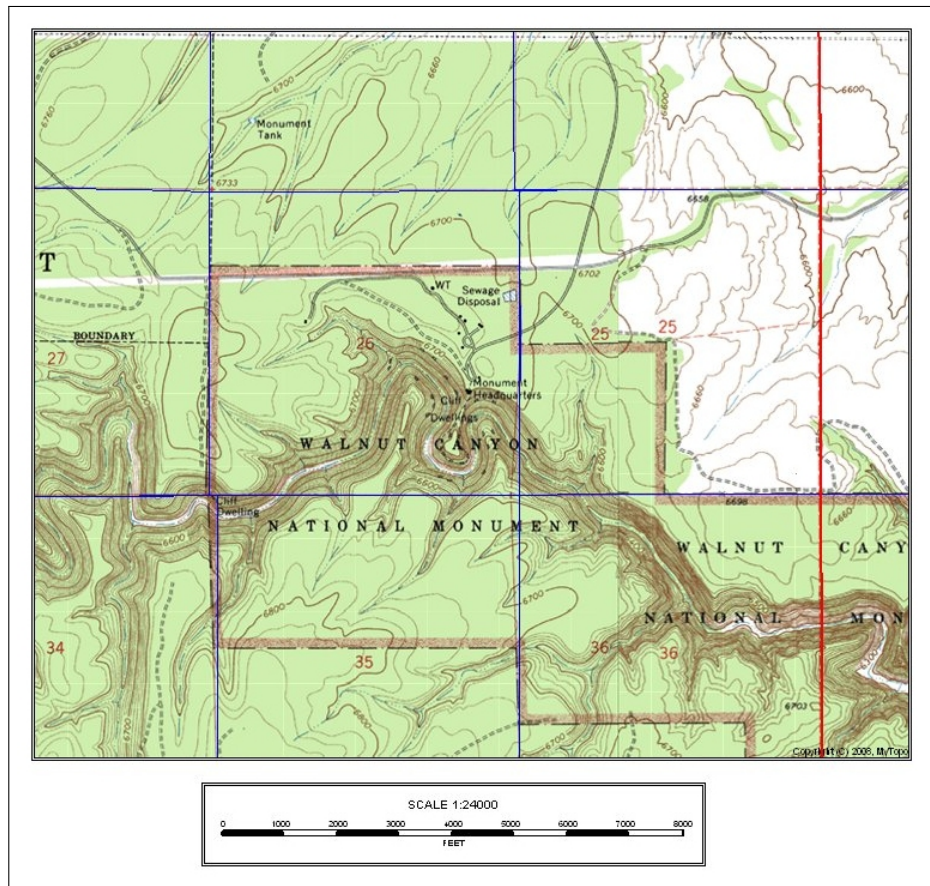
quadrant is then subdivided into 9 five-minute by five-minute keys that are also numbered from west to east starting with the northwesternmost key. The coordinate for a particular key looks like 013BH47.

More information about GARS can be found at [https://www.gocivilairpatrol.com/media/cms/Pathfinder\\_Articlenovdec06GARS\\_4CDC9DF09FFFA.pdf](https://www.gocivilairpatrol.com/media/cms/Pathfinder_Articlenovdec06GARS_4CDC9DF09FFFA.pdf).

## Public Land Survey System

*Public Land Survey System*, also known as *Township and Range*, is another coordinate system sometimes used in SAR and by land management agencies. It is found on topographic maps and is the primary coordinate system on U.S. Forest Service maps. While it is an area location system and not a point location coordinate system like Lat and Long or UTM, it can be useful because it is the only coordinate system that can be found marked on the ground in some places. Public Land Survey System markers are often found at section corners and are usually a brass cap with the Township, Range, and the four Sections that intersect at that location. Due to cattle ranching in the West, section lines often correlate with fences to designate cattle grazing allotments. On a topographic map Sections are bordered by red lines and are approximately one-square mile, or 640 acres, in area (see Figure 15.5 on the next page). A particular Township and Range will have 36 sections. If the section line on the map is dashed, then it generally means that, at the time the map was made, the section line was also a fence line.

A Township and Range coordinate looks like T26N R6E Sec 24. That coordinate would be read as “*Township Twenty Six North Range Six East Section 24*”. The section can be broken down into smaller parts by dividing it into half or quarter sections. For example the Southwest 1/4 of the Southeast 1/4 of the Northwest 1/4 of Section 24.



**Figure 15.5.** Example of topographic map with Township and Range. Sections are the red squares with the number in the center

### Section 15.3 Who Uses Which Coordinate System?

While each SAR unit can use the coordinate system of its choice, it is important to know what the National SAR Committee has designated the coordinate system to use in their Catastrophic Incident SAR addendum to the National SAR Plan. See Table 15.1, where all Lat/Long coordinates are in degrees decimal minutes (hddd mm.mmm).

**Table 15.1.** National SAR Committee Designated Coordinate System

Responders	Primary	Secondary	Tertiary
Land SAR	USNG	Lat/Long	
Aeronautical SAR	Lat/Long	USNG	GARS
Air Space Deconfliction	Lat/Long		
Land/Aeronautical SAR Interface	USNG	Lat/Long	
Incident Command—Land SAR Coordination	USNG	Lat/Long	
Incident Command—Air SAR Coordination	Lat/Long	USNG	
Area Organization and Accountability	GARS	USNG	Lat/Long

A public domain software package, GEOTRANS, that converts between these and other coordinate systems, is discussed in Section A.3 on page 360.

## Section 15.4

### Compass Bearings

There are basically two different compass bearings used in SAR: true and magnetic. A true bearing is corrected for declination<sup>9</sup> based on local declination information. A magnetic bearing is not corrected for local declination. Declination information is generally found at the bottom of a topographic map—however this information is often outdated. Local declination should be checked before adjusting a compass for declination. Magnetic Declination can be checked using a calculator at [www.ngdc.noaa.gov/geomagmodels/Declination.jsp](http://www.ngdc.noaa.gov/geomagmodels/Declination.jsp).

SAR aviation units use magnetic bearings because their compasses cannot be adjusted for declination, while ground SAR units use either magnetic or true bearings. There are advantages for ground SAR teams to use true bearings. The primary reason is that the declination rules (“Map to Field subtract declination”, “Field to Map add declination”)<sup>10</sup> do not need to be remembered when taking a bearing in the field and then plotting on the map, or taking a bearing off of a map and then using it in the field.

To minimize confusion and error the type of bearing, either true or magnetic, should be reported when giving a bearing to another unit or to Incident Commander.

When using a GPS in conjunction with a compass it is very important that the bearing reference in the GPS be set to match the compass, either true or magnetic, or significant navigation error can occur.

### Summary

There are multiple coordinate systems and map datums in use in SAR and some coordinate systems have multiple formats. Failure to clearly communicate the coordinate system and corresponding map datum when sharing location information between field units, or between field units and Incident Commander, can create confusion and incident planning errors. There are also two ways to report a bearing, either true or magnetic, that if not taken into account can cause errors.

So, there are at least three areas of miscommunication involved in reporting locations.

- Not identifying map datums.
- Not identifying the coordinate formats.
- Not identifying the bearing.

One way to resolve these issues is to include a Navigation Briefing, such as the one in Figure 15.6 on the next page developed by Art Pundt of the AZ Coconino County Sheriff’s Office SAR Unit, in the verbal or written incident action plan. This Navigation Briefing document is in the Access Forms section of Win CASIE III.

### Exercises/Quizzes

<sup>9</sup> Declination is the angle between local magnetic force lines (the direction the north end of a compass needle points) and true north.

<sup>10</sup> These declination rules are for east declination and are opposite for west declination. Arizona falls within east declination.

<u>Navigation Information Briefing Sheet</u>
<u>Technical Specialist-Navigation:</u>
<u>Operation Name:</u>
<u>Date and Operational Period:</u>
<u>Maps To Be Used:</u>
<u>Map and GPS Datum Information (Which Resources Use Which Datums)</u> Ideally use one datum for all resources but if not possible outline who uses which datum.
<u>Coordinate Format Information (UTM Zones, Lat/Lon Formats, Etc.)</u> Ideally use one coordinate system and format but if not possible outline who uses what coordinates and formats.
<u>Compass and Area Declination Information (True or Magnetic Bearings )</u> Aircraft are typically restricted to magnetic bearings. Ground SAR can be flexible
<u>Additional Information</u>

Figure 15.6. Navigation Briefing Sheet

### Talking Points, Check Your Understanding, and Exercises

- 15.1. Explain the term ‘datum shift’ to a layman.
- 15.2. Describe the five coordinate systems that are commonly used by SAR personnel.
- 15.3. Explain the difference between the terms ‘Degrees Minutes Seconds’, ‘Degrees Decimal Minutes’, and ‘Decimal Degrees’.
- 15.4. Explain the difference between the two different compass bearings used in SAR.
- 15.5. Identify the three areas of miscommunication involved in reporting locations.
- 15.6. Explain why coordinate format confusion is a serious problem and what can be done to mitigate it.

15.7. A lost subject gave their location as N 49° 22’ 55” and W 123° 04’ 36”. These coordinates were misreported to the SAR Coordinator as N 49.2255° and W 123.0436°. Show that the distance between these two locations is approximately 10.95 miles.

### Quizzes

- 15.8. A Lat/Long coordinate is reported in Decimal Degrees as N32.72104. This is a valid coordinate. (a) True. (b) False.
- 15.9. A Lat/Long coordinate is reported in Degrees Decimal Minutes as N32 72.104. This is a valid coordinate. (a) True. (b) False.
- 15.10. A Lat/Long coordinate is reported in Degrees Minutes Seconds as N372 52 10.4. This is a valid coordinate. (a) True. (b) False.

**15.11.** A Lat/Long coordinate is reported in Degrees Minutes Seconds as N352 5210.4. This is a valid coordinate. (a) True. (b) False.

**15.12.** For SAR use, the datums NAD83 and WGS84 are functionally equivalent. (a) True. (b) False.

**15.13.** The primary coordinate system designated by the National SAR Committee for use in their Catastrophic Incident SAR addendum to the National SAR Plan for land SAR responders is (a) Lat/Long (hddd mm.mmm). (b) UTM. (c) GARS. (d) USNG.

**15.14.** It is unnecessary to designate whether a bearing is either True or Magnetic because the error is insignificant in map and field applications. (a) True. (b) False.

**15.15.** The Public Land Survey System (a) Is the only coordinate system that can be found marked on the ground in some places. (b) Is sometimes used in Search and Rescue and by land management agencies. (c) Often employs the use of brass cap markers at section corners that designate Township, Range, and Section. (d) Are the best source of maps for all Search and Rescue purposes. (e) Answers (a), (b), and (c).



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## CHAPTER 16

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### Cell Phones

The cell phone has dramatically changed search and rescue in at least four ways.

- First and foremost, the change is seen in how incidents are reported. While it used to be that search and rescue incidents, particularly those involving overdue people, were reported by a third party, more and more the incidents are being reported by the individual involved via cell phone.
- Secondly, and as important, is the ability to use cell phone data to aid in the location of a subject.
- Thirdly, the cell phone has added another communication tool for search and rescue personnel.
- Finally, many cell phones have integrated cameras so photos of evidence or conditions can be sent between field teams and the Incident Command Post in real time.

*The cell phone has dramatically changed search and rescue.*

This chapter focuses on the use of cell phones to locate a person.

In some areas the 911 center may be Phase II compliant. This means that a cell phone's GPS location can be transmitted from the subject's cell phone to the 911 center or PSAP (Public Safety Answering Point). Recently there have been several cases reported around the country in which the coordinates received by the PSAP were significantly different than the actual location of the subject. One possible explanation is that the GPS in the cell phone may have had expired almanac data. New almanac data is sent each day from a ground station to the GPS satellites and it takes a GPS receiver approximately 12.5 minutes to receive the updated almanac. If the GPS receiver has not received updated almanac data within a few days or the receiver has moved over 300–500 miles without receiving updated almanac data the initial position reported by the GPS could be in error. If a 911 call is received with significant location uncertainty the caller could be instructed to turn on the location services on the phone, leave it on for at least 13 minutes, and then call 911 again and that could resolve the location error. Alternatively there are applications that could be used to determine the location of the cell phone, which are discussed later in this chapter.

In other areas this information may not be available and other techniques may need to be used to aid in locating the subject's cell phone. This generally involves determining the cell-phone carrier and the target cell-phone number of the search subject. The cell-phone provider can usually be determined by checking the number on websites such as [www.fonefinder.net](http://www.fonefinder.net), [www.freecarrierlookup.com](http://www.freecarrierlookup.com), or [phonelookup.zetx.com](http://phonelookup.zetx.com). An advantage of using the [phonelookup.zetx.com](http://phonelookup.zetx.com) service is that there is an option to print out a carrier specific Preservation Letter if that is needed for additional investigation. The carrier lookup feature of ZETX is free, however there are many other powerful analytical tools available to law enforcement through a subscription to ZETX. It is also possible to determine whether



a phone number has been ported to a new carrier by registering for an account with NPAC at [www.npac.com](http://www.npac.com). A law enforcement agency can call the cell phone carrier's law enforcement assistance unit and request some information that can aid in the location of the cell phone.

The Communications Assistance for Law Enforcement Act of 1994 (CALEA) defines the statutory obligation of telecommunications carriers to assist law enforcement in executing electronic surveillance pursuant to a court order or lawful authorization. Cellular communications investigation assistance and tools, including cell site databases, are available through the National Domestic Communications Assistance Center (NDCAC) portal on <https://ndcac.fbi.gov/about/contact>. Access to <https://ndcac.fbi.gov/about/contact> and NDCAC portal require applications to be completed by law enforcement officers. Cellular providers can disclose communications information to law enforcement without a warrant or subpoena "...if the provider, in good faith, believes that an emergency involving danger of death or serious physical injury to any person requires the disclosure without delay of communications relating to the emergency."<sup>1</sup> The provider may disclose customer records "to a governmental entity, if the provider reasonably believes that an emergency involving the immediate danger of death or serious physical injury to any person justifies the disclosure of the information."<sup>1</sup> In the case of a missing person in a search and rescue event it can often be assumed that the person is in danger as the nature and the location of the problem is unknown.

To provide this information, most companies require a letter of exigency, such as the example shown in Figure 16.1 on the next page. When the cellular carrier is contacted the technician asks for the nature of the incident and the target phone number. The carrier often faxes an Emergency Information Request form that needs to be completed and ask for the type of information is requested.

It is very important to keep all emails, faxes, and phone logs of the information that has passed between the requesting agency and the cell phone provider in case assistance is requested from the Air Force Rescue Coordination Center (AFRCC) discussed on page 160. That information is needed by the AFRCC's cell phone forensics team to continue the investigation.

## Useful Information From Cellular Carriers

- Cell phone status (on or off).
- Time of last activity.
- Last cell tower used (street address and Lat/Long).
- Sector on tower (many towers are tri-sector towers).
- Azimuth of the center of the tower sector (if the tower is a tri-sector tower then the azimuth is the center of the sector and the boundaries of the sector are 60 degrees on either side of that azimuth).
- Distance from the tower (this can often be determined by the signal strength of the subject's cell phone).
- Any other location information related to the cell phone (this is a good statement to add to the Emergency Information Request form).

The information received can be plotted on a topographic map to help determine the area to search for the subject. It should be noted that the preferred Lat/Long format for most cellular carriers is decimal degrees (hddd.ddddd). (See page 147 for an explanation of decimal degrees.) As with any information it should not be relied upon solely especially if it conflicts with other investigative information.

At the outset of a search it is good practice to call the cell phone number of the search subject as well as to send a text message to the phone to initiate phone activity. In some cases a text message goes through when a voice call does not because text messages take less bandwidth. Communicating by text message may also reduce the drain on the subject's cell phone battery allowing for communication for longer periods of time. Following that activity querying the cellular carrier may provide some important

<sup>1</sup> U.S. Code, Title 18, Part I, Chapter 121, Section 2702.

**Figure 16.1.** Letter of exigency

AT&T and T-Mobile have location services available that rely on triangulation based on the Time on Arrival or Timing Advance and not the internal GPS. Verizon Wireless does not have location services but maintains Real Time Tool records that rely on the last call/text message/data activity and not the internal GPS to generate a network based location with a confidence level of either High, Medium, or Low. It is a good practice to not rely on Medium or Low confidence coordinates to pinpoint a person because there could be significant errors in the location. Sprint does provide location services using the cellular phone's internal GPS by sending the phone a "ping". AT&T, Sprint, T-Mobile, and Verizon can send continuous location updates via email if requested.

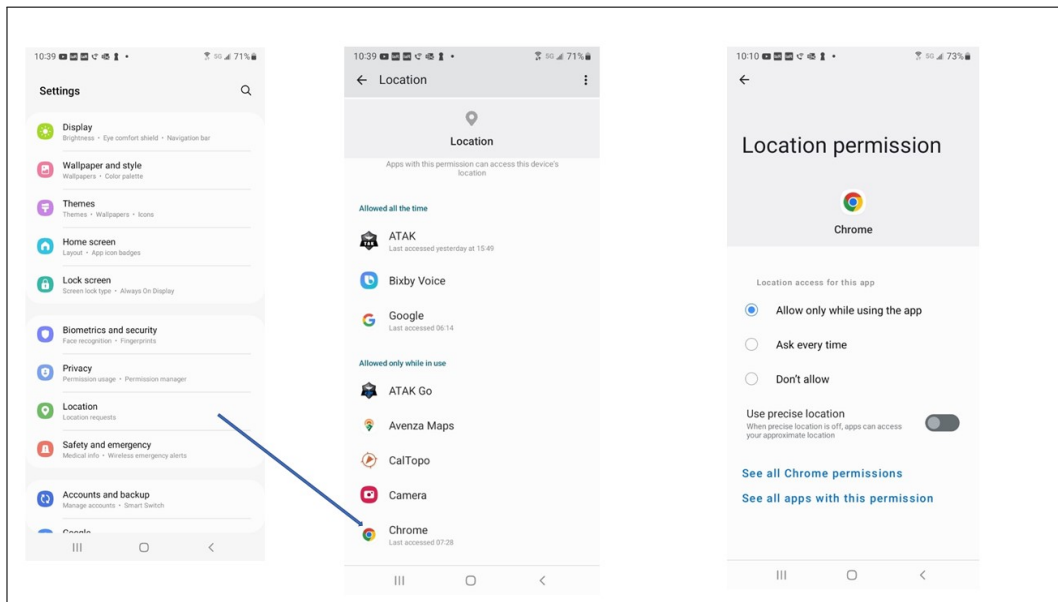
© 2011–2024 by Arizona Search and Rescue Coordinators Association, Ltd.—September 14, 2024

and Android phones that can be downloaded from the Apple App Store or the Android Market.<sup>2</sup> Some of these apps are free while others have a small cost associated. Apps that access the cell phone's GPS capability and do not rely on cell tower information can be very useful in providing location information. With some instruction about how to read the information from the app a lost person may be able to provide GPS coordinates from a downloaded app. It is helpful if the SAR personnel communicating with the subject are familiar with the type of phone (iPhone or Android phone) when trying to give the subject the instructions. In addition there are applications such as Google Latitude that allow a person to share their location information with friends. It could be worthwhile to ask the lost person if they use such an application and, if so, which friend to contact to help provide location information.

Applications have been developed to aid in the real-time location of a cell phone. These applications generally involve sending an SMS message to the subject's cell phone which requires that they click on the link to share their location. One such SMS location link can be found in the commonly used SARTopo software. When the subject receives a SMS location link through the SARTopo software and activates the link, the location of the subject will appear on the SARTopo map and the Emergency Response Manager application. There are similar SMS location links available in the Team Awareness Kit plugins and through some agency dispatching software such as Rapid Deploy

Alternatively, a subject could be directed to go to [www.findmesar.com](http://www.findmesar.com) and once there, if location services are turned on for the browser, the subject could either read off the coordinates displayed or take a screen shot and text that to search and rescue personnel.

Recently, due to privacy concerns about location tracking, the operating systems on iPhones and Android phones allow the user to select whether to share precise location with a variety of apps and the web browser on the phone. If precise location is selected the actual GPS location of the phone will be used. If precise location is turned off, the location of the phone is purposely degraded and may be significantly different than the actual location. This can have an impact on emergency response. Emergency responders may need to coach a subject to navigate through their device settings to make sure that precise location is enabled. This is generally found in the device settings and privacy settings. See Figure 16.2 and Figure 16.3. It should be noted that the precise location setting does not impact the GPS location provided when a caller calls 911 from a cell phone.



**Figure 16.2.** Android location settings

<sup>2</sup> The Android Market has been renamed Google Play.

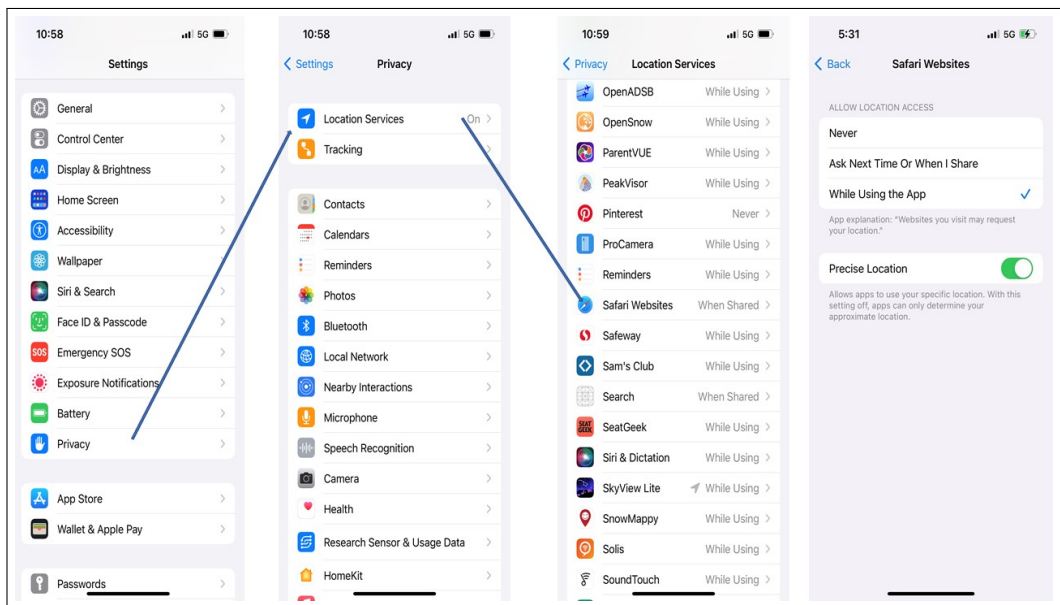


Figure 16.3. iOS location settings

During night searches subjects are often located from the illumination of their cell phone, either when the device is called or when it is opened. This aids both ground and air resources.

More sophisticated cell phone forensic analysis is available through the CAP and some other law enforcement agencies such as the U.S. Marshals Service. The CAP's cell phone forensic team is made up of experts in cellular analysis, and the team can be activated through the AFRCC. In Arizona this request is made through the Arizona State SAR Coordinator at AZDEMA. The analysis provided by the CAP includes more sophisticated interpretation of signal strength and the area that can be "seen" by the cell tower to determine high probability areas to search. The U.S. Marshals Service and other law enforcement agencies may have cell phone locating equipment that allows the tracking of a particular cell phone and the ability to communicate with that phone.

If an agency has limited or no experience in cell phone analysis it is prudent to request assistance from the AFRCC through AZDEMA at the outset.

A SAR Coordinator that intends to use these techniques should keep a copy of a contact list for the various cellular carriers such as the Law Enforcement Telephone Investigations Resource Guide which is a law enforcement sensitive document published by the U.S. Department of Justice. The latest version of the Law Enforcement Technology Investigations Resource Guide can be obtained by sending an email from your government agency email account to [TechnologyResourceGuide@gmail.com](mailto:TechnologyResourceGuide@gmail.com) with "Subject Line: Request current LE Resource Guide" and "Signature Line: include name, rank, agency, and contact information".

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

**16.1.** Explain how the cell phone has dramatically changed search and rescue.

**16.2.** Explain what useful information can be obtained from cellular carriers.

## Quizzes

**16.3.** The preferred Lat/Long format used by most cellular carriers is (a) Decimal degrees. (b) Degrees decimal minutes. (c) Degrees, minutes, seconds.

**16.4.** If the information obtained from the cellular provider conflicts with other investigative information, then (a) Believe the cellular provider. (b) Believe the other investigative information. (c) Discount both. (d) None of the above.

**16.5.** Cellular providers can disclose communications information to law enforcement only with a warrant or a subpoena. (a) True. (b) False.

**16.6.** A 911 center is Phase II compliant means that a cell phone's GPS location can be transmitted from the subject's cell phone to the 911 center or Public Safety Answering Point. (a) True. (b) False.

**16.7.** Which SAR entity can be contacted, through the appropriate channels, for more sophisticated cell phone data analysis? (a) CALEA. (b) NeuStar. (c) Civil Air Patrol. (d) AZDEMA.

**16.8.** Identify an action that can be communicated to a lost subject with a cell phone that can aid in their location. (a) Tweet about the status of their situation. (b) Use the illuminated face of the cell phone at night to attract searchers. (c) Download GPS applications to their smart phone that can display location coordinates. (d) Both (b) and (c).

**16.9.** Important websites that can be used for investigative purposes to aid Search and Rescue needs include [www.fonefinder.net](http://www.fonefinder.net) and [www.npac.com](http://www.npac.com). (a) True. (b) False.

I am often asked how radio works. Well, you see, wire telegraphy is like a very long cat. You yank his tail in New York and he meows in Los Angeles. Do you understand this? Now, radio is exactly the same, except that there is no cat.

*Albert Einstein*

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## CHAPTER 17

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### Communications

Communication problems are the single most common deficiency in a SAR operation. This chapter deals with radio and telecommunication issues.

*Communication problems are the single most common deficiency in a SAR operation.*

There are differences between radio communications in regular law enforcement patrol and in SAR communications. Typically a county sheriff's office and other emergency service agencies have a radio communications system consisting of one or more frequencies and several mountain-top repeaters. The frequencies may be designated for geographical areas or for functional use areas such as patrol, detectives, administration, and special operations. The mountain top repeaters serve to extend the range of the individual radios so that someone in Williams, Arizona, can talk to someone in Flagstaff, Arizona. That communication is difficult if the radios use a line of sight communication, also known as simplex, due the distance involved and the terrain between those locations.

#### Repeater Operations

A repeater works by having a radio "talk" into the repeater on one frequency and then the repeater retransmits that signal on another frequency. So a repeater has a transmit and receive frequency pair. Repeaters also generally use a subaudible tone or PL tone.<sup>1</sup> This tone is not audible to the human ear but serves to activate the repeater. This is useful when there are several repeaters in an area that may use the same frequency pair. The PL tone allows only the desired repeater to be activated. There are some systems that are voted systems. In a voted system there is one frequency pair and one PL tone for multiple repeaters and a voter unit determines which repeater is the best one to use based on signal strength. An example of a voted system is the Arizona Interoperable Radio System or AIRS. AIRS usually has several repeaters assigned to a specific frequency pair and PL tone in a region. When a user presses the push-to-talk button on the radio the signal goes out and the voter determines which repeater is the best to use and activates that one. The repeater effectively extends the range of a portable or mobile radio by being placed on high terrain so that the user can transmit to the repeater which will then repeat the transmission from its location on high terrain using higher power.

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<sup>1</sup> PL stands for "Private Line". It is the Motorola terminology for CTCSS (Continuous Tone Coded Squelch System). Other terminologies are "QC", the RCA abbreviation for "Quiet Channel", and "CG", the General Electric abbreviation for "Channel Guard".



## Simplex Operations

Simplex radio operations use one frequency to both transmit and receive and may or may not have a PL tone. This type of radio communication does not use a repeater and is limited to line-of-sight communications. Essentially the radios talking to each other in this mode must be close enough and be free of major terrain obstacles that could block the signal from getting from one radio to the other. Simplex communications are effective when one unit is working in a canyon and cannot access a repeater and another unit is on the rim of the canyon acting as a relay. Simplex is also used for tactical communications between units working in relatively close proximity that do not need a repeater to extend their range. An example of a simplex frequency is the National SAR frequency (155.160 MHz).

## Temporary or Human Repeaters

In areas where the terrain does not allow for units to access an established permanent repeater, such as rugged mountainous or canyon terrain, a temporary repeater or human relay may be established to allow for communications. There are many different models of temporary repeaters ranging from trailer mounted units (see Figure 17.1) to units that require only two hand-held radios (see Figure 17.2). Human relay or repeater points require a person to camp at a specified point and act as a relay. This person needs to have adequate equipment to maintain that position including appropriate radio equipment, batteries, food, water, and shelter. A human relay might also serve as a weather spotter for the incident.



**Figure 17.1.** A trailer-mounted portable repeater unit



**Figure 17.2.** A portable repeater using two hand-held radios

There are some vehicle repeaters in use that can enhance radio communications options. The vehicle repeater is connected to the mobile radio in the vehicle. When a deputy or volunteer exits the vehicle and is using a portable radio the vehicle repeater can be turned on. The portable radio is then set to a specific channel to talk to the vehicle which repeats that transmission on the frequency that is selected on the mobile radio. The mobile radio receives any transmissions as normal and then they are repeated through the vehicle repeater to the portable radio.

## Documentation of Radio Traffic

Repeated frequencies in use by law enforcement or other public safety agencies are often recorded at a dispatch center. These recordings are sometimes used as evidence in criminal proceedings and can be requested by the media as public information. Generally simplex frequencies are not recorded by a dispatch center because the dispatch center may not hear these transmissions between units. The benefit of having a recorded frequency is that the communications can be reviewed at a later time if

needed while unrecorded simplex communications rely on a written communications log for review at a later time. As an alternative to a handwritten communications log there is a free Windows software program called Comm Manager (see Appendix A.2 on page 359) that allows communications personnel to document incident communications.

## Common Radio Frequencies In Use In SAR Operations

In Arizona there are several frequencies that are in use in most parts of the state for SAR operations. These are a combination of repeated and simplex frequencies.

### State SAR Frequency (VSAR16—formerly known as SAR NFM, State SAR, or MRA)

In general, most SAR units have access to the AZ State SAR frequency of 155.160 MHz.<sup>2</sup> This frequency is also used for land SAR nationwide however some ambulance services use this frequency in parts of the United States. This is a simplex frequency but some counties have installed or are installing repeaters on this frequency with the 155.1600 narrowband MHz as the repeater output or receive frequency.

### Fire Mutual Aid (VFIRE21)

Many EMS and Fire agencies use VHF Fire Mutual Aid also known as VFIRE21 (154.2800 narrowband MHz) for interagency communications. Often, EMS helicopters (HEMS) also use this frequency to communicate with ground units for landing instructions when they are on approach to an accident scene.

### Arizona Interoperable Radio System (AIRS)

Throughout Arizona an interoperable radio system has been installed called the Arizona Interoperable Radio System (AIRS). Arizona has been divided into several AIRS regions. Each region has a frequency pair and specific PL tone for that region (AIRS1, AIRS2, AIRS3, AIRS4, AIRS5). The AIRS suite at each site consists of a VHF, a UHF, and an 800 MHz radio so that if one unit is using UHF on AIRS2 that transmission is broadcast on AIRS2 VHF, AIRS2 UHF, and AIRS2 800 MHz allowing for interoperable communications between units or agencies in disparate radio systems.

In each AIRS region there are also tactical frequencies assigned which are not interoperable because they do not use a repeater. Each of tactical frequencies are radio-band specific. For example, VTAC13 is a VHF (denoted by the V) tactical frequency (denoted by TAC) and UTAC13 would be a UHF (denoted by U in the title) tactical frequency.

## Federal/Non-Federal VHF SAR Operations Plan

The Federal/Non-Federal SAR and Operations Plan as outlined on page 39 of the National Interoperability Field Operations Guide (NIFOG) published by the U.S. Department of Homeland Security Office of Emergency Communications (available from <https://www.dhs.gov/national-interoperability-field-operations-guide-nifog>) is reproduced in Figure 17.3 on the next page.

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<sup>2</sup> Some jurisdictions may use a different designated frequency for SAR. For example, Maricopa County Sheriff's Office utilizes 159.09 MHz simplex and repeated.

<b>Federal / Non-Federal VHF SAR Operations Interoperability Plan</b>	
<b>Suggested SAR Function</b>	<b>Frequency (MHz)</b>
Ground Operations	155.1600 narrowband FM
Maritime Operations *	157.050 or 157.150 (VHF Marine ch.21A or 23A) as specified by USCG Sector Commander
Air Operations – civilian	123.100 MHz AM (may not be used for tests or exercises)
Air Operations – USCG/Military	345.0 MHz AM for initial contact only, then move to 282.8 MHz AM or other working channel
Air rescue assets to air rescue assets (deconfliction)	As charted on standard air chart or MULTICOM 122.850 (south or west sector) & 122.900 MHz (north or east sector), or as specified by FAA. 122.850 may not be used for tests or exercises
Ground to Air SAR working channel	157.175 83A (21A, 23A, 81A alternates as specified by local USCG Sector Commander) **
Ground to Maritime SAR working channel	157.050 21A (23A, 81A, 83A alternates as specified by local USCG Sector Commander) **
Maritime/Air/Ground SAR working channel *	157.175 83A (21A, 23A, 81A alternates as specified by local USCG Sector Commander) **
EMS / Medical Support	155.3400 narrowband FM
Hailing* & DISTRESS only - Maritime/Air/Ground	156.800 VHF Marine channel 16 *
<b>* Use VHF Marine ch.16 to make contact (30 seconds max.), then move to appropriate working channel as directed by local USCG Sector Commander. Non-maritime use of any VHF Marine channel requires FCC Special Temporary Authority or appropriate license. VHF marine channels use wideband FM, emission 16K0F3E</b> <b>** VHF Marine channels: 16=156.800 21A=157.050 22A=157.100 23A=157.150 81A=157.075 82A=157.125 83A=157.1750</b> <b>Direction from USCG, FCC, or FAA overrides information in this table. This table does not convey authority to operate.</b>	

**Figure 17.3.** Federal/Non-Federal VHF SAR Operations Plan

## Amateur Radio

Amateur Radio (HAM) is a good alternative or back-up to a specific county radio system. There are many HAM repeaters dispersed throughout the state. HAM radio requires a license from the FCC. To obtain the license an individual must take and pass an amateur radio exam. This exam is offered by many amateur radio clubs at various times.

Some HAM repeaters have auto-patch capability that allows a HAM operator to use the repeater as a telephone for short telephone calls. Some repeaters are internet linked (IRLP), which allows a HAM using a radio in Tucson to contact a HAM using a radio in Flagstaff, for example.

HAM operators can also use Automatic Position Reporting System (APRS) where a radio is linked to a GPS unit to transmit position information of that radio. This can be an effective tool for incident management staff to monitor the location of teams in the field.

For more information about HAM radio contact a local HAM club or visit [www.arrl.com](http://www.arrl.com).

## Arizona Statewide Interoperable Channel Plan—Priority Programming Guides

The Statewide Interoperability Executive Committee (SIEC) has approved these “priority programming guides” to standardize and increase interoperable communications throughout the state in the VHF, UHF, 700, and 800 MHz bands. It is suggested the each agency incorporate these channels into their



channel plan the next time their radios are programmed, but no later than the narrowbanding deadline of January 1, 2013.

CH#	NAME	BAND-WIDTH	RX FREQ MHz	RX CTCSS Hz	TX FREQ MHz	TX CTCSS Hz
1	VAIRS1	12.5 kHz	155.4750	CSQ	155.1900	141.3
2	VAIRS2	12.5 kHz	155.4750	CSQ	155.1900	131.8
3	VAIRS3	12.5 kHz	155.4750	CSQ	155.1900	110.9
4	VAIRS4	12.5 kHz	155.4750	CSQ	155.1900	123.0
5	VAIRS5	12.5 kHz	155.4750	CSQ	155.1900	167.9
6	VSAR16	12.5 kHz	155.1600	CSQ	155.1600	127.3
7	VFIRE21	12.5 kHz	154.2800	CSQ	154.2800	CSQ
8	VMED28	12.5 kHz	155.3400	CSQ	155.3400	CSQ
9	VLAW31	12.5 kHz	155.4750	CSQ	155.4750	CSQ
10	VCALL10	12.5 kHz	155.7525	CSQ	155.7525	156.7
11	VTAC11	12.5 kHz	151.1375	CSQ	151.1375	156.7
12	VTAC12	12.5 kHz	154.4525	CSQ	154.4525	156.7
13	VTAC13	12.5 kHz	158.7375	CSQ	158.7375	156.7
14	VTAC14	12.5 kHz	159.4725	CSQ	159.4725	156.7
15	VTAC36*	12.5 kHz	151.1375	CSQ	159.4725	136.5
16	VTAC37*	12.5 kHz	154.4525	CSQ	158.7375	136.5

□ NOTE: The use of tactical repeater pairs VTAC36/37 will supersede the use of VTAC11-14 since their Rx/Tx frequencies will be in use. In other words; - VTAC36 uses the Rx of VTAC11 and the Tx of VTAC14 with a 8.335 MHz separation. - VTAC37 uses the Rx of VTAC12 and the Tx of VTAC13 with a 4.285 MHz separation.

Figure 17.4. Statewide VHF Priority Programming Guide

Statewide UHF Priority Programming Guide						
	CURRENT NAME	BAND-WIDTH	RX FREQ MHz	RX CTCSS Hz	TX FREQ MHz	TX CTCSS Hz
1	UAIRS1	12.5 kHz	460.3750	CSQ	465.3750	141.3
2	UAIRS2	12.5 kHz	460.3750	CSQ	465.3750	131.8
3	UAIRS3	12.5 kHz	460.3750	CSQ	465.3750	110.9
4	UAIRS4	12.5 kHz	460.3750	CSQ	465.3750	123.0
5	UAIRS5	12.5 kHz	460.3750	CSQ	465.3750	167.9
6	UAIRS D	12.5 kHz	460.3750	CSQ	460.3750	100.0
7	UCALL40	12.5 kHz	453.2125	CSQ	458.2125	156.7
8	UCALL40D	12.5 kHz	453.2125	CSQ	453.2125	156.7
9	UTAC41	12.5 kHz	453.4625	CSQ	458.4625	156.7
10	UTAC41D	12.5 kHz	453.4625	CSQ	453.4625	156.7
11	UTAC42	12.5 kHz	453.7125	CSQ	458.7125	156.7
12	UTAC42D	12.5 kHz	453.7125	CSQ	453.7125	156.7
13	UTAC43	12.5 kHz	453.8625	CSQ	458.8625	156.7
14	UTAC43D	12.5 kHz	453.8625	CSQ	453.8625	156.7
15	MED-5D	12.5 kHz	463.1000	CSQ	463.1000	136.5
16						

Figure 17.5. Statewide UHF Priority Programming Guide—Effective 1/11/2012

Statewide 800 MHz Priority Programming Guide

ZONE	NAME	BAND-WIDTH	RX FREQ MHz	RX CTCSS Hz	TX FREQ MHz	TX CTCSS Hz
1	8AIRS1	20 kHz	866.0125	CSQ	821.0125	141.3
2	8AIRS2	20 kHz	866.0125	CSQ	821.0125	131.8
3	8AIRS3	20 kHz	866.0125	CSQ	821.0125	110.9
4	8AIRS4	20 kHz	866.0125	CSQ	821.0125	123.0
5	8AIRS5	20 kHz	866.0125	CSQ	821.0125	167.9
6	8CALL90	20 kHz	866.0125	CSQ	821.0125	156.7
7	8TAC91	20 kHz	866.5125	CSQ	821.5125	156.7
8	8TAC91D	20 kHz	866.5125	CSQ	866.5125	156.7
9	8TAC92	20 kHz	867.0125	CSQ	822.0125	156.7
10	8TAC92D	20 kHz	867.0125	CSQ	867.0125	156.7
11	8TAC93	20 kHz	867.5125	CSQ	822.5125	156.7
12	8TAC93D	20 kHz	867.5125	CSQ	867.5125	156.7
13	8TAC94	20 kHz	868.0125	CSQ	823.0125	156.7
14	8TAC94D	20 kHz	868.0125	CSQ	868.0125	156.7
15	8AZTAC5†	20 kHz	866.0375	CSQ	821.0375	156.7
16	8AZTAC5D†	20 kHz	866.0375	CSQ	866.0375	156.7

† The use of 8AZTAC5 and 8AZTAC5D are unique to Arizona with the approval of the Region 3 - 800 MHz Regional Planning Committee.  
 Note: The names of 8TAC95 and 8TAC95D were changed to 8AZTAC5 and 8AZTAC5D on January 11, 2012.

Figure 17.6. Statewide 800MHz Priority Programming Guide—Effective 1/11/2012

Statewide 700 MHz Priority Programming Guide

	NAME	BAND-WIDTH	RX FREQ MHz	RX NAC	TX FREQ MHz	TX NAC
1	7CALL50	12.5 kHz	769.24375	3966 or \$F7E	799.24375	659 or \$293
2	7CALL50D	12.5 kHz	769.24375	3966 or \$F7E	769.24375	659 or \$293
3	7MED65	12.5 kHz	769.39375	3966 or \$F7E	799.39375	659 or \$293
4	7MED65D	12.5 kHz	769.39375	3966 or \$F7E	769.39375	659 or \$293
5	7TAC55	12.5 kHz	769.74375	3966 or \$F7E	799.74375	659 or \$293
6	7TAC55D	12.5 kHz	769.74375	3966 or \$F7E	769.74375	659 or \$293
7	7FIRE63	12.5 kHz	769.89375	3966 or \$F7E	799.89375	659 or \$293
8	7FIRE63D	12.5 kHz	769.89375	3966 or \$F7E	769.89375	659 or \$293
9	7TAC56	12.5 kHz	770.24375	3966 or \$F7E	800.24375	659 or \$293
10	7TAC56D	12.5 kHz	770.24375	3966 or \$F7E	770.24375	659 or \$293
11	7LAW61	12.5 kHz	770.39375	3966 or \$F7E	800.39375	659 or \$293
12	7LAW61D	12.5 kHz	770.39375	3966 or \$F7E	770.39375	659 or \$293
13	7GTAC57	12.5 kHz	770.99375	3966 or \$F7E	800.99375	659 or \$293
14	7GTAC57D	12.5 kHz	770.99375	3966 or \$F7E	770.99375	659 or \$293
15	7CALL70	12.5 kHz	773.25625	3966 or \$F7E	803.25625	659 or \$293
16	7CALL70D	12.5 kHz	773.25625	3966 or \$F7E	773.25625	659 or \$293

Figure 17.7. Statewide 700MHz Priority Programming Guide—Effective 1/11/2012

Table 17.1. Separate AIRS and 800 MHz Zones

Zone 1	Name	Bandwidth kHz	TX Freq MHz	TX CTCSS Hz	RX Freq MHz	RX CTCSS Hz
1	8CALL90	20	821.0125	156.7	866.0125	CSQ
2	8CALL90D		SIMPLEX	156.7	866.0125	CSQ
3	8TAC91	20	821.5125	156.7	866.5125	CSQ
4	8TAC91D		SIMPLEX	156.7	866.5125	CSQ
5	8TAC92	20	822.0125	156.7	867.0125	CSQ
6	8TAC92D		SIMPLEX	156.7	867.0125	CSQ
7	8TAC93	20	822.5125	156.7	867.5125	CSQ
8	8TAC93D		SIMPLEX	156.7	867.5125	CSQ
9	8TAC94	20	823.0125	156.7	868.0125	CSQ
10	8TAC94D		SIMPLEX	156.7	868.0125	CSQ

**Table 17.2.** Separate AIRS and 800 MHz Zones

Zone 2	Name	Bandwidth kHz	TX Freq MHz	TX CTCSS Hz	RX Freq MHz	RX CTCSS Hz
1	AIRS1	20	821.0125	141.3	866.0125	CSQ
2	AIRS2	20	821.0125	131.8	866.0125	CSQ
3	AIRS3	20	821.0125	110.9	866.0125	CSQ
4	AIRS4	20	821.0125	123.0	866.0125	CSQ
5	AIRS5	20	821.0125	167.9	866.0125	CSQ

## Satellite Communications

Increasingly satellite communications devices are being deployed with SAR teams to facilitate communication. These include satellite phones and satellite messengers such as the Garmin InReach, SPOT, NAL Shout nano, Somewear, ACR Bivy Stick, and the ACR SARLink (only available to government customers) which is a combination of a PLB and a satellite messenger. Many of these devices allow for two-way voice or text communication as well as asset tracking via a website. When land mobile radio or cellular service is not available or limited, the satellite devices may be a good option for communication and personnel accountability.

## Mesh Network

Mesh communications are making their way into the public safety market. Products such as GoTenna and BearTooth utilize small radios that are connected wirelessly to responder's cell phones and establish a mesh network to communicate between devices. Text messages and location data “hop” between devices that are nodes in the network. If a node in the network is connected to the internet via a data connection it can back haul the location information for the other nodes even if they do not have an internet connection. Some of these devices can be integrated with the Team Awareness Kit (TAK) in addition to their standalone apps.

## Communications Summary

Communications is an essential tool for SAR personnel performing a mission. Critical information needs to be relayed in a timely manner. A good communication plan should be developed before units head into the field. Communications should be tested periodically to determine if there are communication difficulties, which should be reported to the incident management team during a debriefing so that they can be remedied for future operations.



## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

**17.1.** Discuss the common radio frequencies used in AZ SAR operations.

### Quizzes

**17.2.** There is no difference between radio communications in regular law enforcement patrol and in SAR communications. (a) True. (b) False.

**17.3.** Radio communications that use line of sight are known as (a) AIRS. (b) Simplex. (c) Repeater. (d) PL Tone.

**17.4.** Generally transmissions using simplex frequencies are not recorded by a dispatch center. (a) True. (b) False.

**17.5.** AIRS stand for (a) Arizona Interagency Radio System. (b) Arizona Interoperable Radio System. (c) All Interagency Radio System. (d) Army Interagency Radio System.

**17.6.** HAM radios have no place in SAR operations. (a) True. (b) False.

**17.7.** Which of the following statements best describes communications needs for Search and Rescue? (a) A Communications Plan is an essential tool for any Search and Rescue operation and should be tested to assure functionality. (b) If AIRS frequencies are being used field personnel never have need of a tactical frequency. (c) Documented communications are sometimes used as evidence in criminal court proceedings, but is seldom a concern for Search and Rescue.

## CHAPTER 18

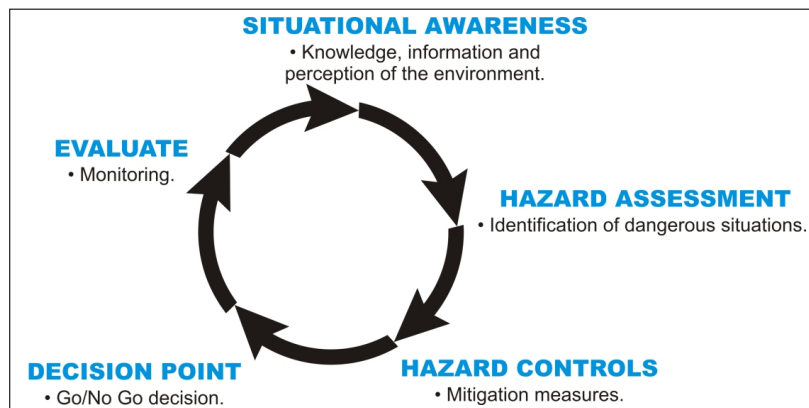
# Risk Management

### Section 18.1 Risk Assessment

**Do you accurately understand the risks that rescuers are exposed to during a search operation?**

Tragically, many accidents in search and rescue operations are the result of a failure to adequately identify and manage risk. This chapter will provide some tools to assess and manage risk during SAR operations. Applying these concepts may very well save a life.

Risk management is a process that should be ongoing. The key steps in the process are shown in Figure 18.1 starting with Situational Awareness.



**Figure 18.1.** The Cyclic Process

Once a Risk Management Cycle is completed the cycle should start again to ensure that personnel are maintaining their situational awareness with updated information.

## Human Error

Human performance in critical situations involves effective decision making and completing error-free tasks. During SAR operations emotions can be high and the adrenalin flowing that creates an environment ripe for human error. Human error is repeatedly cited in accidents and incidents across a wide variety of disciplines.

Gordon Dupont, a Canadian aviation accident investigator, has compiled the “Dirty Dozen of Human Errors” based upon his experiences.<sup>1</sup> These factors can set up anyone to make an error no matter what the task or occupation.

1. **Lack Of Communication**—A failure to exchange information.
2. **Complacency**—Loss of awareness and the development of overconfidence.
3. **Lack Of Knowledge**—Lack of experience or training in the task.
4. **Distraction**—Anything that takes your mind off the job.
5. **Lack Of Teamwork**—Without teamwork, we are only a group of individuals involved in a similar task.
6. **Fatigue**—Considered to be the number one contributor to human error.
7. **Lack Of Resources**—Insufficient or not fully operational equipment and manpower to safely perform a task.
8. **Pressure**—External as well as self imposed psychological pressure.
9. **Lack Of Assertiveness**—Failing to speak up when things do not seem right.
10. **Stress**—Overwhelmed by stress leads to human error.
11. **Lack Of Awareness**—A lack of alertness and vigilance in observing. Failing to ask the “what if?” question.
12. **Norms**—The “normal” accepted way things actually are done in an organization, regardless of whether their practices are valid and safe.

These common errors are good points to review with personnel during an operational briefing as well as incorporating them into the IAP.

## Section 18.2

### Situational Awareness

Situational Awareness is the ability to continuously analyze information coming in and constantly update your mental model of the situation. This is a critical skill for emergency responders. Many times responders get initial incident information from Dispatch and begin to formulate a plan to deal with the incident based on that information only to find a different situation when responders arrive on scene. It is crucial that responders are able to recognize that the conditions have changed from the initial impression and compensate for those changes.

A lack of situational awareness has been cited in many accidents as a contributing factor. Under stress it is sometimes hard to take in new information, analyze it, and update the mental image of the conditions. The following are some actions that prevent the loss of situational awareness.

- Actively question and evaluate the mission progress.
- Analyze the situation.
- Update and revise the image of the mission.
- Use assertive behaviors when necessary:
  - Make suggestions.
  - Provide relevant information without being asked.
  - Ask questions as necessary.
  - Confront ambiguities.
  - State opinion on decisions/procedures.
  - Refuse unreasonable requests. IT’S OKAY TO SAY NO!

<sup>1</sup> See Reference [Dupont].

### Section 18.3

## Communications

Communications are essential during a SAR mission. Personnel rely on both their communications equipment and their personal communications skills to convey important information. Without good communications the mission can rapidly degrade and responder safety can be jeopardized.

SAR personnel have the following communications responsibilities:<sup>2</sup>

1. Brief others as needed.
2. Debrief your actions.
3. Communicate hazards to others.
4. Acknowledge messages.
5. If you don't know, Ask. Clarify ambiguities before proceeding.

### Radio/Phone Communications

Effective incident communications must be established before operations get underway. There are several issues that should be considered when establishing incident communications.

- Pre-plan communications in response areas especially areas that are known to cause communications difficulty.
- Brief incident personnel on established communications plans and protocols.
- Use adjacent agency radio frequencies to expand incident coverage.
- Use long range (high gain) portable radio antennas.
- Use ground-to-air radios.
- Use amateur radio to supplement agency radio communications ability (requires properly licensed personnel)
- Deploy human relays or portable repeaters.
- Use satellite phones.
- Use satellite tracking/messaging devices.

### Section 18.4

## Personal Preparedness

It is a fact that some people do not belong in SAR operations. SAR personnel must be evaluated for fitness and readiness to respond to SAR incidents. Capabilities must be matched with appropriate tasks.

When evaluating personnel for assignment on a SAR mission the following items should be considered.

- Physical fitness.
- Mental fitness.
- Equipment and Clothing.

The Incident Commander must be ready to demobilize personnel who are not fit for the mission.

<sup>2</sup> See Reference [NIFC-IRPG, page ix].

## Section 18.5

### Fatigue

Combating fatigue during a SAR incident requires vigilance. Incident Management Team members must make an effort to monitor and manage personnel fatigue. Personnel who are fatigued are prone to making poor decisions.

#### Factors increasing fatigue<sup>3</sup>

- Sleep loss (7–8 hours of sleep is optimal).
- Disrupted sleep from alcohol, medications, caffeine.
- Disruption of circadian rhythm—working between 10 p.m. and 6 a.m.
- Long and multiple work shifts.
- Low activity and repetitive tasks as well as high intensity workload.
- Decision-makers are more prone than those doing hard physical work.
- Environment (altitude, heat stress, carbon monoxide exposure, etc.).
- Dehydration.
- Age or poor fitness level.

#### Signs and symptoms of fatigue

- Poor decision making.
- Slowed reaction time.
- Difficulty communicating.
- Forgetfulness.
- Fixation.
- Lethargy.
- Bad mood.

Fatigue has been equated to being intoxicated. In some studies a 19-hour work day equates to the mental performance of someone with a 0.08 blood alcohol concentration, which is legally impaired in most states.

Rest periods, including naps of about 30 minutes, and good nutrition are important to combat fatigue.

The natural circadian rhythm is also a factor in fatigue. Humans naturally have low points in the circadian rhythm in the early afternoon (1500–1700 hours) and in the early morning (0300–0500 hours).

#### Case Study—People Just Aren’t At Their Peak At 4 a.m.

Before the March 28, 1979, Three-Mile Island Nuclear Generating Station Accident near Harrisburg, Pennsylvania began, the reactor was operating at full power, and there did not appear to be any cause for concern. But unbeknownst to the operators, a valve that was supposed to be open had been left closed by a maintenance worker who was no longer on shift. And it was four o’clock in the morning, the lowest point in the human circadian cycle.<sup>4</sup> No matter how well-intentioned they are, how attentive they try to be, how much coffee they have had, people are not at their best at 4 a.m.—not even people whose job it is to control a nuclear power plant.<sup>5</sup>

<sup>3</sup> See Reference [USDA].

<sup>4</sup> The human circadian cycle is about 24 hours.

<sup>5</sup> See Reference [Vicente, page 127].

*People are not at their best at 4 a.m.*

During wildland firefighting activities the U.S. Forest Service and the Department of Interior adhere to a 2-to-1 work-rest ratio (for every two hours of work or travel, one hour of sleep is provided). This translates into a work shift of 16 hours in a given 24 hour period. Additionally drivers are limited to 10 hours of behind the wheel driving. A driver is permitted to drive only if they have had at least 8 consecutive hours off duty before beginning a shift. However, if this is not possible during critical response situations, fatigue mitigation measures must be documented.

SAR Incident Management Team members should be thinking about and planning for demobilization and relief almost as soon as the incident starts. Prior to releasing personnel from an incident consideration should be given to fatigue issues and responder safety. A rest period may be needed after a responder leaves the field and before they are allowed to drive home from the incident.

### **Case Study—Death of an Incident Commander, Virginia**

Five-year-old boy Victor Shoemaker was reported missing and lost after wandering away from kids he was playing with in the mountains of Hampshire County near the town of Kirby, WV. At 8 o'clock on the morning of May 3, 1994, 24-year-old Lisa Hannon had just been relieved as Incident Commander by fellow Appalachian Search and Rescue Conference (VA) members. Lisa had worked tirelessly through the night to organize the massive search operation that would eventually involve over 1,000 personnel. She had not slept in 23 hours. Twenty minutes after sliding in behind the wheel of her truck, Lisa fell asleep while driving and struck a tree on U.S. Route 50 at full speed, killing her instantly. Lisa's death was the first line-of-duty death for the State of Virginia Search & Rescue Program.<sup>6</sup>

## **Section 18.6** **Aviation Operations**

Within the limits of safety, weather, and performance capability, the helicopter and fixed wing aircraft can be a valuable resources in SAR operations. It is vital that these resources be applied appropriately. Discipline is required of rescuers to not let the urgency of the situation overwhelm their judgement. Flight operations must be conducted in accordance with applicable FAA Regulations and agency policy. The nature of search incidents requires a higher degree of vigilance of SAR personnel during responses to unimproved helispots.

### **Case Study—Navy Helicopter Crash, Granite Dome, California**

A military helicopter crashed on July 8, 2001, during a search for 28-year-old Eric Tucker in the Emigrant Wilderness of the Stanislaus National Forrest. See Figure 18.2 on the next page. "Longhorn 1", an HH-1N Huey from Fallon NAS (NV), was in the process of transporting personnel and equipment to a radio relay site on Granite Dome. All six persons on board escaped with light to moderate injuries. There was a "loss of control" as the aircrew attempted to land on the 10,322 foot summit of Granite Dome.<sup>7</sup> The accident was a result of the aircraft being over its allowable gross weight for the altitude of the mission.

<sup>6</sup> See Reference [Dixon].

<sup>7</sup> See Reference [Scharper].





**Figure 18.2.** Navy helicopter crash, Granite Dome, CA

### Twelve standard aviation questions that could save your life

1. Is this flight necessary?
2. Who is in charge?
3. Are all hazards identified and have you made them known?
4. Should you stop the operation or flight due to:
  - Communications?
  - Weather?
  - Turbulence?
  - Personnel?
  - Conflicting Priorities?
5. Is there a better way to do it?
6. Are you driven by an overwhelming sense of urgency?
7. Can you justify your actions?
8. Are there other aircraft in the area?
9. Do you have an escape route?
10. Are any rules being broken?
11. Are communications getting tense?
12. Are you deviating from the assigned operation or flight?

*WHEN IN DOUBT—DON'T!*

#### **Case Study—State Police Helicopter Crash, Santa Fe, New Mexico**

On June 9, 2009, a New Mexico State Police Agusta A109E crashed during the attempted rescue of an uninjured hiker near Santa Fe Baldy Peak 12,632 feet, which is northeast of Santa Fe, New Mexico. Instrument meteorological conditions prevailed when the helicopter

impacted terrain, killing the 46-year-old pilot and female subject. The pilot and police spotter had landed after locating the search subject just before dark. Dispatchers had directed the helicopter crew to the missing hiker, as they spoke with her by cell phone. While the pilot hiked off from the landing zone to reach the subject, the weather deteriorated and began sleeting. The pilot returned carrying the hiker on his back. After becoming airborne, storm clouds closed in around the helicopter. Based on radio transmissions, the pilot reported “*we hit a mountain*”, and continued to fly for at least one minute. The helicopter impacted terrain and rolled 800 feet down a steep talus slope. The deteriorating weather conditions were known in advance and the helicopter response lacked a formal mission briefing between all personnel involved. The incident commander had not dispatched and was not in operational control of the helicopter during the mission. The flight crew was not prepared with adequate survival equipment to remain at the landing zone overnight. A late season snowstorm hampered rescue efforts and the spotter, who was the sole survivor, was not located until the following day.<sup>8</sup>

During an escalating SAR operation, responders may be tempted by the urgency and mission tempo to take shortcuts with personal safety. A lack of “operational control” of aviation assets on a SAR can allow this dangerous condition to develop. It requires professional discipline to not allow turning rotors to let poor decision-making occur. Some common hazards associated with helicopter missions include crew fitness, distraction, mission focus, communication, weather, takeoff or landing weights, landing areas, other aircraft, wires and other obstructions.

### Aviation user checklist<sup>9</sup>

- Pilot is qualified and current for aircraft type and mission?
- Aircraft approved for mission?
- “Flight Following” in place or Flight Plan filed?
- Personal Protective Equipment-available and worn by all passengers and pilot?
- Pilot briefed on mission objectives, flight parameters, known hazards, and aerial hazard map?
- Pilot has provided a briefing to passengers?

### Flight Following

“Flight Following” is the task of maintaining contact with specified aircraft for the purpose of determining en route progress and/or flight termination. It involves positive control and position reporting of deployed aviation assets. This is a key component in aircraft mission safety and, regardless of whether it is performed by a dispatch facility or at a remote location in the field, it must be given a high priority.

Identification of Flight Following requirements.<sup>10</sup>

- When the flight is planned, Flight Following requirements should be clearly identified.
- Requirements should identify check-in procedures, including time and locations, dispatch office(s) or other flight following facilities involved, individuals responsible for flight following, frequencies to be used, and any special circumstances requiring check-ins (for example, to military facilities within Special Use Airspace).
- Check-ins must be documented and provide enough information so the aircraft can be easily located if it is overdue or missing.

<sup>8</sup> See Reference [Ledwidge, page 3].

<sup>9</sup> See Reference [NIFC-IRPG, page 51].

<sup>10</sup> See Reference [NIFC-IRPG, page 56].

- Identify that the Flight Following facility shall implement response procedures for overdue or missing aircraft.

### The four M's of aviation risk assessment

- Method—Appropriate method for the task?
- Medium—Safe working environment for the aircraft?
- Man—Adequate trained personnel to manage the aircraft? Pilot carded?
- Machine—Aircraft carded? Task within performance limitations of the aircraft?

The concept of Crew Resource Management (CRM), where each member of the aviation operation assumes a pro-active and responsible role in the safety of the mission, needs to be promoted and adhered to. Team members must be encouraged to speak up and provide relevant information without being asked.

When employing Department of Interior and USDA-Forest Service carded aircraft, all personnel are required by national policy to wear personal protective equipment (PPE) including flight helmet, Nomex<sup>®</sup> clothing, leather boots and leather or Nomex<sup>®</sup> gloves. See Figure 18.3. The Interagency Helicopter Operations Guide (IHOG) is an excellent reference for employing federal land management agency helicopter assets as well as non-federal rotorcraft during SAR operations. The complete Guide is available on the internet.<sup>11</sup>

It is important to note that the PPE policies of the federal land management agencies may not be practiced by other entities such as the U.S. military, law enforcement agencies, and commercial medical evacuation aircraft. Thus, no one can fly on a federal land management agency's carded aircraft unless they have the required PPE, and, conversely, federal land management agency personnel cannot fly on "non-carded" aircraft.



**Figure 18.3.** Nomex<sup>®</sup> flight suit and gloves

The single most important management action that an incident commander can take when they have aviation assets assigned to an incident is to dedicate a properly trained individual to manage air operations. This dedicated oversight will be worth the effort and peace of mind.

<sup>11</sup> See Reference [NIFC-IHOG].

## Section 18.7

### Vehicle Operations

Motor vehicles are operated on a near constant basis, providing recurring exposure to a hazard that can easily be normalized. According to NIOSH, “roadway crashes are the leading cause of occupational fatalities in the U.S.”<sup>12</sup>

#### Case Study—Outside Joshua Tree National Park, California

On Saturday July 17, 2004, two volunteer members of the San Geronio (CA) Search and Rescue Team died in a motor vehicle accident, while traveling to a search assignment at Joshua Tree National Park (CA). As five team members drove through the town of Morongo Valley at 5 a.m., a Ford Ranger pick-up truck heading west on State Highway 62, a four-lane highway, veered into oncoming traffic and struck the marked suburban carrying them. As a result of the collision, Mr. Scott Johnston, age 30, SAR Tech. II, team member for five years, was pronounced dead at the scene. Philip Calvert, age 58, SAR Tech. II, team member for 12 years, sustained major injuries and subsequently died of those injuries. Three additional SAR members were in the vehicle and they received minor to moderate injuries. The driver of the other vehicle was arrested for driving under the influence. The search subject, 17-year-old, Eric Sears was found deceased one week later.<sup>13</sup>

While this type of accident may not immediately appear preventable, it truly underscores the personal risk involved with an activity that is performed on a routine basis. Additionally any vehicle operation conducted in an emergency response (lights and siren) mode dramatically increases personal risk.

#### Case Study—Oceano Dunes State Vehicular Recreation Area, California

A SAR volunteer was killed on May 24, 2009 during an emergency response at Oceano Dunes State Vehicular Recreation Area in San Luis Obispo County. Christopher Meadows, 24, was part of a team responding to an accident at the state park south of Pismo Beach. The Honda ATV quad he was operating flipped due to the “unsafe speed for descending a sand dune” and landed on top of him after an almost sheer drop of about 30 feet. According to the California Highway Patrol, which investigated the accident, a 4-wheel-drive ambulance behind Meadows wasn’t able to stop completely before hitting the downed ATV and Meadows. Meadows had been a SAR volunteer for one year and was employed as a full-time EMT with the ambulance company, whose vehicle struck him.<sup>14</sup>

To operate an emergency vehicle in the emergency response mode, a responder must have completed a formal Emergency Vehicle Operations Course (EVOC) or agency accepted equivalent. All emergency vehicle responses must be carried out in accordance with agency policy and applicable state laws.

### Emergency vehicle response

- In emergency response mode both lights and siren are activated.
- Drive with due regard for the safety of others.
- Seatbelts in use by all occupants.
- Proceed past a stop sign only after slowing as necessary for safe operation.
- Emergency lights activated and spotter employed when backing large apparatus.

<sup>12</sup> See Reference [NIOSH].

<sup>13</sup> See References [Lehman] and [Ohlfs].

<sup>14</sup> See Reference [Wenner].

- SLOW DOWN—arrive safely!

Recurring incident safety briefings and tailgate training sessions are an effective means to promote safe vehicle operations.

### Section 18.8 Incident Safety Analysis

During an extended search incident the safety officer prepares an incident safety analysis in conjunction with the operations section chief. This formal analysis reviews the planned tactical work assignments in the next operational period, lists the known safety hazards, and identifies the associated mitigation strategies being put in place to reduce the operational risk. The safety officer employs the ICS 215A Form (Incident Safety Analysis), see page 316. Part of a completed ICS 215A Form is shown in Figure 18.4.

Incident Safety Analysis								
WORK ASSIGNMENTS	HAZARDS				MITIGATIONS			
	Dehydration	Hazardous footing	Fatigue	ATV operations	Emphasize hydration and provide water resupply for personnel	Awareness of footing, safe route selection and good footwear.	Crew rest monitored. Adequate backup resources. Work breaks enforced.	Follow established agency ATV operations policy.
DIVISION A—Ground search assignments.	X	X	X		X	X	X	
DIVISION B—ATV patrols.	X		X	X	X		X	X

**Figure 18.4.** Completed ICS 215A Form

The completed ICS 215A is reviewed during the planning meeting. The information from the Incident Safety Analysis is then incorporated into the written incident action plan by the Safety Officer as a detailed safety message or a specific written plan for an assignment. Examples of a Search Incident Safety Message and a written Rock Fall Mitigation Plan—written by the NPS—are shown starting on page 181.

Additionally the Safety Officer has the authority to suspend or terminate operations immediately if operations are found to be dangerous to personnel. There is only one Safety Officer assigned to an incident. However they may have assistants, as necessary.

### Top SAR-specific hazards and training opportunities

- Personal Protective Equipment (PPE).
- Critical Personal Communications.
- Emergency Vehicle Operations and Scene Safety.
- Patient Lift and Moving Techniques.
- Environmental Exposure.
- Body Substance Isolation Procedures.
- Tool and Equipment Safety.

- Fall Prevention and Protection.
- Personal Health and Fitness Testing.



## Search Incident Safety Message

Our Top Priority Is The Safety And Health Of All Incident Personnel In The Search Area. The safety and health of all personnel shall be accomplished by strict planning in the development of individual assignments. Do not complicate the ongoing incident response with an accident. If you identify a safety issue and can address the situation, then FIX IT! If you are unable to correct a problem, notify your Division/Group Supervisor immediately.

**Personal Preparedness:** Be rested. Be alert. Stay hydrated by drinking plenty of fluids. On field search assignments be prepared to stay overnight by having enough food, water and personal items with you.

- Be prepared for the known and unknown.
- Use sunscreen.
- Have rain gear ready.
- Wear proper clothing and PPE (Personal Protective Equipment) for your assignment.

**Weather:** This is the monsoon season which is usually characterized with clear mornings and afternoon thunderstorms. Intense rain, flash flooding, and lightning is possible during this time of year. Be prepared with appropriate clothing.

- Remember while searching in drainages stay alert for potential flash flood.
- Again, protect yourself from the heat, and direct sunlight. Do this by wearing proper clothing, sunscreen, hat and of course drinking plenty of fluids.

**Communication:** Communication and coordination between all personal is essential. All incident personnel must have access to a radio to communicate through the chain of command. Keep radio transmissions concise and clear using plain text.

### Vehicle Safety:

- Avoid distractions to driving and adhere to posted speed limits.
- Seatbelts in use by all occupants.
- Driver is rested or takes breaks as necessary.

### Aviation:

- Ensure personnel receive safety briefings and are qualified for the required mission.
- Keep Air Operations involved in planning and updates that change focus of incident.
- Avoid aerial search assignments that involve flying into the sun.
- For over-water assignments, complete a water ditching briefing in advance.

### River Operations:

- Search personnel will wear PFD and helmet when operating within ten feet of swiftwater.
- Ensure personnel are qualified for river rescue operations.
- Be alert to the location and activities and all personnel in your group.

### Operational Mindset:

- “SPEAK UP” if you do not understand an assignment, feel you’re not qualified for an assignment, or feel something is “just not right”.
- **Maintain Your Situational Alertness At All Times.**

## Rock Fall Mitigation Plan

**Helmets to be worn at all times when in areas of rockfall or while in technical terrain.**

### **MINIMIZE YOUR EXPOSURE.**

- Take breaks in a safe location.
- Complete the task with the essential personnel required and depart the hazardous zone as quickly as possible.

**Preplan** your reaction to rockfall.

- Yell, “*rock!*”
- Don’t look up.
- Protect your spine with your hand cupped to the back of your neck.
- Minimize your profile—hug the cliff or use available natural protection for cover and safety.

Rappel or ascend a cliff face by means of a clean route.

- Remove potential debris along rope path above cliff.
- Scout in advance with a critical eye.
- Mentally project and ask yourself, “*what potential rockfall exists at this location?*”
- Clear away loose debris near a cliff edge or rope pathway in advance.
- Try to position the rope to pass over a barren edge or slick-rock edge.
- Employ a natural high directional (for example, tree) close to the cliff edge, which will minimize critical rope contact.

Avoid having a rope pendulum along the cliff edge.

- Personnel that must remain “on belay” below a cliff may need to establish a separate fixed safety line, which permits them to traverse safely.

Avoid standing directly beneath someone who is rappeling or ascending.

Remain motionless while someone passes beneath you or is working below you.

Working on a slope

- Avoid placement or positioning of personnel directly below one another.
- Stage multiple personnel in a diagonal pattern if possible.
- If necessary to be in the fall line—work close together rather than far apart.

Traveling on/across slopes

- Step on uphill side of a rock.
- Lift your feet and place them deliberately when walking on talus.
- Rig your gear/pack to prevent dangling tripping hazards.

## Section 18.9

## Establishing Controls For Managing Risk

Once risks associated with an incident have been thoroughly assessed, mitigation efforts and control measures are put in place to reduce the threat to personnel. Starting with the highest threat, identify the risk control options for all of those hazards identified in the Incident Safety Analysis that exceed an acceptable level of risk.

### The STAAR Model Risk Management Mitigation efforts includes

- SPREAD the risk over time, distance or numbers of personnel to reduce the effect of a single event.
- TRANSFER the risk away from critical system components or to those most reliable to decrease probability of a bad outcome.
- AVOID threats by establishing barriers and other controls to eliminate probability of a bad outcome.
- ACCEPT the level of threat and its probability with every aspect of the system poised for success.
- REDUCE the effect or exposure through safety devices (Personal Protective Equipment, alarms, etc.) or limit the number of resources exposed.<sup>15</sup>

### A “Safety Discipline” for search incidents

1. Assign a dedicated Safety Officer.
2. Conduct thorough briefings.
3. Perform formal Safety Analysis and planning for tactical assignments.

The job of risk management on an incident cannot become over-shadowed by the objective of the SAR operation. Keep in mind that accountability for operational safety ultimately rests with the Incident Commander. Slow down, and be proactive about safety from the beginning of the incident.

## Section 18.10

## Risk Management Models

SAR personnel are continually exposed to varying levels of risk during operational deployments. Risk management involves quantifying risk and then mitigating it through control measures. One way to quantify risk is to use models.

### The SPE Model

In this model risk is assessed by multiplying three numbers together: the **S**everity of a hazard resulting in adverse event, the **P**robability of an event occurring, and the degree of **E**xposure, which is expressed in the following formula.

$$\text{Risk Assessment} = \text{Severity} \times \text{Probability} \times \text{Exposure.}$$

The numbers to use in this formula are determined as follows.

- **Severity.** A measure of the event’s potential consequences.
  - 1 = Negligible
  - 2 = Minimal
  - 3 = Significant

<sup>15</sup> See Reference [NIFC-IHOG, pages 3–8].

4 = Major

5 = Catastrophic

- **Probability.** A measure of the likelihood of the threat or hazard occurring.
  - 1 = Impossible or remote under any conditions
  - 2 = Unlikely under normal conditions
  - 3 = About 50/50
  - 4 = Greater than 50%
  - 5 = Very likely to happen
- **Exposure.** A measure of the amount of time, number of occurrences, number of people, and/or the amount of equipment involved in an event, expressed in time, proximity, volume, or repetition.
  - 1 = None or below average
  - 2 = Average
  - 3 = Above average
  - 4 = Great

The value for Risk Assessment derived from this formula should be compared to the SPE Guidance Table, Table 18.1, to determine a recommended action.

Table 18.1. SPE Guidance Table

VALUE	DEGREE OF RISK	GUIDANCE
80–100	Very High	Discontinue, Stop
60–79	High	Correct Immediately
40–59	Substantial	Correction Required
20–39	Possible	Attention Needed
1–19	Slight	Probably Acceptable

## GAR Risk Assessment Model

The GAR (Green, Amber, Red) Risk Assessment Model is a powerful “Go”-“No Go” decision tool. The primary difference between this model and the SPE model is that the GAR model incorporates the opinions of several personnel involved and the SPE model is performed by one person.

Using the GAR model the respondents independently assign a risk score between 1 (no risk) and 10 (maximum risk) to eight different elements.

1. **Supervision.** The presence of qualified, accessible and effective supervision on the incident. A clear chain of command is in place.
2. **Planning.** Adequate incident information is available and clear. There is sufficient time to plan, operational guidelines are current, briefing of personnel is being conducted, and team input solicited.
3. **Contingency Resources.** Backup resources that can assist if needed. Evaluate shared communications plan and frequencies. Has an alternative plan been evaluated?
4. **Communication.** Evaluate how well personnel are briefed and communicating. How effective is communication system and is there is an established communication plan? Does the operational environment value input?
5. **Team Selection.** Team selection should consider the qualifications and experience level of the individuals. Consider the experience for the mission being performed.
6. **Team Fitness.** Consider physical and mental state of the crew. Evaluate team morale and any distractions.
7. **Environment.** Consider factors affecting performance of personnel and equipment such as time, temperature, precipitation, topography, and altitude. Evaluate site factors such as narrow canyons, forest canopy, technical terrain, snow, swiftwater, etc.

8. **Incident Complexity.** Evaluate severity, exposure time, and probability of mishap. Assess difficulty of the mission and proficiency of personnel.

The scores are summed and then compared to the GAR Risk Assessment Table. A comparison of each individuals GAR score should be conducted to see where the majority of the scores fall in the GAR Risk Assessment Table, Table 18.2.

Table 18.2. GAR Risk Assessment Table

1–35	36–60	61–80
GREEN	AMBER	RED
Go—Proceed With Mission	Caution—Mitigate Hazards Before Proceeding	NO GO—Stop. Do Not Proceed With Mission

### Complacency Model

Complacency is defined by dictionary.com as “a feeling of quiet pleasure or security, often while unaware of some potential danger, defect, or the like”.<sup>16</sup> This model examines the factors of **R**epetition, **C**onfidence, and **E**xperience as they relate to risk using the formula developed by Craig E. Geis, California Training Institute, [www.cti-home.com](http://www.cti-home.com).<sup>17</sup>

$$\text{Risk} = \text{Repetition} \times \text{Confidence} \times \text{Experience}.$$

- **Repetition**
  - 1 = I Rarely Do It.
  - 2 = I Seldom Do It.
  - 3 = I Do It Occasionally
  - 4 = I Do It Often.
  - 5 = I Do It All The Time.
- **Confidence**
  - 1 = I Am Very Concerned.
  - 2 = I Am Nervous About The Task.
  - 3 = So, So. I’ve Had Close Calls Before.
  - 4 = I’m Pretty Sure It Won’t Be A Problem.
  - 5 = Positive, Never Had A Problem Before.
- **Experience**
  - 1 = Less Than 3 Years.
  - 2 = From 3 To 5 Years.
  - 3 = From 6 To 15 Years.
  - 4 = Greater Than 15 Years.

The Risk calculated with the formula is then compared to Table 18.3 on the next page to determine what type of error may result and the corrective actions.

<sup>16</sup> [www.dictionary.com](http://www.dictionary.com).

<sup>17</sup> See Reference [Geis].

Table 18.3. Risk Values

Value	Recommendation
1—19	Low Skill: Stop and Get Help
20—39	Moderate Skill: Review Procedures
40—59	Safety Zone: Proceed
60—79	Moderate Complacency: Review Procedures
80—100	High Complacency: Stop and Think

### Why do the models work?

The ability to assign numerical scores or color codes in the GAR Model, SPE Model, and Complacency Model is not the key ingredient in how this process performs effective risk assessment. Rather, the key ingredient occurs when team members discuss their post-scoring results together, because it generates valuable discussion toward understanding the risks and how the team will manage them. The models should also raise the level of awareness for the incident management team and prompt discussions of appropriate strategies and tactics.

The National Park Service has created a Risk app called “Risk: SPE, ORMA, and GAR Calculator” that is freely available in the Apple App Store. The British Columbia Search and Rescue Association has also created an app called “RADeMS” which also calculates a risk and response capability score which is available on both the Apple App Store and Google Play.

### An Example

#### Case Study—DPS Air Rescue

On October 13, 2008 Sedona Fire District received a report of lost hikers outside of Sedona, AZ, on Bear Mountain. During the call the hikers indicated that they were tired and dehydrated. Sedona Fire District responded and requested the assistance of DPS Northern Air Rescue to locate the hikers. DPS Air Rescue accepted the mission and flew to the area for an aerial search. Prior to DPS Air Rescue arrival Sedona Fire believed that they had spotted the hikers through binoculars. That information was passed to DPS Air Rescue and Air Rescue was going to fly over the area and try to confirm the location of the hikers. Discretion was given to Air Rescue as to whether they would land and make contact or just report the location and best access for ground-based rescuers.

#### Risk Assessment of the Sedona Mission—SPE Model

Severity = 4

Probability = 2

Exposure = 3

$$\text{Risk Assessment} = 4 \times 2 \times 3 = 24.$$

Assessment: Condition Yellow—**Attention Needed.**

#### Risk Assessment of the Sedona Mission—GAR Model—one individual’s assessment

Supervision = 3

Planning = 6

Contingency Resources = 5

Communication = 5

Team Selection = 2

Team Fitness = 1



Environment = 7

Incident Complexity = 7

$$\text{Risk} = 3 + 6 + 5 + 5 + 2 + 1 + 7 + 7 = 36.$$

Assessment: AMBER—**Caution: Mitigate Hazards Before Proceeding.**

### Risk Assessment of the Sedona Mission—Complacency Model

Repetition = 5

Confidence = 4

Experience = 3

$$\text{Risk} = 5 \times 4 \times 3 = 60.$$

Assessment: Moderate Complacency—**Review Procedures.**

## FINALLY, BEFORE YOU HEAD OUT...

It is the subject's emergency—not yours! Be a professional and do not sacrifice personal safety. There are folks at home who want everyone to return. This is a job—no one needs to die doing it.

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

**18.1.** Develop an Incident Safety Analysis for a search that has personnel involved in the following tactical assignments.

- Search team working downstream adjacent to moving swiftwater.
- Multiple aircraft being used for insertion of search crews.
- Poor radio communications in one division due to mountainous terrain.

**18.2.** Prepare a safety message to be included in the incident action plan on the search incident associated with the Incident Safety Analysis completed in Exercise 18.1.

**18.3.** List two strategies to combat fatigue.

**18.4.** List five different factors that increase fatigue.

**18.5.** List five different symptoms of fatigue.

**18.6.** List five different mitigation methods to combat fatigue.

### Quizzes

**18.7.** According to the Dirty Dozen Of Human Errors, the number one contributing factor to human error is (a) Distraction. (b) Lack of resources. (c) Stress. (d) Fatigue.

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## CHAPTER 19

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### The Role Of The Incident Commander

#### Selection Process

Search Managers, or as they are known in the ICS world, Incident Commanders, should not necessarily be chosen from the top of the test score list, or by a popularity contest, or by rank, but by their skills, experience, knowledge, and training.

The Incident Commander needs to be a person who

- Has the ability to convince resources that their mission is still important after hours—and sometimes days—of searching with no results, when the negative results of the search seem evident, and when bad weather is just over the horizon.
- Can drive to a search location without getting lost or having to stop and ask for directions while talking on the phone and radio.
- Can direct other units to the search location while eating a left-over breakfast burrito.
- Can deal with all the other external influences that may effect the incident, the searchers, and the agency they represent.

These skills are not learned by taking tests or being popular.

#### Expectations and Relationships

The Incident Commander is expected to be just that, the Commander of the Incident. The Incident Commander needs to

- Be able, be willing, and have the authority to act and make crucial decisions in an instant.
- Have the trust and support of the Agency Administrator and be able to take action in their absence while wearing several hats simultaneously.
- Be the Public Information Officer if one has not been appointed or is not available.
- Make various command decisions, some for safety reasons and others like suspending a search or canceling a rescue because the hazards are too great.
- Provide Leader's Intent to incident personnel.
  - Task: What is the goal of the assignment?
  - Purpose: Why is the assignment important to the mission?
  - End State: What does successful completion of the assignment look like?

To be able to accomplish these tasks the relationship between the Incident Commander and the Agency Administrator must be one of trust, knowledge, experience, and support.

Every agency varies as to the extent that the Agency Administrator is involved in SAR operations and the SAR Incident Commander is usually hand-picked by the Administrator or Bureau Commander based on the abilities of the Incident Commander. However, in some cases, the Incident Commander is picked at random or for unrelated reasons, but for the most part, the Agency Administrator prefers to have the SAR Incident Commander as someone that is reliable, trustworthy, and able to make decisions without assistance.

### Role of the Agency Administrator

In a perfect world the role of the Agency Administrator is one of support relying on the Incident Commander to make decisions, manage resources, and keep the lines of communication open. The Agency Administrator has an active role in the financial area of the mission and sometimes has the final say in mission suspension or continuation, on what resources may be utilized or requested, on what information is released to the public, and on the involvement and cooperation between other political entities. Communication between the Agency Administrator and the Incident Commander may take place one-on-one depending on the size of the agency, but in most cases they occur through some form of chain of command. Goals and objectives of the Administration are relayed to the Incident Commander in this manner.

In Arizona, the Agency Administrator of an incident that occurs in a county is the Sheriff of that county. If the incident occurs on National Park Service land then the Agency Administrator is the superintendent of that park.

### Agency Administrator Expectations of the Incident Commander<sup>1</sup>

- Have clear authority to manage the incident without interference and have knowledge of the agencies' policy. This may come from a delegation of authority in writing. Delegation of authority letters are not required when Incident Commander's normal position authority covers all the required activities. For example, it is not required when the Incident Commander is operating in their own jurisdiction.
- Provide competent and professional incident management using ICS/NIMS.
- Ensure the safety of responders and the public.
- Establish an Incident Command Post.
- Determine incident priorities, objectives and strategies.
- Approve and implement the Incident Action Plan.
- Provide regular, scheduled briefings/updates on the incident status and supervise debriefings.
- Provide timely notification of all significant events/occurrences.
- Approve requests for additional resources and release of resources.
- Coordinate activities of Command and General staff.
- Consult prior to making policy decisions that affect the agency's ability to achieve its mission.
- Have an approved plan for dealing with external influences, the media, suspension of the mission, and demobilization.
- Provide a complete, accurate incident documentation file.
- Ensure that a complete, effective After Action Review is conducted.
- Maintain Command presence and manage the incident to the best of their ability.

### Incident Commander Expectations of the Agency Administrator<sup>1</sup>

- Agency Administrator provides direction on policy and jurisdiction to the Incident Commander.
- Identify agency priorities/objectives for the incident.

<sup>1</sup> This section is based on the ideas of Paul Anderson and Roland Hamrick.

- Establish management priorities and brief the Incident Commander and Staff on
  - Management Objectives.
  - Policy Issues.
  - Priorities.
  - Key issues.
  - Stakeholders.
  - Political and Community Concerns.
  - Environmental threats.
  - Financial Constraints.
- Clarify authority and expected accomplishments.
- Determine the complexity of the mission and review daily with the Incident Commander.
- Complete an incident situation analysis and review it daily with the Incident Commander.
- Identify limitations and information guidelines.
- Supervise the Incident Commander and evaluate performance.
- Establish Multi-Agency Coordination and staff the Emergency Operating Center.

## Dealing with Searchers

SAR volunteers are a unique resource and are essential to supplement paid employees who are cost prohibitive. Dealing successfully with searchers is a big part of the Incident Commander's job.<sup>2</sup>

To be successful in the management of volunteers and other resources, organization is the key. The Incident Commander insures that the volunteers' importance in the mission is realized by providing a good briefing, subject information, Incident Command Post location, start time, and estimated duration of field time. The more information that can be shared in the early stages of the incident, the less the confusion during the operation. The number one rule is: always use the basic ICS management forms, because they encourage organized explanations and reasonable span of control.

*Always use the basic ICS management forms, because they encourage organized explanations and reasonable span of control.*

The Incident Commander should delegate responsibility and tasks to searchers when appropriate. This helps to develop respect and confidence in the leadership of the Incident Commander. Developing an attitude of teamwork, soliciting honest input, being positive and enforcing the standards and protocol that have been established, are essential for the successful Incident Commander. The Incident Commander should communicate the goals and objectives clearly and honestly and be positive and caring about the wants and needs of searchers and help provide for them when necessary. When SAR resources return from the field the Incident Commander should provide for an organized debriefing of all resources either in person or through a delegate. No personnel should leave the mission without being debriefed unless exigent circumstances exist.

## Dealing with Incident Stress

The Incident Commander should be aware of possible stressful situations SAR resources may encounter, whether seeing a dead body for the first or the 50<sup>th</sup> time. Every mission is different and the Incident Commander and members of the Incident Management Team should know the stress signs to look

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<sup>2</sup> Some volunteers do SAR as a hobby or avocation, and are actually experts in Search Management. Don't be afraid to seek their advice and counsel, and use it.

for. They should address concerns initially in the debriefing immediately after teams return from the field and determine if further discussion is warranted. Most agencies have trained personnel to deal with critical incident stress and, if not, then arrangements should be made to accommodate the needs of searchers in a reasonable amount of time. The longer a person attempts to deal with stress alone increases the seriousness of the situation. Time is critical. The Incident Commander should be skilled in addressing stressful situations and, if not, knowledge of the proper procedure to follow is mandatory.

## Dealing with the Media

Most agencies in this modern age have a designated Public Information Officer who is available to respond to critical incidents (including SAR missions) to deal with and control the actions of the Media.

It takes time for the Public Information Officer to arrive at the scene of the incident, which puts the initial burden of dealing with the Media on the Incident Commander. It is always advisable to give the Media explicit directions as to what is allowed and what is not, and it is essential to control the movements of the Media otherwise microphones and television cameras may appear in the Incident Command Post. Media personnel are trained to get the “Real Story” and do not take “No” for an answer. New SAR Coordinators should remember that the Media will make up a story if they are not given one, and just because they have been referred to the Public Information Officer does not mean that they will wait for them to arrive. Some agencies have strict policies regarding communication with the Media and those policies should be strictly adhered to. The Incident Commander should not ignore the Media and should always be clear and concise in instructions and information given to the Media. Stick to the facts and blame will be lessened. For more details on dealing with the Media, see Reference [Shimanski 2].

It is wise to make the media a partner in the search effort from the beginning. Their support will be crucial if and when the incident transitions to a limited continuous search effort.

## Signs Of Trouble

Here are some signs that the search is not being well-managed by the Incident Commander.

- Management Problems
  - There is no pre-plan, or if there is one, it is not being followed.
  - ICS is not being used.
  - There is no Missing Person Flyer.
  - There is no posted organizational chart identifying the persons performing the key management functions. No one should have to ask, “Who is in charge?”.
  - There is no designated Incident Command Post, or if there is one it is disorganized, crowded, and noisy. It is difficult to make good decisions under these circumstances. Only authorized people should be in the Incident Command Post.
  - The Incident Commander repeatedly says, “I’ll get to that later.” This is a sure sign that they need to delegate the management functions now.
  - The Incident Commander is in the field instead of the Incident Command Post.
  - After delegating the management functions, the Incident Commander still assumes those roles. Incident Commanders cannot adequately do their job if, for example, they are talking to the press (a Public Information Officer function), or are briefing resources going into the field (a Planning function), or are interviewing the family (an Investigator’s function).
  - Little or no consideration is given to bringing in more experienced search managers from outside agencies to help manage the search. Worse, having brought them in, they are given no assignments.
  - The search tactics are based single-mindedly on one scenario, when others are equally likely.

- Multiple resources are told to arrive at the staging area at the same time, when there is only one 2-passenger helicopter to transport them to all their assignments.
- Resources self-deploy or change their assignment.
- Search Area Problems
  - Insufficient consideration is given to confining the subject to the search area.
  - Team leaders are not given written assignments, and, in turn, are not supplying the Planning Section Chief with written debriefings when returning from the field, describing clues found, safety hazards, and other significant information.
  - The same map is not being used by all personnel.
  - Regions are searched a second or third time before other viable regions are searched for the first time. To quote Benjamin Franklin “*The definition of insanity is doing the same thing over and over and expecting different results.*”
  - The search effort is not well documented.
  - Overemphasis is placed on one piece of information, resulting in multiple resources being diverted from their assigned tasks, which are neither completed nor carefully documented. This is noticeably bad when the information turns out to be false.
- Overall Problems
  - Investigation is not ongoing.
  - Clues are not well-documented and are not followed up on.
  - Communications are not well documented, and there is no common method of communication.
  - The stakeholders and Media are handled badly or not at all.
  - The resources talk to the Media without permission from either the Incident Commander or the Public Information Officer.
  - Stakeholders start dictating the search tactics and even conducting their own search.
  - Minimum planning is made for the next operational period during the current operational period, based on the belief that the subject will be found “real soon now”.
  - A Route and Location Search continues for many operational periods with no thought being given to transitioning to an Area Search. This may be caused by the Incident Commander having little or no understanding of concepts such as *POA*, *POD*, *CPOD*, and *ROW*.

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

**19.1.** Discuss the signs that the search is not being well-managed.

**19.2.** The following abbreviated article, written by Russell Contreras on March 9, 2012, appeared in [AZCENTRAL.COM](http://www.azcentral.com),<sup>3</sup> together with a photograph of the subject provided by David Kuthe, see Figure 19.1 on the next page. If you were the Incident Commander and read this article, what would you do?

#### *Long missing hiker found with cat in N.M. forest*

*ALBUQUERQUE, N.M. — A woman who had been missing for nearly a month in a New Mexico national forest and who authorities said has a history of mental illness was found alive Wednesday in a sleeping bag with her cat by her side, authorities said.*

*Margaret Page, 41, was located by a rescue crew in the Gila National Forest around a mile up the Railroad Canyon Trail in rugged area known as the Black Range. That’s where authorities believe where Page had purposely gone hiking off a*

<sup>3</sup> <http://www.azcentral.com/news/articles/2012/03/09/20120309long-missing-hiker-found-cat-nm-forest.html>.



trail with her cat between Feb. 10 and Feb. 12 and set up a camp.

Dave Kuthe, search crew leader, told the Silver City Sun-News (<http://bit.ly/wkSzoB>) said that Page was found malnourished and emaciated but well-hydrated and sleeping in a blue sleeping bag. Authorities said she stayed alive by drinking water from a nearby creek and fed her cat, Miya, her cat, with cat food she had packed.

“Her cat was in better shape than she was,” Marc Levesque, incident commander with New Mexico State Police Search and Rescue, told The Associated Press. “Her cat was also hunting. (Page) ran out of food a while back.”

Authorities aren’t sure what Page ate after she ran out of food. Levesque said by the time she arrived to Gila Regional Medical Center she was alert and articulate after losing 20 to 25 pounds.

Lt. Robert McDonald, a spokesman for the New Mexico State Police, said members of the Grant County Search and Rescue and other crews began the search for Page on Tuesday after Page’s family notified State Police that Page’s car had been found in the Railroad Canyon Campground.

“When they called in at 9 and said we found her, my chin dropped and I said is she alive?” Glenn Tolhurst, operations section chief for the search, told the newspaper. “They said ‘she’s alive. And she’s got a cat.’ ”



AP

This image provided by David Kuthe shows missing hiker Margaret Page with her cat, being loaded into an ambulance Wednesday inside the Gila National Forest, N.M. Authorities believe Page, who was missing for nearly a month, had probably stayed alive by drinking water from a nearby creek.

Figure 19.1. Missing hiker with cat

According to *weather.com*, the area where Page was found camping had seen average highs reach around 60 degrees with evening lows in the 20s. The area did not see much rain or snow, but Page was forced to endure some high winds.

Page’s vehicle, which McDonald described as a silver Chevy passenger car, had been originally spotted by a Forest Service Law Enforcement Agent on Feb. 12 but authorities didn’t think much of it since hikers leave vehicles near trails all the time.

However, a U.S. Forest Service agent noticed the car Feb. 25 but didn’t contact state police until 10 days later. The vehicle was towed as crews began their search mission—something Robert Matulich, a field certified member of the Dona Ana County Search and Rescue team, said was unusual since crews sometime use vehicles to give the search dogs a scent to use. “It looks to me like somebody dropped the ball on this one,” Matulich told the Silver City Sun-News. “Why’d they tow the truck? Who towed the truck?”

## Quizzes

**19.3.** Search Managers should always be chosen from people who score highly on tests. (a) True. (b) False.

**19.4.** Search Manager skills are learned by taking tests and being popular. (a) True. (b) False.

**19.5.** A SAR Incident Commander is expected to make crucial decisions in an instant. (a) True. (b) False.

**19.6.** The IC should obtain the Agency Administrator’s concurrence prior to suspending a mission. (a) True. (b) False.

**19.7.** The IC should obtain the Agency Administrator’s concurrence on the plan for dealing with external influences. (a) True. (b) False.

**19.8.** The longer a person attempts to deal with incident stress alone increases the seriousness of the situation. (a) True. (b) False.

**19.9.** What are appropriate expectations and relationships of an Incident Commander? (a) Possess the authority and ability to make crucial decisions. (b) Should be a high ranking official from within the organization of jurisdiction. (c) Possess the ability to assume roles of Command and

General staff if those positions have not been delegated. (d) Possess the ability to successfully manage search resources and recognize the indicators of stress. (e) Answers (a), (c), and (d).

**19.10.** There are many indicators that a search is not being well managed by the Incident Commander. What are some of the signs that indicate

management problems? (a) Situation changes result in deviation from the IAP. (b) Investigation is developing clues that the subject has left the search area. (c) The Incident Command System is not being used. (d) Failure to enlist the help of other experienced search managers. (e) Answers (c) and (d).

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## CHAPTER 20

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### Searching For Multiple Subjects

When investigators start obtaining information about a missing subject, they should not overlook the possibility that there is more than one subject missing. If there is more than one, then the search is a Multiple-Subject Search.<sup>1</sup>

A Multiple-Subject Search is usually more complicated than a single-subject search for a variety of reasons. One of these is because two different possibilities need to be considered—either the group has kept together or it has split into smaller units, each of which has gone its own way. For example, if two people are missing, they could remain together or split, which could happen if one has an accident and the other goes for help, or if one is deceased and the other tries to survive. Or, after a group realizes that it is lost, there might be a dispute as to what to do, leading to the group splitting. Consequently, during the investigation process, the investigator should try to determine the chances that a group might stay together or split.

Multiple-Subject Searches are not as uncommon as some might think. Of 482 SAR missions in Arizona, about 36% involved multiple subjects. Of those that involved multiple subjects, 86% were found together, and 14% were found at different locations. To put this another way, of these searches in Arizona about 64% were single-subject searches, 31% were multiple-subject searches where the subjects were found together, and 5% were multiple-subject searches where some subjects were found apart.<sup>2</sup>

While the search skills and tactics are unchanged from a single-subject search, the planning for a Multiple-Subject Search definitely changes. For example, a plan needs to be developed in the event that multiple subjects require medical assistance.

#### Comments On Groups That Keep Together

- A group may be easier to locate than a single subject because a group generates more clues and is a larger target.
- A single search urgency rating chart is completed based on the worst case situation for each person in the group.
- If one member is immobile, then the group is immobile.
- Generally speaking, groups don't get lost, only people get lost. So concentrate on profiling and searching for people, rather than groups. During the investigation, try to determine if there is a natural leader who is a dominant influence on the group's behavior. (If there is a leader available who was not on the hike—say, a scout leader—then they are important for the profiling in addition

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<sup>1</sup> This chapter is the result of discussions between Paul Anderson, Aaron Dick, David Lovelock, Dan O'Connor, Dave Perkins, Pete Roberts, and Rick Toman, on the basics of how to analyze and respond to a multiple-person search. See Reference [Lovelock 1].

<sup>2</sup> Compiled by Barry Scott, Arizona Division of Emergency Management, February 2011.

to friends, family, etc.) While one member of the group is the dominant member, the other members may have some influence or effect on the group. For example, a grandfather suffering from dementia is out for a stroll with his 9-year-old grandson when they get lost. Will the grandfather or the 9-year-old take the lead, or will neither? The grandson may become the dominant member of the group but his behavior and movements might be affected by the physical and mental ability of the grandfather.

- A group may be composed of subjects falling into different subject profiles. For example, one might be a 30-year-old father hiking with his 6-year-old girl. Is the LPB characteristics for the group that of a hiker or a 6-year-old child? Is the distance traveled from the IPP for the group that of a hiker or a 6-year-old child, or neither?
- To quote Ken Hill, Reference [Hill 2], *“In my review of numerous multiple-subject searches in Nova Scotia, I found that the lost persons stayed together in all instances, and that they traveled about the same distance as comparable subjects lost alone.”*
- How do the group members interact? To quote Ken Hill, Reference [Hill 2], *“it is my strong impression, from interviewing scores of lost persons soon after rescue, that people lost with companions are much less scared and considerably more rational during their ordeal than are people lost by themselves.”*
- The possibility that a group may split should always be considered and investigated.

### Comments On Groups That Split

- A group splitting may occur under two different circumstances.
  1. The subjects know nothing of the others' whereabouts. This would happen, for example, when looking for multiple bodies after a mid-air collision between two aircraft. So finding one may yield limited or no information of the others.
  2. The subjects know something of the others' whereabouts. This would happen, for example, if they were all together at the beginning of a hike, and elected to split. Each group would know something about the other group's location, plans, condition, etc. So finding one might give some indication as to where the others are, either because they tell the searchers or because finding one helps to identify high priority areas for the other.
- There have been incidents where a subject who was not lost became injured, so the companion left to get assistance, and then the companion got lost, giving rise to two missing in two different locations. In many cases the injured subject was located prior to the one that left for help.
- Definitive clues in opposite directions are tricky as they may indicate two or more went separate ways or they stayed together and did a lot of wandering.
- If the clues related to two individuals, say footprints, went in different directions, then two separate searches need to be planned and conducted. This will require significantly more resources.
- If a group splits, then one might be immobile and unresponsive and the other might be mobile and responsive.

### What To Do?

- Assume that the subjects are together and follow clues until there is a clear indication that they split.
- If one person is found, then use the separation point as the hub for a new search—assuming there is evidence that the subjects were together at that stage—accounting for the distance already traveled, the time taken, and the routes followed. (This hub plays the role of a new IPP, although, when the subject is found, it is the “as-the-crow-flies” distance from the initial IPP to the subject that is recorded for statistical purposes.) Also all that has potentially occurred since the person was at

the new IPP needs to be taken into account. This includes the time since leaving the new IPP, the direction of travel, the mental and physical condition of the subject, the subject's plans, etc. Essentially this is a new search with an already well-developed subject profile.

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

**20.1.** Discuss why a multiple-subject search is usually more complicated than a single-subject search.

**20.2.** Discuss why a group may be easier to locate than a single subject.

### Quizzes

**20.3.** In Arizona, Multiple-Subject Searches are uncommon. (a) True. (b) False.

**20.4.** In Multiple-Subject Searches a single search urgency rating chart is completed. (a) True. (b) False.

**20.5.** When looking for multiple lost subjects, the incident management team should assume that the subjects are together and follow clues until there is a clear indication that they split. (a) True. (b) False.

**20.6.** Search skills and tactics remain the same for single-subject and multiple-subject search efforts, but the planning for a multiple-subject search changes. (a) True. (b) False.

My father asserted that there was no better place to bring up a family than in a rural environment. . . . There's something about getting up at 5 a.m., feeding the stock and chickens, and milking a couple of cows before breakfast that gives you a lifelong respect for the price of butter and eggs.

*William E. Vaughan*

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## CHAPTER 21

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### City/Rural Search

There are two typical inland search environments: City,<sup>1</sup> and Wilderness. City searches are, by and large, house-to-house searches, while Wilderness searches take place away from urban areas.

However, some of today's non-wilderness Search and Rescue incidents occur in a mixed City and Rural environment rather than a pure City environment. The rural environment component occurs because of attempts by city planners and architects to preserve some of the natural environment by mixing it with houses and buildings. For example, a housing development with paved streets and concrete sidewalks might contain a greenbelt, a golf course, or a flood control area running through it, together with nature or hiking trails and wildlife habitats, bordered by an interstate highway, a railroad, or multi-complex shopping malls. Now, instead of a City search or a Wilderness search, search teams encounter a mixture of both—a City/Rural search.

However, no matter what the environment, the strategy used in a City/Rural search is similar to the strategy used in a Wilderness search. Early reporting, aggressive investigation, and the use of good tactics are essential to the success of any search, but especially so in an urban setting. Early management of the search, family members, media, trained searchers, and multi-agency cooperation are all keys to early mission success. Rapid response by patrol units, timely activation of Search and Rescue resources, and early containment are mandatory.

The similarities between a Wilderness search and a City/Rural search are many, but there are some differences that need to be addressed, primarily in regards to the environment, subject profiles, and the use of resources.

- **Environment**

- **Search Area.** Although the search area in a City/Rural environment contains features not usually found in a wilderness search—many buildings and little undergrowth—it is almost always flat, which distinguishes it sharply from a typical wilderness search area.
- **Containment and Attraction.** Unlike a Wilderness search, marked patrol units are usually the best resource to use for containment in a City/Rural search. It is man-power intensive to use traditional containment methods because there are so many avenues of escape. Natural barriers like freeways, waterways, and limited access areas such as gated communities and secure facilities, can all be used to provide points of containment and to assist in identifying the search area. Some attraction tactics that work effectively in a wilderness search, such as shouting the subject's name—"John. John. John."—may not be very effective in a City/Rural search.

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<sup>1</sup> It would be more appropriate to refer to 'City' searches as 'Urban' searches. Unfortunately, FEMA has already reserved the use of the word 'Urban'. Specifically, Urban SAR "involves the location, rescue (extrication), and initial medical stabilization of victims trapped in confined spaces. Structural collapse is most often the cause of victims being trapped, but victims may also be trapped in transportation accidents, mines and collapsed trenches."



- Tactics. Grid search techniques may be needed at the start of the search to clear small areas of concern, such as vacant lots.
- **Subjects**
  - Lost subjects in a City/Rural environment are primarily small children, the elderly, and despondents. These subject profiles are included in wilderness searches but are more prevalent in this environment.
  - Manhunts for criminals are common in the City/Rural environment. It is rare that SAR volunteers are requested in this type of search, whereas search managers may find their talents being used in times of urgency. The same strategy applies to manhunts but different tactics are implemented. The subject is always assumed to be unresponsive.
- **Resources**
  - Most resources utilized in wilderness searches can also be used in city searches, although the skills of technical and Alpine teams are usually not required and ground search and tracking teams do not need to come prepared with 24-hour packs. Trackers can still be used depending on the environment. When the search area is all concrete and asphalt other resources can be utilized. Trackers are good for sign-cutting and clue finding on road shoulders, vacant lots, and greenbelts.
  - Dog teams can be very successful in city searches. Air scent and tracking dogs are good at determining direction of travel from the IPP, and at locating subjects sometimes undetected by the human eye. More and more tracking and trailing dog teams are training in city environments.
  - Horses, trained mounted search and rescue teams, are used in wilderness searches but they can also be used in city searches. Horses provide a high search platform, they have keen senses, and people like them so they draw a lot of attention in a city environment, which can help with notification and also attraction methods.
  - ATV's, UTV's, cars, trucks, bicycles, and aircraft, help transport search teams in and out of areas and, with proper markings and lights, can help with notification and attraction.
  - Aircraft are key in any search not only for searching, but also in the perception of search activity by family and the media. Aircraft can assist in containment and attraction methods and clear areas not accessible to ground teams. Because of the relatively flat terrain, helicopters can safely fly an outward spiral pattern from the IPP, a tactic not normally available in a wilderness search. Air space restrictions and congestion must be taken into consideration in City/Rural searches.
  - Those resources assigned to house-to-house searches should include the addresses checked and subjects interviewed in their ICS 214 Forms (Activity Log).
  - The U.S. Department of Justice has adopted a program called the "Child Abduction Response Team", CART, that contains preplanned resources from law enforcement agencies, SAR Teams, civilian organizations and businesses. This team has specific plans and actions to locate abducted children as soon as possible. Law Enforcement from different agencies in the county or state respond even when the incident is not in their primary jurisdiction.
- **Criminal Element**
  - Treating City/Rural searches as possible crime scenes cannot be under estimated.
  - Investigation into possible criminal elements in the search should continue throughout the mission until proven otherwise. This is also true in wilderness searches but mandatory in the city environment especially when dealing with children and the elderly.

For more information on non-wilderness searches, see Reference [Young].

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

**21.1.** Discuss how City/Rural searches differ from Wilderness searches.

### Quizzes

**21.2.** A City/Rural search environment contains features not usually found in a wilderness search, including (a) Many buildings. (b) Little undergrowth. (c) Flat terrain. (d) All of the above.

**21.3.** Marked patrol units are usually the best resource to use for containment in a City/Rural search. (a) True. (b) False.

**21.4.** Some attraction tactics that work effectively in a wilderness search, may not be very effective in a City/Rural search. (a) True. (b) False.

**21.5.** Lost subjects in a City/Rural environment are primarily (a) Small children. (b) The elderly. (c) The despondents. (d) All of the above.

**21.6.** The strategy used in City/Rural search is similar to the strategy used in a Wilderness search. (a) True. (b) False.

## The Transition

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## CHAPTER 22

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### Transition Overview

The phases of managing a search should not necessarily be thought of as completely independent nor that one must be completed before starting the next. While the Route and Location Search progresses, actions should be undertaken in case this search is unsuccessful, and a transition to an Area Search is indicated. These actions assume that the subject is immobile and include

- Establishing the Search Area.
- Segmenting the Search Area.
- Conducting an Initial Consensus.

In theory, these actions seem relatively easy to perform. However, in practice, because of the diverse terrain in many search areas, they are not as easy as they seem.

Moreover, anticipating additional staffing, including Incident Management Team members and search resources, need to be considered and ordered if necessary. If the ICS structure is not in place at this stage, then the search can rapidly get out of hand.

*If the ICS structure is not in place at this stage, then the search can rapidly get out of hand.*

#### Establishing the Search Area

When establishing the search area consideration of Lost Person Behavior, information collected from the Lost Person Questionnaire, an analysis of the terrain and weather, and an examination of potential scenarios that led to the subject going missing, are critical factors. These factors are commonly referred to as

- Theoretical. Based on the time elapsed how far could the subject have traveled?
- Statistical. What have others in the missing subject's category done?
- Subjective. What are the natural or manmade features that could limit the movement of the subject?
- Deductive Reasoning. What does the Incident Management Team believe happened?

Applying these four factors helps define a manageable search area, which needs to be documented on a map. Everything outside the search area is identified as the Rest of the World (ROW). The search area is likely to be too large for a single resource to search in one operational period. The search area then needs to be divided into smaller units, called segments, that can be searched in an operational period (about 6 to 8 hours of active searching) by a search team.

## Segmenting the Search Area

Segmentation can be very difficult and is truly an art. When segmenting the search area it is critical to have

- Good map reading skills to interpret the topographic information.
- An understanding of the vegetation in the area.
- The ability to estimate the area of the segment.

Segment boundaries are very important considerations so that the search teams on the ground can identify where their segments begin and end. Having a mixture of terrain and vegetation types in the same segment should be avoided. Good segmentation improves search efficiency and maintains or improves the morale of the searchers.

Segmentation should be practiced like any other search skill and feedback should be solicited from the searchers assigned to segments to determine if improvements are needed. If there are unknown caves, mines, sinkholes, lakes, or other features that require specialized resources to search, then these features are in the ROW until they are discovered and made into their own segments.

## Conducting an Initial Consensus

Once the search area has been determined and segmented it is time for experienced SAR personnel to conduct the initial consensus. The purpose of the consensus is to identify the “hot” segments. This requires that every individual involved in the process assign a probability that the subject is in each segment and in the ROW without consulting with each other. This is done after all the known information about the situation is briefed to the personnel involved in the consensus.

There are a few ways to conduct a consensus including

- The Mattson Method.
- The O’Connor Method (also known as the Modified Mattson Method).
- The Proportional Method.

However, they all have the same objective—to identify the hot segments.

Each individual Consensus form (which can be printed from Win CASIE III) should be collected and entered into Win CASIE III to identify the initial hot segments. This phase is where the transition from the Win CASIE III Initial Note to the Win CASIE III Full Incident takes place.

The transition from a Route and Location Search to an Area Search is a critical time in the search and if not handled carefully can cause the Incident Management Team to fall behind the curve in terms of good search management. Having a search management mentor on hand who has been through this process before and who has some lessons learned is a great resource. This is also a good time to consult with the State SAR Coordinator about the possible escalation of the search.

*The transition from a Route and Location Search to an Area Search is a critical time in the search.*

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## CHAPTER 23

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### Incident Review—The Kim Search

The following are excerpts from the After Action Review of the Kim search, see Reference [Kim]. For consistency with the rest of this manual, minor editorial changes have been made.

Section 23.1

Background

#### Overview of Incident

*On Friday, November 17, 2006, James Kim, Kati Kim, and their children, Penelope Kim and Sabine Kim, left on what was to be a nine day road trip to Seattle, Washington and back. The family was expected to return to San Francisco on Monday, November 27, 2006.*

*On Saturday, November 25, 2006, the family left Portland for the Gold Beach area. Late that evening they missed the main turnoff for Highway 42 leading to their destination. While following an alternate route, they became lost in a maze of backcountry roads.*

*When both James Kim and Kati Kim did not show up for their commitments on Tuesday, November 28, 2006, friends became concerned for their safety. The Kims were known to always keep in touch daily with their friends and co-workers either by phone or e-mail.*

*On November 29, 2006, Charlene Wright, a friend and employee of James Kim, reported to the San Francisco Police Department that James Kim, his wife and two daughters were missing. The San Francisco Police Department (SFPD) sought information regarding the missing San Francisco family. The SFPD investigation led to Portland Police Bureau issuing an “All Points Bulletin” (APB) on November 30, 2006. A search*

*of western Oregon, the area of their last known whereabouts, and one that spans nearly 17,000 square miles, began.*

*On the afternoon of Monday, December 4, 2006, Kati Kim, Penelope and Sabine Kim were located alive in the wilderness of Josephine County, Oregon. On December 6, 2006, James Kim was located, deceased, in the wilderness of Josephine County, Oregon.*

#### Background Information

*The Kim Family became stranded in remote Josephine County on November 25<sup>th</sup>, 2006. The investigation into their disappearance started on November 29<sup>th</sup> when San Francisco Police contacted the Portland Police Bureau. The investigation continued through to the end of the search mission.*

*At the time the Kim Family was reported missing, the geographic area of the search was 16,604 square miles of western Oregon but the area was continually reduced by the investigative efforts. On December 1<sup>st</sup>, information was verified that the Kims had stopped in Roseburg and the search area was reduced to 5,046 square miles (all of southwest Oregon). Once the search area could be further defined, ground and air search resources were deployed.*

*The area in which the Kims became stranded was in remote and rugged terrain. The canyons that James Kim traveled are deep with steep side*



walls (60–70 degree slope). Ground searchers excelled at locating and following the clues that were left behind by James Kim. On the evening of December 2<sup>nd</sup>, the terrain had become too difficult for regular ground teams to continue. Eugene Mt. Rescue responded to continue the search of the canyon. The efforts of the ground search further refined the search area to the Big Windy Creek drainage, which gave the helicopter crews a more defined area to search. This led to the discovery of James Kim's body.

The political situation in Josephine County, during the search, was remarkable.

Each county has a unique political environment. It should be noted that when this incident evolved, the current Sheriff had not run for reelection and was retiring. The undersheriff was running an office faced with a huge funding shortfall due to the potential loss of a federal funding stream. The entire office was being impacted both by the political race and the looming threat of layoffs. The undersheriff was fresh off the campaign trail having run for sheriff and narrowly losing that race. The election had been held in November and there was a new Sheriff-Elect. The Sheriff-Elect had already given notice to the undersheriff that he was not going to keep him in the new administration. The undersheriff was actively looking for employment during late November as his last scheduled work-week happened to be during the search.

While generally neighboring Sheriff's Offices work well together on cross-jurisdictional cases, the investigation turned up some notable personality conflicts that may have affected communication. The individuals involved agree that the issue exists but strongly state that they attempt to put their differences aside and work together for a common goal when they have a mission to complete.

The most significant example of this conflict was exhibited between the Josephine County Search Coordinator and the Jackson County Search Manager. They both have a different way of managing. One of the noticeable disparities between the two is that one is a civilian, non-sworn employee and the other is a police officer who holds the rank of lieutenant.

They both cite differences that span more than the scope of this investigation. These issues have

developed over time during former incidents and interactions.

Josephine County Search Coordinator Rubrecht states she has been reluctant to call Jackson County because she feels that the Search and Rescue Manager, Pat Rowland, "takes over" even when it is someone else's county. She describes herself as generally being able to get along with everyone. She believes her frustration stems from past incidents where she believes Rowland changes the assignments in the field after they are given out by command. She states that she knows she cannot conduct a large-scale search without the resources and knowledge of neighboring Jackson County. She worries in this case that the command would grow fragmented with assignments getting moved after they were handed out. There were a couple of examples cited of confusion in the field when some believed that Jason Stanton of Josephine County was running operations in the field and then Pat Rowland came on the radio and announced the he was "taking over command in the field". There was also a couple of searchers who stated that they were inserted into the search, removed and then asked to go back in what seemed like conflicting orders without explanation.

While some may ask if these differences caused delay in calling for additional help, it does not appear to have had an impact on timeliness. One remarkable delay came in what OSP Lt. Powers states was during the Sunday morning meeting (12-3-2006). He said he felt as if he was "walking on eggshells" because he was absolutely convinced that the Kims were in the Bear Camp Road area, but Search and Rescue decisions and resources belong to the County. He felt that Josephine County was discontinuing the search unless they had significant leads or information that placed the missing persons in their county and he found himself spending the morning getting Josephine County on board with continuing the search.

The decision to ask for additional, mutual aid and resources from another county came only when the search area was narrowed with cell phone data. When it was suggested to Josephine County leadership to call Jackson County, the only effect at that time was that OSP was asked to make the request, which they immediately did.

*Lt. Powers did comment that it was an awkward situation that changed his role in the incident. He stated he was asked by Rubrecht to manage the Jackson County resources, if he was going to call them. This caused him to adjust his role from working only on the investigative leg of the incident. Powers was willing to do whatever it took to continue the search.*

*It should be realized that Rubrecht was never listed as or served as the Incident Commander and the ultimate decisions regarding the search belonged to others. She provided input based on her opinion, experience and training.*

### Section 23.2 The Search

*The Kim Family was reported missing to the San Francisco Police Department on November 29<sup>th</sup>, 2006 and the ensuing investigation led to a statewide “Attempt to Locate” or “All Points Bulletin” sent to all Oregon Law Enforcement agencies on November 30<sup>th</sup>. There were no clues to determine the whereabouts of the Kims other than western Oregon, a possible search area of 16,604 square miles.*

*Reports of overdue vehicles traveling in and through the state are very common in Oregon and the overwhelming majority of them are easily resolved. In the case of the Kim Family, however, there were several possibilities that might explain their lack of contact with friends and family:*

- 1. They might have changed their itinerary without notifying anyone. Although possible, this was reported to be out of character and it was felt to be highly unlikely.*
- 2. They might have been the victims of foul play. Although not out of the question, this in reality is not a very likely scenario.*
- 3. They might have become stranded in some remote area where they could not reach out by cell phone. This does occasionally happen but they had not mentioned wanting to go into any remote areas and their itinerary did not require them to do so.*
- 4. They might have been the victims of a car crash where their vehicle left the roadway and off into brush, a ravine, or into a body of water where it was not easily seen by other motorists*

*or searchers. This was by far the most likely scenario.*

*On December 1<sup>st</sup>, the Oregon State Police (OSP), and the Douglas, Coos, Curry, Jackson and Josephine County Sheriff’s Offices all provided personnel to assist law enforcement investigators by searching primary and secondary routes from the Portland area to Gold Beach (the Kim’s next reported intended destination). Due to the unique nature of this incident, the line between investigative and search actions cannot be clearly defined. It is not unusual for Search and Rescue (SAR) volunteers to assist law enforcement on operations where normal law enforcement resources cannot meet the need. In this case SAR was utilized to check the secondary routes that have proved to be problematic in the past such as Bear Camp Road and the Glendale to Powers Road. Bear Camp Road was actually searched both from the air (a National Guard helicopter called at the request of Curry County) and from the ground by vehicles and snow cat.*

*On December 1<sup>st</sup>, a tip about a possible sighting of the Kims at a Roseburg Denny’s restaurant was received by the OSP tip line. The sighting was confirmed on December 2<sup>nd</sup>. Once that Roseburg sighting was confirmed the investigative area was narrowed down to an area of about 5,046 sq. miles (west of I-5, California/Oregon border and north to State Hwy. 42).*

*On December 1<sup>st</sup>, Josephine County Sheriffs’ employees (Deputy Stanton and Sara Rubrecht) came upon John James and his brother on Bear Camp Road. The James brothers indicated they had searched the forest road that leads to the Black Bar Lodge access road and it needed to be checked further due to the James brothers only being able to check part of the road on snowmobiles. The exchange between Stanton and Rubrecht and the James brothers was perceived differently by both parties.*

*The James brothers told Stanton and Rubrecht that the road needed to be searched completely. According to the James brothers, the road that leads to the Black Bar Access Road, in the past, has pulled in other travelers who have attempted to drive the Bear Camp Road route. When Stanton and Rubrecht were questioned later, it was their impression the James brothers had searched the road or were going to go back and search the road.*

*This information was not documented for future follow-up by SAR leaders.*

*At the time that Stanton, Rubrecht and the James brothers met on Bear Camp Road, the search area was still all of western Oregon and the advice given by the brothers was not given a high priority.*

*On December 2<sup>nd</sup>, the probable search area was further narrowed to 531 square miles by the cellular phone data provided by Edge Wireless. This placed the most likely location in Josephine County. Kati Kim and her two children were located with their vehicle on December 4<sup>th</sup> by the pilot of a non-coordinated resource. They were rescued by a helicopter and transported to the Grants Pass hospital for evaluation and treatment. James Kim's body was found on December 6<sup>th</sup>.*

### Section 23.3 Issues Identified by SAR Review Committee

#### Command and Control Issues

*Josephine County employed the Incident Command System (ICS) in a limited manner. At times, the primary functional areas were staffed, but it appears that the processes was not formalized by the posting of an organizational chart or the use of name and position tags, nor were vests used to indicate who was staffing the various positions.*

*There was frequent confusion as to who was in the position of Incident Commander. At one point during the recovery of James Kim, a field team member came on the radio and declared that he was "assuming command." This led to a level of confusion. There were also periods of time in which OSP Lt. Powers and Undersheriff Anderson both filled the role of Incident Commander. Functionally this was a unified command, even though it was not formally declared.*

*The duties of OSP and the duties of involved Sheriff's Offices were not clearly understood by all personnel involved in the mission. OSP took the lead in the coordination of investigation information. This was appropriate considering the geographic size of the area. In the eyes of some of the people involved, OSP maintained operational control throughout the mission. This was appropriate*

*until the search area could be defined and SAR assets were assigned. At that point, the Josephine County Sheriff's Office should have assumed operational control for the search mission. The team conducting the investigation should have been assigned to the plans section under the supervision of an investigation unit leader. OSP would have been the appropriate agency to fill this position.*

*This mission required the assistance of an expanded and extended Overhead (search management) Team. Those in management positions were rapidly overwhelmed by the scope of the mission, media attention, and exhaustion. Lines of communication between the investigative team and the search management team were not clear. This mission required a single point in the Command Center to evaluate and channel investigative information into the operational plan.*

*On at least one occasion, the Command Center was closed prior to search teams leaving the field. Search teams leaving the field late were not accounted for and had no way to be debriefed on their search efforts.*

*The documentation indicates that on only one day were plans prepared in advance of the next operational period. Searchers expressed concerns that the planning process appeared to be going on in conjunction with the daily briefing. ICS Recommendations:*

- *The ICS system needs to be used on all SAR missions and staff appropriate positions, even if the most basic of ICS principles are used.*
- *Ensure roles and responsibilities are clearly defined and that the personnel filling those positions are identified in a visible manner.*
- *Assign staff to document all phases of the operation.*
- *Search missions of this size require that an adequate overhead team be in place.*

#### Radio Communications

*Limited radio communications between the field teams and the Command Center created problems. A human relay was not providing verbatim message relays. The Command Center turned down several offers of assistance from a SAR communications organization located in Portland. The search managers eventually called for a communications van from OSP and a portable cell*

phone system to assist with coverage in the Big Windy Creek drainage. The mission ended before those resources were fully operational.

Phone communications into the Command Center were inadequate. Frequently the only way to call into the Command Center was to call on a search manager's cell phone.

Outfitting a command post with additional phone lines and using Search and Rescue Communication resources could have alleviated these problems.

## Public Information

This mission received an unusual amount of media attention that drew heavily upon the resources of the management team. The amount of media required more PIO personnel than were present to meet the needs of the media. The media were invited into the command center for a briefing and live shots (Larry King Live show). This interrupted activity in the command center and actually required all activity in the center to stop for a period of time. The efforts of the State Police PIO Hastings were an important contribution to the operation and demonstrated excellent interagency cooperation. Lt. Hastings was able to update the media and respond to on-camera interviews, relieving other search managers of the duty.

In a mission the size of the Kim Search, there is a magnitude of information that needs to be disseminated. Sometimes the information released is premature or taken out of context. After reviewing a phone call recording between dispatch and Undersheriff Brian Anderson, the information printed in the *Oregonian* regarding the phone call and his lack of response due to a football game is unfounded.

## Coordinate Systems

Search units did not all use the same coordinate systems or map datum. SAR units in Oregon have agreed to use “Universal Transverse Mercator” (UTM) as the standard coordinate system on ground searches. The issue arises because aviation uses Latitude/Longitude as a standard. Some aviation units cannot utilize UTM (i.e. military aviation). It appears all of the following coordinate systems and datum were used during this search.

- Common Lat/Long coordinate systems: Decimal Degrees, Degrees Decimal Minutes, Degrees Minutes Seconds.
- Common Map Datum: NAD27, NAD83, WGS84.

SAR units need to train, exercise and practice the conversion of the various coordinate systems and map datum. This process needs to be clearly understood by those conducting coordinate conversions.

The use of the various coordinate systems did not adversely affect the Kim Search efforts. It did cause some degree of confusion until the issue was identified and resolved. If early in the search effort it was identified that ground and air were using two different systems, it would have possibly eliminated some confusion later on during the search.

## Maps, Roads and Local Terminology

Searcher references to road names in this back-country region can confuse an outsider; indeed, even the search experts, investigators, and laypersons who worked on this review struggled to get a clear picture of which roads were which. A vast network of hundreds of miles of county roads, Bureau of Land Management (BLM) and Forest Service (FS) roads and road spurs, paved and unpaved, many of which often overlap, intersect, or are called something different by the locals, cover this area.

## Air Assets

The Kim Search was unusual in the aspect that a number of private aircraft were used in the effort. Use and coordination of private aircraft conflicts with the use of military aircraft in the same search area unless there is coordination between all aircraft.

Use of National Guard helicopters (104<sup>th</sup> Air Medical unit) for SAR has operational limitations. SAR managers must be able to state that the mission is a “life, limb or loss of eyesight” situation. The National Guard is not permitted to compete with private industry. The National Guard did respond to the search and flew on several days with both H-60 Blackhawk and OH-58 Kiowa helicopters. When they were not flying,



they were on standby with an aircraft and crew that was prepped and ready to fly.

Coordination and information sharing could have reduced duplicated coverage and made better use of the available air resources. The use of a Temporary Flight Restriction (TFR) early in the search could have reduced concerns of aviation safety in the search area.

Several persons mentioned in the review process that the National Guard helicopters would not fly until the area was cleared of other search aircraft. The Curry County Lieutenant was sure that this request and requirement was met in a timely fashion so that the Guard resource could launch.

The Search and Rescue Aircraft Log shows that there was exceptional coverage with the air assets on this search. Search managers also are familiar with the requirement that local resources have to be depleted or unavailable before utilizing the Guard helicopters.

The aircraft log shows that the Guard was used almost exclusively when there would be no interference with private air assets and during the hours of darkness with their Forward Looking Infrared (FLIR). FLIR was a tool not available with the local helicopters.

### Family Liaison

The Kim Family was conducting their own search efforts and investigation. The early assignment of a Liaison Officer would have provided both the Kim Family and search management timely information and information sharing. This would have specifically reduced the duplication of air search efforts. In addition, this would have also minimized the conflict of multiple aircraft in the same area.

### Use of Resources

During this mission the limited local SAR personnel became exhausted and overwhelmed. Several counties and private sector resources offered their assistance. Communications equipment as well as search management personnel were offered from other agencies but never received a request to deploy.

There is a system available in Oregon to provide support resources through Oregon Emergency Management and all other Sheriff's Offices. It appeared that this system was not used to its fullest extent.

### Access to Wireless Usage Information

There is a perception that the search managers did not act quickly when they obtained the information on the cell phone "pings". Interviews with the involved parties and examination of the official records show that this was not the case with one possible exception. Daylight is a precious commodity for Search and Rescue operations. In retrospect, it would have saved valuable time and daylight if Powers, Rubrecht, Stanton, Anderson, and Fuqua might have met late Saturday night in lieu of the 8 a.m. meeting Sunday morning. Meeting during the morning realistically moved the beginning of the focused search to the afternoon when all the mutual aid arrived from Jackson County thus leaving only a few hours of search time that day.

On Friday December 1<sup>st</sup>, OSP took some excellent proactive steps to receive and disseminate information. One significant action was setting up the 800 tip line. The case was still being coordinated out of the Portland Police Bureau, (PPB) who had taken the primary case. Again, OSP stepped up and volunteered to assist statewide. Eric Fuqua, the Edge Wireless technician who was looking into a theory, had called an OSP dispatcher in Salem. The busy dispatcher gave him the number for the PPB detective initially handling the case. Fuqua states that he called the number given and heard a recording to enter his digital number. He did not enter his number (phone number). He resorted to other avenues to find the Kim's cell number to work on his theory. He did not call back again until the next afternoon. This time he had the information and his theory proved correct.

This review report reveals different reports of frustration experienced by civilians and law enforcement alike. As the investigation hit full speed over the weekend, it was difficult for some to contact a live person, at agencies and businesses to obtain or share information.

*The switching technician was in contact with OSP Lt. Powers on December 2<sup>nd</sup> at 10:00 p.m., telling him that he had information that could narrow the search area. The search managers had difficulty understanding the cell phone data over the phone. Search managers met with the Edge Wireless technician Sunday morning (12-3-2006). At that time, the search managers were able to view a visual representation of the cell phone data and were able to get a description of what the data meant. Ground resources were then deployed to search roadways identified by the cell phone propagation map. Bear Camp Road appears in the propagation area, but data did not provide an exact location of the cell phone ping. The propagation map narrowed the search area to 531 square miles.*

*Interpretation of data generated from cell phone systems is a relatively new tool for Search and Rescue in Oregon. In this case, the cell phone service provider went out of its way to provide critical information. If the cell phone service had not been willing to assist, search managers would have had to obtain a court order to acquire the information.*

*Generating an exact location from a cell phone “ping” on a cell site was not possible in this case, and in many cases may not be possible at all. Due to the terrain, number of road miles, and varying snow conditions, this was still a sizable and challenging area to search.*

*Early access to wireless activity can significantly reduce the search area. When that information was applied in this case, it focused the search to a specific area. Currently this information is not readily (easily) available to search managers. Investigators need pre-arranged contacts (available 24/7) to reach technicians who can provide the usage and location information as well as the legal authority to quickly obtain the information during an emergency.*

*Search managers should absorb the cell phone signal information in context as part of a larger search picture. While it worked out in narrowing the search for the Kims in this case, there are documented other searches where it misled search managers and expended resources in an area that ultimately turned out to be wrong. Cell signals sometimes travel beyond the area thought to be covered. Search managers agree that it is, however, a very useful tool. Access to records needs*

*to be improved and curriculum on techniques for how to use the technology needs to be developed.*

*Often times as investigators check into phone records, they are requesting the information for the calls made. Through the work of the Edge Wireless employee in the Kim case, investigators learned that there were more than just calls and other billable actions to use as evidence or clues. They learned that there is a “handshake” that occurs on every cell tower that the phone is in range of that has compatible technology. Often times those towers are on a secondary company’s tower.*

*In the Kim case, the ping was not a billable item that would show on the cell phone use records, but was simply a piece of data buried in a technical report with an outside company.*

*As searcher managers viewed the signal range map provided by Edge Wireless, they weighed these factors: the pings were a week old, a considerable portion of the coverage area was in Douglas County, and there is history of some signals sending searchers to the wrong area. One thought also was that the Kim’s phone pinged that first night but they were traveling through the area and had moved on.*

## **Fitness and Qualification of Resources**

*One of the issues in this search is that unqualified and/or unfit resources were used in the field. A specific example of this was using a volunteer resource that was not equipped with the proper survival gear, clothing, and training to go into a ravine. The report states this volunteer was wearing cowboy boots and actually had to be assisted from the search area. In another case, SWAT members dressed in camouflage clothing were difficult to see by the helicopter pilots who were lowering them to the ground on a long line.*

*There are resources available around the state that are trained and equipped for almost any type of environment. Reaching out to these resources would help insure the safety of persons involved and prevent the necessity to suspend or slow down search efforts to rescue the rescuers.*



## Management of Spontaneous and Self-Dispatched Volunteers

A major concern in almost any search is the spontaneous response by untrained, unskilled, and improperly equipped spontaneous volunteers. In this search, there were private helicopter pilots who were flying in the area without having any communication with the Search Base. There were also reports of searchers who were out looking in the area and failed to check in with the Search Base.

It can be difficult for search managers to keep track of spontaneous volunteers who respond without being requested. Civilian resources entering the field without notification can hinder search efforts and leave false clues. There are methods to alleviate some of these issues. The first is through public awareness. Secondly, establishing a liaison officer and an area for “spontaneous” volunteers to show up to and give them an assignment where trained volunteers are directing them. Thirdly, issuing radios or at least identifying communication frequencies and briefing information will help to ensure that a method of contacting and accounting for private parties is possible for periodic updates.

### Section 23.4 Summary

This search mission was an anomaly in more than just duration and size. It required resources that few search missions ever utilize. It brought together agencies and resources from all over the state, all with one goal: to find the Kim Family. The scope of this mission was daunting: find one car in several thousand square miles.

Each search mission generates its own challenges. While many search missions are similar, no two missions are ever alike. They are rapidly changing, dynamic events. Every search manager looks back after a mission and asks, “How could I have done that better?” Josephine County has taken a courageous step of seeking a peer review and asking just that question.

The investigation and the search mission for the Kim Family was very unique and presented these challenges:

- It involved a large geographic area; in the beginning, it covered more than 16,000 square miles.

- It required the cooperative effort of multiple police agencies and SAR resources.
- It required a complex investigation to narrow the search area from 16,000 square miles.
- A technological tool (cell phone data) was used which required a technician to explain so the information could be applied to the search effort.
- Search managers did not have the benefit of “lost person behavior” profiles, which are commonly used to predict the behaviors of lost people. There is no data for overdue or missing motorists.
- Intense media coverage consumed an inordinate amount of search managers time and energy.
- Compiling and evaluating information from multiple agencies, sources, and resources proved difficult.
- Both accurate and inaccurate witness information was incoming.
- Interfacing with privately contracted resources and spontaneous volunteers.

Rarely does a search mission require the resources or grow to the size of the Kim Family Search. This mission drew heavily upon all of the resources involved. No one involved in this search wanted anything less than total victory, to bring all of the members of the Kim Family out of the wilderness alive and in good health. Extraordinary efforts were made in both the investigation and search by the private and public sector and volunteers. All of those efforts had the same goal, to find the Kim family. Kati Kim and her children were found alive and returned safely. Even though James Kim did not survive the event, his body was ultimately found and returned to his family. This is not always the case.

The investigation into the disappearance of the Kim Family and the subsequent search mission was a massive effort involving law enforcement agencies in two states and search teams from five counties. The team of investigators assigned to this review had hindsight to their advantage. Even with three weeks to interview, examine, investigate and report, there was an overwhelming amount of information to be managed and still many questions to be answered. Investigators remarked about how difficult it must have been dur-

*ing the search to absorb so much information in the field in just a few days without the benefit of hindsight. Those who worked these missing persons' case and search deserve our thanks.*

### After Action Review

*Needs for improvement:*

- Mobilize as many resources as fast as possible.
- Confirm status of ordered resources—are they available or not?
- Air attack position (group support).
- Better information on resource capabilities.
- Need to be on the same page for map datum and coordination system.
- Break down of jurisdictional lines sooner.
- Improve communication, cooperation and coordination sooner.
- ID or assume quicker agency ownership or management group.
- Verification of what roads have been cleared, e.g. spray paint?
- Utilization of helicopters more efficiently.
- Technical communication issues, training, use and equipment.
- Media needs their own area.
- Red Cross needs to train more people earlier.
- Early disconnect between Ops and Field.
- Use of more TAC and command frequencies—develop a comm's plan and better use of command frequencies.
- Regional use of resource list—type and capability.
- Better intel sharing—specific to field.
- Earlier use of ICS.
- Match resources with job.
- Agency to agency information.
- Better process for requesting/ordering and specific instructions.
- Aircraft orientation for ground resources and search managers.
- Road marking system for aircraft (use rules).
- Include air assets in briefings.
- Use of existing comms resources.
- Liaison between family and command.
- Crew rest and management for ground and aircraft.
- Better crew debriefing process.
- Media management.
- System for verifying intel.
- Screening by PIO and IC prior to speaking with press.
- Improved communication with affected family members.
- Local expertise for missions.
- Relief resources.
- Manage ICP flow and facility better.
- Establish task force to explore improvements.
- No formal transfer of command/IAP.
- Follow ICS planning timelines.
- Listen to ground troop intel.
- ID command staff.
- Agencies offer type and availability of resources earlier.
- Single point media contact.
- Better communication discipline—awareness of who is around.
- Communication plan—logistics, planning, air ops, command, TAC(s), written plan etc.
- Situation unit for information handling and sharing.
- Pre-identified search locations for logistics support—i.e. Repeater sites, field command posts.
- Earlier ICS assignments.
- Establish MAC (Multi Agency Coordination) earlier.
- Resources can be moved by aircraft.
- Designated media area away from ICP.
- JIC (Joint Information Center), PIO needs assistant!
- Better awareness of how national media works—tactics in information gathering.

I'll be more enthusiastic about encouraging thinking outside the box when there's evidence of any thinking going on inside it.

Terry Pratchett

## CHAPTER 24

### Establishing The Search Area

Most searches are over within 24 hours, see Figure 24.1,<sup>1</sup> which “includes investigation, driving time, and time after the subject is found needed for search resources to return from the field and drive home.” The graph shows the percentage of searches ended as a function of time. So, according to this graph, 85% of these searches were over within 12 hours, and 97% within 24 hours.

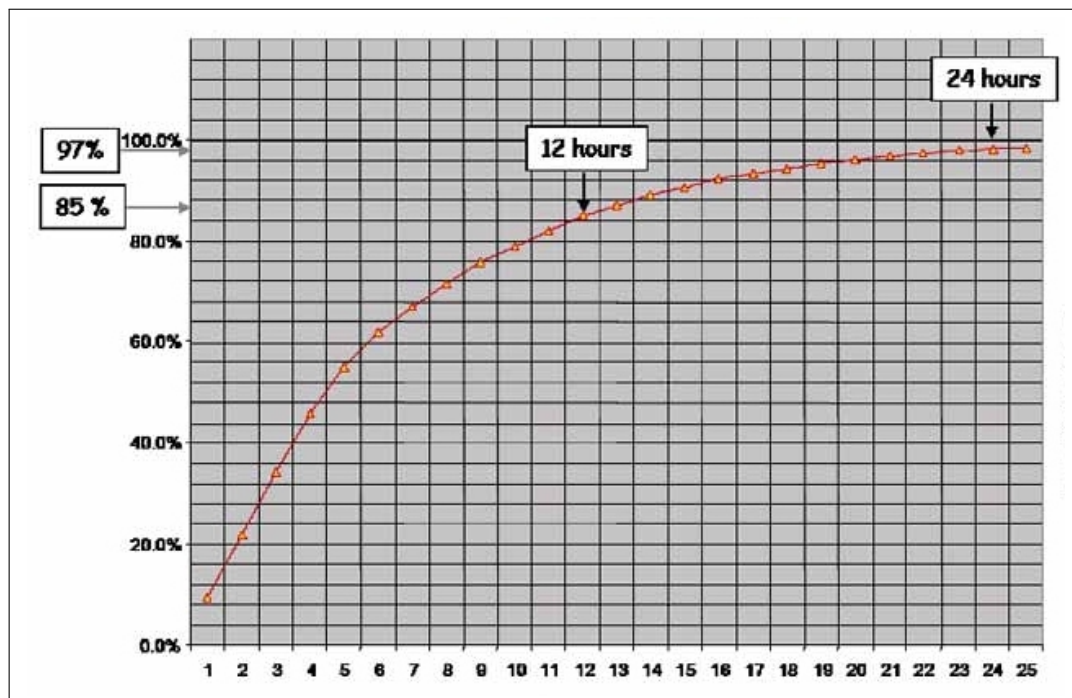


Figure 24.1. Length of search

If at this stage there is no evidence that the subject is moving, it is time to consider transitioning from a Route and Location Search to an Area Search.

One of the first actions in this transition is establishing the search area. This is a critical action and, like other components of search planning, should not be done alone. Staffing key roles in the incident management team, such as the Planning Section Chief (discussed on page 119) and the Operations Section Chief (discussed on page 120), are also extremely important as they need to have input into this process. The establishment of the search area sets the stage for the rest of the transition actions.

<sup>1</sup> This graph was obtained from Reference [SAR], which summarizes the results of 3000 searches in the United Kingdom, Oregon, New Mexico, Alberta, British Columbia, and North Cascades NP. Used with permission.

If a suitable Incident Command Post for an extended operation has not yet been selected it must be done at this point because much map and paper work needs to be completed during the transition. It is more comfortable and efficient to have a suitable space for this than it is to continue working off the hood of a truck, as suggested by Figure 24.2.



**Figure 24.2.** Establishing the search area on a map

At this stage it is assumed that during the Route and Location Search a PLS or LKP was determined and identified as the IPP. It is pointless to develop a search area if there is no IPP to base the search on.

*It is pointless to develop a search area if there is no IPP to base the search on.*

When establishing the search area it is critical that quality maps of the region are available. Generally 1:24,000 scale topographic maps are used for this process, which are either in paper format or on a computer mapping or GIS program. Other specialty maps may also be helpful in interpreting the area especially if those maps have been in the possession of the search subject. Increasingly aerial photographs and internet based programs, such as GOOGLE Earth™ and Microsoft® Bing, are used to supplement topographic maps during this process. If paper maps are being used it is also helpful to have clear mylar or acetate for overlays and a variety of permanent and dry-erase markers available. The map that is selected for use in defining the search area will need to be reproduced for the IAP that will be distributed to search resources once the search area has been identified and segmented. Key locations should be marked on the map such as the IPP, Incident Command Post, together with other incident facilities and important reference points.

There are four common methods of establishing the search area,<sup>2</sup> assuming the location of the IPP is known.

1. **Theoretical.** Based on the time elapsed, how far could the subject have traveled?
2. **Statistical.** What have others in the missing subject's category done?
3. **Subjective.** What are the natural or manmade features that could limit the movement of the subject?

<sup>2</sup> See Reference [Setnicka, page 85].

#### 4. **Deductive Reasoning.** What does the Incident Management Team believe happened?

Each of these methods determines a region that is plotted on the map. The area common to all four regions determines the boundary of the search area. These methods should be applied in the order presented: Theoretical, Statistical, Subjective, Deductive.

### Theoretical Method

The Theoretical Method attempts to estimate the maximum distance the search subject could have traveled from the IPP during the time since they went missing. This involves some mathematics, and usually results in a fairly large circular search area, centered at the IPP.

In order to determine the Theoretical Search Area two numbers need to be estimated.<sup>3</sup>

- The time elapsed since subject was last known to be at the IPP.
- How fast the subject can travel away from the IPP—the speed of the subject radially.<sup>4</sup>

Once these numbers are known the Theoretical Search Area can be determined using the formula for calculating the area of a circle,  $\pi r^2$ , where  $\pi = 3.14$  and  $r$  is the radius of the circle. The radius of the circle can be determined by multiplying the time elapsed by the speed that the subject can travel radially. The area of the circle, or Theoretical Search Area, can then be determined by squaring  $r$  and multiplying it by  $\pi$ .

For example, if the subject has been in the field for 8 hours and is able to walk at 2 miles per hour radially, then the radius of the Theoretical Search Area is

$$\begin{aligned}\text{Radius of Theoretical Search Area} &= 2 \text{ miles per hour} \times 8 \text{ hours} \\ &= 16 \text{ miles,}\end{aligned}$$

and its area is

$$\begin{aligned}\text{Theoretical Search Area} &= \pi \times \text{Radius}^2 \\ &= 3.14 \times 16^2 \\ &= 804.25 \text{ square miles.}\end{aligned}$$

A circle, centered at the IPP, with radius 16 miles, is then drawn on the map to identify the Theoretical Search Area. The Theoretical Search Area is often too big to search efficiently.

Delaying the response to an overdue person situation adds more time to the subject being in the field, and so causes the Theoretical Search Area to increase dramatically. In the previous example, if the response is delayed by one hour (so the subject had been in the field for 9 hours instead of 8), the radius of the search area is 18 miles, and the area is 1017.88 square miles. So that hour delay adds an extra 213 square miles to the Theoretical Search Area.

*Delaying the response to an overdue person situation causes the Theoretical Search Area to increase dramatically.*

<sup>3</sup> Usually the distance is measured in miles and the speed in miles per hour, giving a radius in miles and an area in square miles.

<sup>4</sup> The number needed here is the speed that the subject is moving away from the IPP. It is not the speed that the subject moves at. For example, a subject might be able to walk at 4 mph, but if the subject meanders away from the IPP, then the speed of the subject away from the IPP is less than 4 mph, even though the subject is traveling at 4 mph.



## Statistical Method

The Statistical Method also determines circles centered at the IPP, but relies upon Lost Person Behavior analysis. It is most helpful if the lost person behavior information is collected locally, such as data from a particular county or state, rather than globally. If local information is not available then there are other sources of lost person behavior including works by Syrotuck, see Reference [Syrotuck], and Hill, see Chapter 32 on page 264. Hill's data is also included in Win CASIE III.

It is important that the Lost Person Questionnaire be completed as thoroughly as possible so that the appropriate Lost Person category can be selected for the search subject. The Lost Person Behavior data is then used to refine the search area based upon the historical behavior of other subjects in the same category. This data generally provides statistical zones and the median<sup>5</sup> and maximum distance that subjects in the selected category were found from the IPP.

The statistical zones, such as the 25%, 50%, and 75% zones correspond to the distance from the IPP that contained 25, 50, and 75 percent of the search subjects in that category. Each of these distances generates a circle on the map centered at the IPP. It is not uncommon to use the 75% statistical zone during the establishment of the search area because it excludes some of the extremes in the data and contains the majority of the subjects in that category.

For example, Table 24.1 shows the entry for the Hikers category from Table 32.2 on page 271. There were 943 people in this category. Of these, 25% of them were found within a circle of radius 0.83 miles centered at the IPP, 50% were found within a 1.60 mile radius, 75% within a 3.30 mile radius, and 100% within a 47.20 mile radius. None were found within 0.01 miles of the IPP.<sup>6</sup>

**Table 24.1.** Distances Traveled (miles) by Lost Persons in Arizona, USA

Category	Cases	Min	25%	50%	75%	100%	Mean
Hiker	943	0.01	0.83	1.60	3.30	47.20	3.03

The maximum distance from the IPP found from Lost Person Behavior data may be useful in developing a containment strategy particularly if passive containment is being used, such as flyers or signs.

Be wary of Lost Person Behavior data when the number of cases is small. It is also important to note that the subject of a search is not yet part of the data set and could be an outlier.

*Be wary of Lost Person Behavior data when the number of cases is small. It is also important to note that the subject of a search is not yet part of the data set and could be an outlier.*

When the Statistical Method is used following the Theoretical Method the search area should be trimmed.

## Subjective Method

The Subjective Method takes into account the physical environment and any clues that may have been found during the Route and Location Search. This method relies on an analysis of terrain or other physical barriers to travel, weather, clues, “hotspots”, physical and mental health of the subject, gut feelings, and any other factors that may impact the subjects movement through the area.

<sup>5</sup> The median distance from the IPP is the distance at which 50% of the cases are inside that distance and 50% of the cases are outside that distance. This is not the average (mean) distance from the IPP.

<sup>6</sup> Remember, for example, that if there is a 75% probability that the subject is within a specific distance of the IPP, then there is a 25% probability that they are not.



Often an analysis of the terrain will eliminate areas from the search area as they are inaccessible or impossible to negotiate without specialized equipment. The weather can also be a significant limiting factor to subject travel. In very hot temperatures at one extreme and deep snow at the other routinely affect the ability of a subject to move through an area.

### Deductive Reasoning Method

The Deductive Reasoning Method relies upon the incident management team to evaluate all of the information available about the situation to develop a most likely scenario about what happened to the search subject. This should include any investigative material available about the subject. Coupled with the other methods this method continues to refine the search area and is generally the last method employed in the series. It is helpful if at least some of the personnel involved in using this method are familiar with the area and its history.

### Final Steps in Establishing the Search Area

Once the four methods for establishing the search area have been employed the initial search area must be drawn on the map. The area outside of the search area is known as the Rest of the World (ROW). With the search area determined the incident management team can move ahead with segmenting the area into searchable units that are suitable for SAR resources to search during an operational period, and then conducting the Consensus to develop the initial hot segments.

### Challenge to Defining a Search Area

On occasion SAR units are notified about an overdue person many days after they were due out of the field or should have checked in with someone. In these cases the most useful methods for defining a search area are the Statistical, Subjective, and Deductive Reasoning. It is a balance between the time elapsed since the subject went into the field and a reasonable analysis of what may have happened to make the subject overdue, so that the search area is neither too small nor too large. A search area that is too small limits the possibility of success as SAR personnel may not search appropriate areas and it could cause friction with the family members of the search subject. A search area that is too large also creates problems in that it is difficult to search all of the area with limited resources, so time and effort may be focused on areas that are unimportant.

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

**24.1.** Based on the time of year and a profile of the subject, an Alzheimer walkaway has been determined to be capable of staying active for 6 hours at a speed of 2 mph. How large is the theoretical search area?

**24.2.** Discuss the four common methods of establishing the search area.

### Quizzes

**24.3.** It is pointless to develop a search area if there is no IPP to base the search on. (a) True. (b) False.

**24.4.** When establishing the search area it is critical that quality maps of the region are available. (a) True. (b) False.

**24.5.** When establishing the search area, the correct order to apply the four methods is (a) Theoretical, Statistical, Deductive Reasoning, Sub-

jective. (b) Statistical, Theoretical, Subjective, Deductive Reasoning. (c) Theoretical, Statistical, Subjective, Deductive Reasoning. (d) Subjective, Statistical, Theoretical, Deductive Reasoning. (e) The order does not matter.

**24.6.** When establishing the search area, the method that takes into account the physical environment and any clues that may have been found during the Route and Location Search is the (a) Theoretical Method. (b) Statistical Method. (c) Subjective Method. (d) Deductive Reasoning Method.

**24.7.** When establishing the search area, the method that attempts to estimate the maximum distance the search subject could have traveled

from the IPP during the time they have been in the field is the (a) Theoretical Method. (b) Statistical Method. (c) Subjective Method. (d) Deductive Reasoning Method.

**24.8.** When establishing the search area, the method that relies upon what the incident management team believes happened is the (a) Theoretical Method. (b) Statistical Method. (c) Subjective Method. (d) Deductive Reasoning Method.

**24.9.** When establishing the search area, the method that relies upon Lost Person Behavior analysis is the (a) Theoretical Method. (b) Statistical Method. (c) Subjective Method. (d) Deductive Reasoning Method.

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## CHAPTER 25

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### Segmentation

Segmentation is the process of slicing the search area into manageable regions called Segments. Segmentation is performed for various reasons.

- To ensure that no part of the search area is ignored.
- To effectively manage the deployment of resources.
- To help set tactics that can be accomplished during an operational period.
- To track resources' tasks for the duration of the search.
- To have a means of quantifying the search effort in an understandable way (using *POD* and *CPOD* discussed in Section 29.1 on page 242).

Segmentation looks easy, but it is not. It takes practice, patience, and thought.

*Segmentation looks easy, but it is not.*

Segmentation is a two-step process.

1. First, identify all regions that are not to be searched, that is, the ROW. Start with the area whose outer boundaries have been established by the techniques of Chapter 24 on page 213. Within that area exclude regions such as places where the subject could not have reached (because they are out of range, because the subject could not get there due to the terrain or vegetation, etc.) and those regions that are not searchable for live subjects (such as under the surface of a lake), unless those regions are specifically identified as being of interest. The region that remains is the Search Area—it often looks like Swiss cheese, with holes in it.
2. Second, divide this remaining region, the search area, into clearly-identified, non-overlapping, segments that cover the entire search area, using the principles discussed in the rest of this chapter. Whereas establishing the search area is based on factors that affect the subject, segmenting the search area is based on factors that affect the searchers.

In relatively flat, sparsely-vegetated terrain, it is common for the final search area to look like a distorted checker board, with no gaps in it, which is how most people imagine a segmented search area. In mountainous terrain, some segments might look like pieces of ribbon, being trails with strips of land on either side bordered by the ROW, leaving the search area pocked with disconnected regions that are in the ROW. So typically, a search area does not look like a distorted checker board—it has gaps in it.

*A typical search area does not look like a distorted checker board—it has gaps in it.*

The Incident Commander should be prepared to answer questions from the family and stake-holders concerning the fact that there are gaps in the search area.

Ideally segmentation should be performed by a segmentation team rather than an individual, preferably the same team that performs the consensus. Some members of the segmentation team must have a very good understanding of map reading in order to know which features make good segment boundaries and which features do not.<sup>1</sup> Members with a personal knowledge of the area are invaluable.

When identifying segments, the segmentation team must consider the following points.

- **The Size of the Segment.** This is important because the size of the segment must be searchable by a typical resource in one Operational Period. This includes being briefed, transported to the segment, finishing their assignment, transported from the segment, and being debriefed. See Figure 25.1.



**Figure 25.1.** It takes time to get resources into the field

The size of the segment is dictated by the resource that is expected to be used, the terrain, and the vegetation. A rule of thumb is to make the size searchable by a typical search team in about 6 hours. If the segment is to be searched by ground resources (air scent dogs, grid searchers, etc.) then a segment size of about 0.25 square miles is often quoted as being an appropriate size. The dimensions of various rectangles with area 0.25 square miles are shown in Table 25.1.

**Table 25.1.** Dimensions of Rectangles with Area 0.25 square miles

Length (miles)	0.5	1	2	3	4	5
Width (yards)	880	440	220	147	110	88

On a 1:24,000 topo map, a little more than 1.25 inches represents 0.5 miles while the width of a dollar bill represents about 1 mile. However, the area estimated on a map is almost always smaller than the area on the ground, unless the terrain is flat and horizontal.<sup>2</sup>

Making search segments too large is a common mistake.

- Doing so causes searchers to rush to complete their assignments resulting in poor coverage and missed clues.
- Searchers who do not rush, search only part of their segment, resulting in the segment having to be split, and the un-searched segment re-searched during a later Operational Period.
- Not completing their assignments because the segment is too large causes poor morale.

*Making search segments too large is a common mistake.*

<sup>1</sup> An introduction to contour lines can be found in Appendix B on page 367.

<sup>2</sup> An overlay tool that helps estimate areas can be downloaded from <http://maptools.com/pdf/AreaEsts/BigArea.pdf>. When printing this file, ensure that the printer does not resize the image.

- **Uniform Terrain and Vegetation.** The terrain and vegetation within the search segment should be relatively uniform. A resource cannot use consistent tactics, nor estimate a single *POD* (a measure of the efficiency of the resource, discussed in detail in Chapter 29 on page 242) for a segment, if the terrain or vegetation vary considerably.
- **Segment Boundaries.**
  - Segment boundaries have to be identifiable by resources in the field. Ridge lines, rivers, cliffs, canyon bottoms, fences, power lines, railroad tracks, roads, dry washes, etc., make good boundaries because they are easily identifiable in the field. Good boundaries are essential to ensure that search teams assigned to different segments neither leave gaps nor overlap in their coverage.
  - Flagging may be used for segmenting long washes or canyons where the sides of the segment are clearly defined by the terrain but the bottom needs to be broken into shorter lengths. Once flagging is in place, it should remain there for the remainder of the search. Ribbon-like segments that follow very long trails could be segmented in this way.
  - Using GPS or UTM grid lines is strongly discouraged, but if they are used it must be with extreme caution to avoid gaps in coverage and overlaps with adjacent segments. Sometimes there is no choice but to use grid lines as segment boundaries by flagging them. For example, flat featureless terrains need to be flagged so that teams can identify their segments. See Figure 25.2.



**Figure 25.2.** Segment boundary flagged

- If the subject's dwelling is to be searched, then it would be natural to include this as its own segment.
- When drawing boundaries, it is not good practice to have resources crossing streams, highways, chasms, and other natural barriers. This endangers the resources and distracts them from their assignments.
- **Individual Segments.** Regions such as trails, lakes, rivers, dry washes, should be treated as individual segments. This helps to ensure complete coverage for the whole trail within the search area or complete coverage for the lake, not just the shoreline. However, many trails may have been searched during the hasty search phase, or may be used as transportation corridors, so treating them as a separate segment may be unnecessary. They are automatically searched.
- **2-Dimensional Map.** The map that is being used to segment is 2-dimensional, whereas the search area is 3-dimensional. This means that segments drawn on maps represent the surface of the search area, not underneath the surface. For example, a lake or a snowfield may be a segment, but, unless

specifically stated otherwise, the segment is the surface of the lake or snowfield, and includes nothing below the surface.

- **Shape.** A uniformly-shaped segment is desirable, but not always possible.
- **ROW.** Fast flowing rivers are always in the ROW, because the subject, if in it, would be mobile.
- **Rethink.** If a segment cannot be searched by “boots on the ground” then it is unlikely that the subject is there, and so thought should be given to moving this segment to the ROW.
- **Identify Segments.** All segments must be identified with a unique number, and the ROW must be clearly marked.

## Practical Matters

There are two possible maps that might be available for segmenting: paper and software.

**Paper.** When segmenting using a paper map it is best to draw the segments using pencil first in the event that minor changes need to be made during the process. After the segmentation is finalized the pencil lines should be made permanent with an ink pen. Acetate overlays can then be used to document search activity. The segment boundaries can be traced onto the acetate overlay and then any other shading or documentation added to that overlay. It is helpful to tape the overlay to the map so that it does not slide around. Additional overlays can be added on top of previous ones to indicate the status of the search during subsequent Operational Periods.

**Software.** If GIS software is available then the initial segments can be drawn by creating polygons on the map. As the search progresses, attributes can then be applied to that polygon to show how well the segment has been searched or the type of resource used to search. Different layers can be turned on or off in the software to show just the segments, just clues, or any other attribute that is of interest. This method is likely to be the way of the future and allows for better data management. Many counties have a GIS department which may be able to assist in the field. There are many volunteers with a GIS background who can be utilized to assist in incident management. This method requires computer hardware, GIS software, a large format printer (plotter), and an experienced GIS operator.

## How to Segment

1. Draw the outer boundary of the search area (determined by the techniques described in Chapter 24 on page 213) on a map which is of the same type that is used by all resources. Label the region outside this area “ROW”.
2. Identify all regions inside the area that are in the ROW, and label those with “ROW”.
3. Identify regions that are of the same terrain and vegetation.
4. Segment those regions into roughly sizes that can be searched by a typical resource in one operational period. Use numbers<sup>3</sup> to label these regions, starting from “1”. Label the segment containing the IPP as Segment 1 so that, whenever Segment 1 is mentioned, everyone knows they are talking about the IPP segment.
5. Identify all mine shafts, caves, dwellings, etc., and give them their own segment and number them.
6. Identify any regions that are “under” the map that are to be searched. For example, below the surface of a lake, or under snow. Distinguish between these regions and their surfaces.
7. Make sure that all regions in the search area are in one—and only one—segment.

Depending on the incident, the number of segments could run from about 10 to well over 50. Some searches have ended with as many as 150 segments. An example of a segmented search area is shown in Figure 25.3 on the next page.

Sometimes it is very difficult to segment a search area if the subject is reported missing many days after they actually disappeared. For example, there was a search in Coconino County where first notice

<sup>3</sup> Using letters causes problems when there are more than 26 segments, and when a segment has to be split.



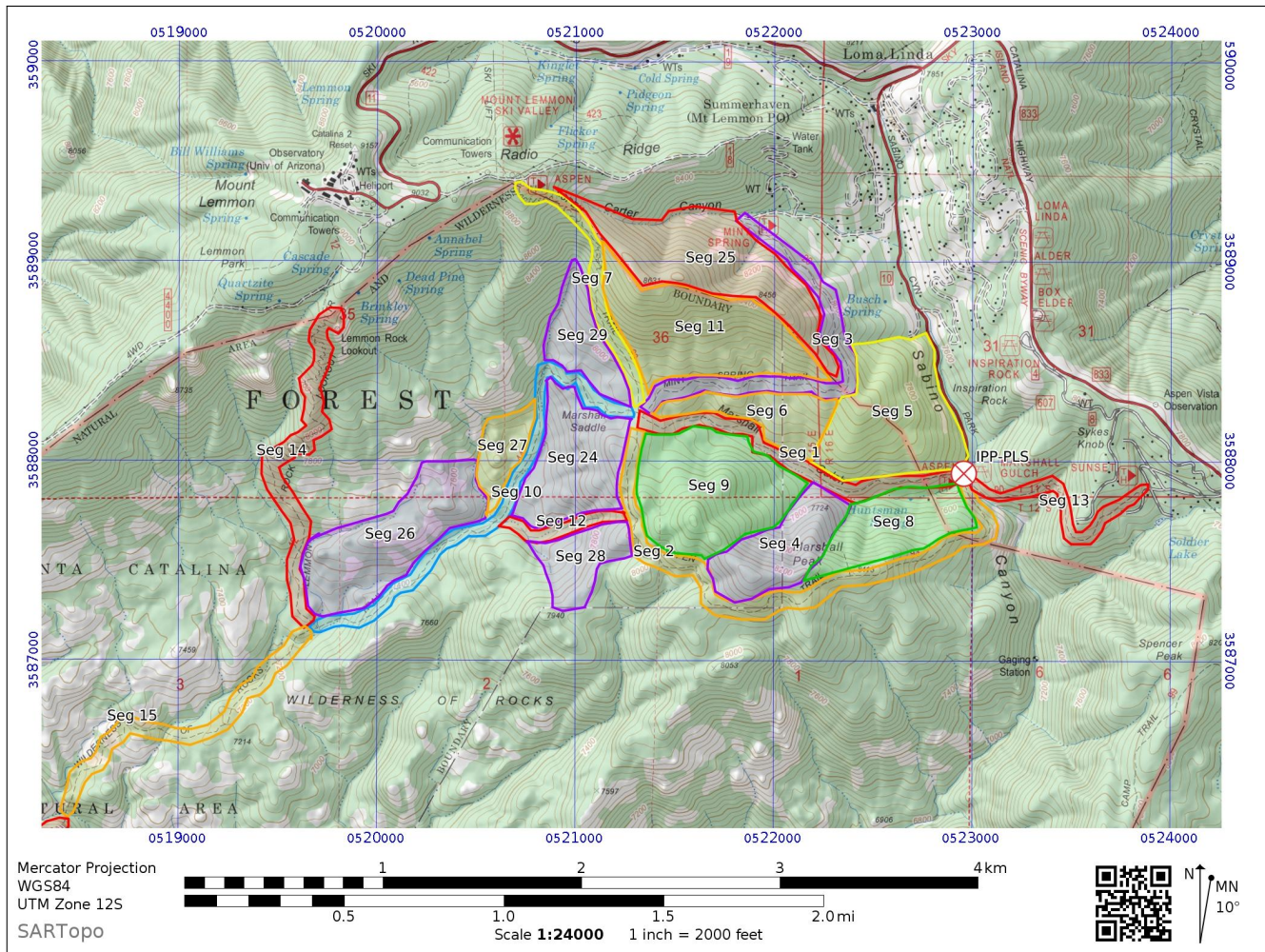


Figure 25.3. A segmented search area

of the incident was received about 2 weeks after the subject left his camp. Incidents like this create a special challenge since the theoretical search area is huge and subject behavior investigation may indicate that the subject can travel long distances based on their physical condition and past history.

The initial search area and its segmentation are not set in stone. During the course of the search, the segments may need to be split because a resource was unable to complete its assignment, or more segments may need to be added as the search area grows.

Finally, if a particular locality is often the region of a search, then it may be prudent to spend time pre-segmenting it to prepare for future incidents.

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

- 25.1.** Explain why it is important to segment a search area.
- 25.2.** Explain the two-step process used to segment a search area.
- 25.3.** Why is the size of a search segment important?
- 25.4.** Explain some of the problems that occur if a search segment is made too large.
- 25.5.** Discuss the points that the segmentation team must consider when identifying segments.
- 25.6.** Explain why, when segmenting a search area, it is not acceptable to have vastly different terrains in the same segment.
- 25.7.** Explain why numbers, rather than letters, should be used to identify segments.
- 25.8.** Segment a search area on a map, then go into the field and see whether it is possible to identify the segment boundaries.

### Quizzes

- 25.9.** Segmenting a search area is easy. (a) True. (b) False.
- 25.10.** A segmented search area never has gaps in it. (a) True. (b) False.
- 25.11.** The size of a search segment is dictated by (a) Terrain. (b) Vegetation. (c) Resource used. (d) Terrain, vegetation, and resource used.
- 25.12.** On a 1:24,000 topo map, the width of a dollar bill represents about (a) 0.5 miles. (b) 1 mile. (c) 2 miles. (d) None of these.
- 25.13.** Once a search area has been segmented, the segments are never changed. (a) True. (b) False.
- 25.14.** Once the ROW is identified it is never changed. (a) True. (b) False.
- 25.15.** A region contained in one segment can also be in another segment. (a) True. (b) False.
- 25.16.** If the region below the surface of a lake is included in the search area, it should be given a different segment number from the surface of the lake. (a) True. (b) False.
- 25.17.** When segmenting a search area, it is acceptable to have vastly different terrains in the same segment. (a) True. (b) False.
- 25.18.** Grid lines on a map make excellent segment boundaries. (a) True. (b) False.
- 25.19.** The area estimated on a map is almost always smaller than the area on the ground. (a) True. (b) False.

## CHAPTER 26

### Initial Consensus

#### Section 26.1 Intuition and Search Theory—Part 1

Before discussing the details of an Area Search, it is important to have an intuitive understanding of search theory. This is done here, and continues in Chapter 28 on page 235, by considering a very simple, although completely unrealistic example.

Imagine that a Route and Location Search is conducted without success, that the decision is made to transition to an Area Search, that the IPP is identified, and that the search area is segmented as shown in Figure 26.1.

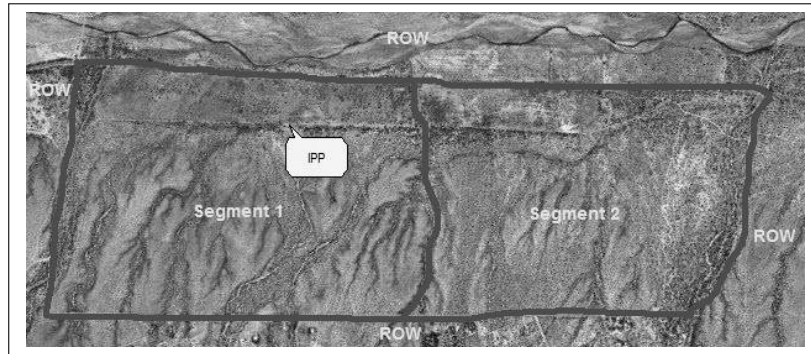


Figure 26.1. Segmented search area

Segment 1, Segment 2, and the ROW, each have a probability that measures the chance that the subject is in that region.<sup>1</sup> This probability is called the **Probability of Area**, and is denoted by  $POA$ .

The probability that the subject is in Segment 1 is denoted by  $POA(1)$ , in Segment 2 is denoted by  $POA(2)$ , and outside the search area is denoted by  $POA(ROW)$ .  $POA(ROW)$  is frequently abbreviated by  $ROW$ .<sup>2</sup>

Imagine that, in this example, Segment 1 has the highest chance of containing the subject, followed by Segment 2, and finally, the ROW. This means that

$$POA(1) > POA(2) > ROW.$$

<sup>1</sup> For a reminder of probabilities, see Appendix C on page 373.

<sup>2</sup> This means that the expression ROW is used in two different ways: either everything outside the search area, or the probability that the subject is outside the search area. However, the context dictates which of these applies, and causes no confusion. For example, “ROW is increasing” refers to  $POA(ROW)$ , whereas “Expand the search area into the ROW” refers to the region outside the search area. Nevertheless, to distinguish between these two the word ROW is italicized when it refers to a probability,  $ROW$ .



**Question:** If there is only one resource available and it could search exactly one segment during the Operational Period, to which segment should the resource be assigned, Segment 1 or Segment 2? Think about this before proceeding.

**Answer:** Because Segment 1 is the segment with the highest probability, that is the segment to assign the only resource.

Based on this the resource is assigned to Segment 1, but it does not find the subject.

**Question:** Does the probability that the subject is in Segment 1 increase, decrease, or stay the same? What about Segment 2? ROW? Again, think about this before proceeding.

**Answer:** The probability that the subject is in Segment 1 decreases, while the probability that the subject is in either Segment 2, or the ROW, both increase.

**Question:** By how much do these probabilities change?

**Answer:** That depends on how well the resource searched Segment 1. The more efficient the resource, the lower the probability that the subject is in Segment 1. The efficiency of a resource is called its **Probability of Detection**, denoted by *POD*, which is discussed in detail in Section 28.1 on page 235.

**Question:** But where did

$$POA(1) > POA(2) > ROW$$

come from?

**Answer:** It came from an initial consensus, the subject of the next section.

**Please do not proceed until the previous questions and answers are thoroughly understood.**

## Section 26.2 Consensus

After the search area has been identified and segmented, the third and final step before embarking on an Area Search, is to decide which segments are “hottest”, that is, have the highest priority.

Ideally this is done by a small team of three to five experts with local knowledge and expertise (for example, the Planning Section Chief, the Operations Section Chief, . . .). Before making any decisions, the consensus team is apprised of all the facts in an extensive briefing where different possible scenarios are thoroughly discussed.

Then, each expert independently and subjectively estimates the probability that the subject is in each of the segments and the probability that the subject is outside the search area, that is, in the ROW, Rest of the World. *ROW* is discussed more fully in Section 28.1 on page 236.

For example, if there are only two segments and three experts in the consensus team,<sup>3</sup> then Jesse, Aaron, and David, might make the subjective estimates shown in Table 26.1.<sup>4</sup>

**Table 26.1.** Jesse, Aaron, and David’s Estimates

Segment	Jesse	Aaron	David
ROW	10%	10%	10%
1	55%	45%	50%
2	35%	45%	40%
Total	100%	100%	100%

<sup>3</sup> Having only two segments in the search area is unrealistic, but it is used here to fix ideas and to make the arithmetic transparent.

<sup>4</sup> Probabilities are decimal numbers between 0 and 1, but they are frequently converted to percentages in every-day life. For example,  $0.5 = 50\%$  and  $0.01 = 1\%$ . To convert a number from decimal to percentage, multiply the number by 100. To convert from percentage to decimal, divide the number by 100.

According to this table, Jesse thinks there is a 10% chance the subject is out of the search area, a 55% chance the subject is in Segment 1, and a 35% chance in Segment 2. If someone says that Aaron thinks that there is an equal chance of the subject being in Segments 1 and 2, are they correct?<sup>5</sup>

Notice that all three columns total 100%, which is essential because the subject is either in or out of the search area.

The Initial Consensus is obtained by averaging each of Jesse, Aaron, and David's estimates, as shown in Table 26.2.

**Table 26.2.** Calculate Initial Consensus

Segment	Jesse	Aaron	David	Consensus
ROW	10%	10%	10%	$(10\% + 10\% + 10\%)/3 = 10\%$
1	55%	45%	50%	$(55\% + 45\% + 50\%)/3 = 50\%$
2	35%	45%	40%	$(35\% + 45\% + 40\%)/3 = 40\%$
Total	100%	100%	100%	100%

The Initial Consensus is shown in Table 26.3.

**Table 26.3.** Initial Consensus

Segment	Consensus
ROW	10%
1	50%
2	40%
Total	100%

This shows that the consensus team believes that there is a 10% chance the subject is out of the search area, a 50% chance the subject is in Segment 1, and a 40% chance in Segment 2. Which is the “hottest” segment?<sup>6</sup>

This represents the best guess about where the subject might be found, based on the experience and subjective “hunches” of the consensus team.

Thus, the initial *POA*'s are  $POA(1) = 50\%$ ,  $POA(2) = 40\%$ , and  $ROW = 10\%$ .

Although this process seems straight-forward, there are a number of hidden assumptions made, which are discussed in the next section.

### Section 26.3 Assumptions

Before taking a consensus the experts must realize that this process involves the following five assumptions.

1. The search area is well defined and segmented into reasonably-sized segments.
2. There is a positive probability that the subject is in any one of the segments.
3. There is a positive probability that the subject is not in the search area.
4. All search segments are very familiar to the consensus team members and contain **no unknown features**.
5. If the subject is in the search area, then **the subject is immobile**.

Item 1 is discussed in Chapter 25 on page 219.

Item 2 derives from the fact that otherwise the expert knows with absolute certainty that the subject is not in that segment, which is not possible.

Item 3 follows from the fact that some subjects are found outside the initial search area.

<sup>5</sup> Yes, because Aaron has assigned the same probability of 45% to both Segments 1 and 2.

<sup>6</sup> Segment 1, because  $50\% > 40\% > 10\%$ .

Item 4 is based on the fact that it is not possible to give a reasonable estimate of the subject's chances being in that segment if an expert is not familiar with that segment.

Item 5 draws attention to the fact that there is no point in estimating the chances of a subject being in a particular segment, if, at that moment, the subject is moving in or out of that segment.

There are a number of consequences of these assumptions.

- Experts must not assign a *POA* of 0% or 100% to any of the segments or to the ROW.
- Unless specifically included in the original search area when the consensus is taken, regions such as beneath soil, beneath snow, or beneath water, are not in the search area, but are in the ROW. Thus, the search area is more 2-dimensional than 3-dimensional.
- If an item, such as a cave, mine-shaft, or dwelling, is discovered in a search segment that was unknown to the consensus team members at the time of the initial consensus, then that item is in the ROW. Had the experts known of this item at that time, then that item would have been given its own segment and its own initial probability. To include this item in the search area at this stage, the search area must be expanded.<sup>7</sup>
- Any regions searched that were initially in the ROW, must be included by expanding the search area. For example, an investigator searches the subject's home, which was not included in the initial search area, without finding the subject. The search area must be expanded to include the home.
- The assumption that "If the subject is in the search area, then the subject is not moving" carries with it an important corollary, namely, "If the subject is moving then the subject is not in the search area, but in the ROW". Thus, rivers that flow fast enough to transport the subject are not in the search area but in the ROW. A similar comment applies to the abduction of a child being transported in a vehicle.
- The assumption that "If the subject is in the search area, then the subject is not moving" carries with it another important consequence, namely, **if it is believed that the subject is moving in the search area, then the experts should not be doing a consensus.**

*If it is believed that the subject is moving in the search area, then the experts should not be doing a consensus.*

## Section 26.4 Consensus Methods

There are three different methods for performing a consensus.

1. The Mattson Method.
2. The O'Connor Method, AKA the Modified Mattson Method.
3. The Proportional Method.

Each of these methods is discussed in turn.

### Mattson Method

The method used in Section 26.2 on page 226 to determine the consensus is called the Mattson Method.<sup>8</sup> In this method, every expert independently estimates the chance (between 0% and 100%, excluding 0% and 100%) that the subject is in each segment, including the ROW. The sum of each expert's chances must total 100%. Then these numerical values are averaged.

<sup>7</sup> Expanding the search area is discussed in detail in Section 28.4 on page 239.

<sup>8</sup> Robert Mattson, a retired U.S. Air Force colonel, published this method in 1976.



According to Mattson, quoted in Reference [Blehm, page 76], it is “*best to do this privately because it will insure [sic] that even the meeker individuals will be able to express their opinion without being intimidated by the more vocal members of the group.*”

But while ideal in theory, in practice this method has limitations, based on the fact that some experts just cannot add very well—they have trouble making their probabilities total 100%. For training purposes a Mattson Consensus is often simulated using four or five search segments. In this case it is fairly easy to assign *POA*’s that total 100%. In real searches, however, there may be 10 or more segments that need to be evaluated. The greater the number of segments, the greater the potential for a wrong total. When the total is not 100%, the expert then concentrates on where to add (when the total is less than 100%) or where to subtract (when the total exceeds 100%) the difference, and frequently the ROW is used as an easy target. Thus, instead of concentrating on distributing 100% based on the search, it is based on arithmetic.

### O’Connor Method, AKA the Modified Mattson Method

To circumvent the problems that some experts have with the Mattson Method, Dan O’Connor introduced an alternative method, based on a scale of relative values.

Instead of assigning a numerical percentage value to each segment, the expert specifies a letter corresponding to the likelihood that the subject is in a particular segment. Specifically each expert independently estimates the chance that the subject is in the ROW as a percentage between 0% and 100%, while the segments are estimated using the verbal cues shown in Table 26.4.<sup>9</sup>

**Table 26.4.** O’Connor Verbal Cues

Letter	Meaning
A	Very likely in this segment
B	
C	
D	
E	Even chance
F	
G	Unlikely in this segment
H	
I	Very unlikely in this segment

Then an algorithm is used to convert these letters to numerical percentage values.<sup>10</sup>

For example, Jesse, Aaron, and David, might use the O’Connor Method to make the estimates shown in Table 26.5.

**Table 26.5.** O’Connor Method

Segment	Jesse	Aaron	David
ROW	10%	10%	10%
1	A	B	C
2	C	C	C

The algorithm then converts the letters to the numerical values shown in Table 26.6 on the next page.

<sup>9</sup> If the ROW is permitted to have a verbal cue, then the *ROW* depends on the number of segments inside the search area. The *ROW* must be independent of how the search area is segmented.

<sup>10</sup> This algorithm is built into the software package Win CASIE III described in Section A.7 on page 363.

**Table 26.6.** Numerical Values Using O'Connor Method

Segment	Jesse	Aaron	David
ROW	10.00%	10.00%	10.00%
1	67.50%	60.00%	45.00%
2	22.50%	30.00%	45.00%
Total	100%	100%	100%

By averaging the numerical values, this leads to the consensus shown in Table 26.7.

**Table 26.7.** Consensus by O'Connor Method

Segment	Consensus
ROW	10.00%
1	57.50%
2	32.50%
Total	100%

This table is then used in the same way as Table 26.3 on page 227. The Assumptions discussed in Section 26.3 on page 227 apply here also.

## Proportional Method

There is another method, called the Proportional Method, that circumvents the Mattson Method. This is a numerical counterpart of the O'Connor Method.

In this method, each expert independently estimates the chance that the subject is in the ROW as a percentage between 0% and 100%. Then the segments are each assigned a positive number, which is not a percentage, but a proportion.<sup>11</sup>

For example, if one segment has the number 100 assigned to it and a second the number 100, then this is interpreted as saying that the subject is equally likely to be in these segments. On the other hand, if one segment has the number 20 assigned to it and a second the number 10, this is interpreted as saying that the subject is twice as likely to be in the first segment as the second. Finally, if one segment has the number 3 assigned to it and a second the number 1, this is interpreted as saying that the subject is three times as likely to be in the first segment as the second.

An algorithm is used to convert these numbers to numerical percentage values.<sup>12</sup>

For example, Jesse, Aaron, and David, might use the Proportional Method to make the estimates shown in Table 26.8.

**Table 26.8.** Consensus by Proportional Method

Segment	Jesse	Aaron	David
ROW	10%	10%	10%
1	100	20	3
2	100	10	1

The algorithm then converts the letters to the numerical values shown in Table 26.9.

**Table 26.9.** Numerical Values Using Proportional Method

Segment	Jesse	Aaron	David
ROW	10.00%	10.00%	10.00%
1	45.00%	60.00%	67.50%
2	45.00%	30.00%	22.50%
Total	100%	100%	100%

<sup>11</sup> If the ROW is permitted to have a proportion rather than a percentage, then the ROW depends on the number of segments inside the search area. The ROW must be independent of how the search area is segmented.

<sup>12</sup> This algorithm is built into the software package Win CASIE III described in Section A.7 on page 363.

By averaging the numerical values, this leads to the consensus shown in Table 26.10.

**Table 26.10.** Consensus by Proportional Method

Segment Consensus	
ROW	10.00%
1	57.50%
2	32.50%
Total	100%

This table is then used in the same way as Table 26.3 on page 227. The Assumptions discussed in Section 26.3 on page 227 apply here also.

### Comments

1. Members of the consensus team do not have to use the same consensus method. They can “mix and match”.
2. All consensus team member should submit their estimates in writing.
3. Software, such as Win CASIE III described in Section A.7 on page 363, has been specifically designed to calculate the initial *POA*’s from the consensus members’ estimates.  
When entering a consensus member’s estimates into a computer program, it is efficient to have one person read the entries segment by segment aloud while the second person records that entry. The reader does not need to say, for example, “Segment 23” pause “5%”, “Segment 24”, pause “3%”, but merely “5%” pause “3%”. Every 10 entries or so the reader and recorder should make sure they are dealing with the same segment entry. Also, if the O’Connor Method is being used, and three successive segments have the same letter assigned to them, say “H”, do not say something like “The next three entries are all H’s”. Better to say “H” pause “H” pause “H”.
4. A consensus is performed only once per incident.

*A consensus is performed only once per incident.*

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

**26.1.** Five experts submit their consensus which are shown in Table 26.11. Are they acceptable?

**Table 26.11.** Initial Consensus

Segment\Expert	1	2	3	4	5
ROW	15.0%	D	10.0%	0.0%	1
1	40.0%	A	A	50.0%	1
2	35.0%	C	C	30.0%	1
3	20.0%	F	J	20.0%	1

**26.2.** Use Win CASIE III (see Section A.7 on page 363) to confirm the consensus in Table 26.7

on the previous page, and Table 26.10.

**26.3.** Three experts submit their consensus which are shown in Table 26.12. Just by looking at the table, decide which is the segment with the highest *POA*. Then use Win CASIE III (see Section A.7 on page 363) to find the consensus.

**Table 26.12.** Initial Consensus

Segment\Expert	Mattson	O’Connor	Proportional
ROW	15.0%	20.0%	10.0%
1	40.0%	A	20
2	25.0%	C	15
3	20.0%	F	10

**26.4.** Use the Mattson Consensus method on a search area that has 10 segments, assuming you believe that

$$POA(1) > POA(2) > \cdots > POA(10) > ROW.$$

The purpose of this exercise is to draw attention to the difficulties most people have making numbers total 100%.

**26.5.** Explain to a lay person what an Initial Consensus is, and how it is useful in searches.

**26.6.** Explain to a lay person why, when taking a consensus, the subject is assumed to be stationary.

**26.7.** This is a continuation of Exercise 11.6 on page 114.

- (a) You are called in to operate Win CASIE III just as the consensus is about to be taken. The search area has been identified and segmented into 3 segments, which are marked on a map.
- (b) The unsuccessful hasty search took place during the Initial Response phase of the search.
- (c) You are told the search is to be called the Weiser Search, with case number 09271722.
- (d) You are asked to print 3 consensus forms using Win CASIE III—one each of the Mattson, O'Connor, and Proportional forms. Make sure you can do this.

This is continued in Exercise 26.8.

**26.8.** This is a continuation of Exercise 26.7.

- (a) The consensus forms are returned to you and they contain the information shown in the table.

Name	Paul A.	John L.	Missy S.
Method	Mattson	O'Connor	Proportional
ROW	10.0%	20.0%	30.0%
Segment 1	40.0%	A	80
Segment 2	30.0%	C	100
Segment 3	20.0%	D	30

- (b) Find the consensus.

This is continued in Exercise 29.16 on page 253.

## Quizzes

**26.9.** In every search,  $POA(1) > POA(2) > ROW$ . (a) True. (b) False.

**26.10.** In every search,  $ROW > 0$ . (a) True. (b) False.

**26.11.** The consensus method that uses verbal cues is called the (a) Mattson Method. (b) O'Connor Method. (c) Proportional Method.

**26.12.** In all consensus methods, the  $ROW$  is always entered as a numerical value. (a) True. (b) False.

**26.13.** The percentage 2% as a decimal is (a) 200. (b) 20. (c) 2. (d) 0.2. (e) 0.02.

**26.14.** The number 2 as a percent is (a) 200%. (b) 20%. (c) 2%. (d) 0.2%. (e) 0.02%.

**26.15.** To convert a number from decimal to percentage, multiply the number by 100. (a) True. (b) False.

**26.16.** To convert a number from decimal to percentage, divide the number by 100. (a) True. (b) False.

**26.17.** If the subject is believed to be moving, should a Consensus be taken? (a) Yes. (b) No.

**26.18.** During a search incident, a consensus should be performed (a) At the end of every Operational Period. (b) Every time a search team is debriefed. (c) At the beginning of every Operational Period. (d) Whenever the incident commander requests it. (e) At most once.

## Module 3.

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### Area Searches

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## CHAPTER 27

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### Area Searches Overview

In addition to those characteristics that describe an Area Search mentioned on page 14, such searches differ from Route and Location Searches in very distinct and potentially problematic ways. It is important that the Incident Commander be familiar with these when embarking on an Area Search.

- Everything is more involved in an Area Search.
  - An Incident Management Team must be in place.
  - A written IAP must be produced.
  - The number of resources is much larger. They may come from different agencies, and there may be inter-agency problems that need to be resolved.
  - The pressure from the family and media is likely to be much greater.
  - There is additional stress because the subject was not found earlier.
  - The longer the search continues, the greater the possibility of a fatality.
  - The volume of documentation increases.
- The Incident Commander and the Incident Management Team must not only have a thorough knowledge of search theory, but also are comfortable implementing it. This means that they have to understand
  - Probability of Detection, *POD*, which is a measure of how efficiently a team has searched its assigned segment.
  - Cumulative Probability of Detection, *CPOD*, which is a measure of how well a segment has been searched by all the resources applied to it.
  - *ROW*, which is a measure of the probability that the subject is not in the current search area.
  - What to do if a resource is unable to complete the search of its assigned segment.
  - How to account for clues in the context of search theory.
  - What Win CASIE III can and cannot do.
  - What to do if there is evidence that the subject is mobile, when an Area Search is based on the assumption that the subject is immobile.
- The primary tactic during an Area Search is grid searching a segment, which requires more resources than a Route and Location Search, and more discipline.
- On average, the chances of a search becoming an Area Search is about a 3%, when compared to a Route and Location Search, so the skills required to run an Area Search successfully are seldom used and easily lost. Running an Area Search is a perishable skill, so it requires constant training.



## CHAPTER 28

### Search Theory

#### Section 28.1 Intuition and Search Theory—Part 2

In Section 26.1 on page 225, search theory was introduced intuitively. This section continues with that topic, assuming that the Initial Consensus is given by Table 26.3 on page 227, namely Table 28.1.

**Table 28.1.** Initial *POA*'s

Event	<i>POA</i> (1)	<i>POA</i> (2)	<i>ROW</i>	Total
Initial Consensus	50%	40%	10%	100%

As was pointed out in Section 26.1 on page 225, if only one resource is available, the most efficient means of searching is to assign it to the segment with the highest *POA*, namely Segment 1. Furthermore, if the resource is unsuccessful (that is, does not locate the subject), then the *POA*'s and *ROW* are updated so that *POA*(1) decreases while *POA*(2) and *ROW* both increase. The amount by which they change depends on the search efficiency of the resource, its *POD*, Probability of Detection.

**Probability of Detection:** *The *POD*, Probability of Detection, is the probability of a resource detecting the subject in a segment, assuming the subject is in that segment.*

Thus,  $POD(1) = 60\%$  means that the resource had a 60% probability of finding the subject, if the subject is in Segment 1. It also means that there is a  $100\% - 60\% = 40\%$  probability of not finding the subject, if the subject is in Segment 1.

**Note:** *POD* is **not** the percentage of the area of an assigned segment that a resource has searched. This would mean some of the segment has not been searched. In that case, the old segment should be split into two new segments, and the new segment that has been searched updated. See Section 28.3 on page 238.

If Segment 1 is unsuccessfully searched with a *POD* of 60%, then the updated *POA*'s are shown in Table 28.2.<sup>1</sup>

**Table 28.2.** Updated *POA*'s After One Search

Event	<i>POA</i> (1)	<i>POA</i> (2)	<i>ROW</i>	Total
Initial Consensus	50.00%	40.00%	10.00%	100.00%
Searched Segment 1 ( <i>POD</i> = 60%)	28.57%	57.14%	14.29%	100.00%

<sup>1</sup> Details of these calculations can be found in Example D on page 375. Doing these calculations by hand is a slow, tedious, and error-prone process. Using software designed specifically for this, such as Win CASIE III described in Section A.7 on page 363, is strongly advised.

Notice that, in agreement with intuition,  $POA(1)$  has dropped from 50.00% to 28.57%,  $POA(2)$  has risen from 40.00% to 57.14%, while  $ROW$  has increased from 10.00% to 14.29%.

If Segment 2 is searched with  $POD(2) = 30\%$  during the same Operational Period as Segment 1, then Table 28.3, shows the current state of the search, where Segment 2 is the hottest segment, with a  $POA$  of 48.28%.

**Table 28.3.** Updated  $POA$ 's After Two Searches

Event	$POA(1)$	$POA(2)$	$ROW$	Total
Initial Consensus	50.00%	40.00%	10.00%	100.00%
Searched Segment 1 ( $POD = 60\%$ )	28.57%	57.14%	14.29%	100.00%
Searched Segment 2 ( $POD = 30\%$ )	34.48%	48.28%	17.24%	100.00%

From the above, it is clear that  $POA$  comes in two types.

- Initial  $POA$ , determined by an initial consensus (either Mattson, O'Connor, or Proportional).
- Updated (sometimes called “shifted”)  $POA$ , which is calculated for all segments after each segment has been searched without success.

However, these items can be combined into one definition.<sup>2</sup>

**Probability of Area:** *The  $POA$ , Probability of Area of a segment, is the probability that the subject is in that segment taking into account all the searches that have taken place within the search area.*

$ROW$  is defined in a similar way.

**$ROW$ :** *The  $ROW$ , Rest of the World, is the probability that the subject is out of the search area taking into account all searches that have taken place within the search area.*

Imagine the search continues into a second Operational Period, when Segment 2 is searched by a resource with  $POD$  of 60%,  $POD(2) = 60\%$ , and Segment 1 is searched by a resource with  $POD$  of 40%,  $POD(1) = 40\%$ . If both searches end unsuccessfully, then Table 28.4 shows the current state of the search.

**Table 28.4.** Updated  $POA$ 's After Two OP's

Event	$POA(1)$	$POA(2)$	$ROW$	Total	OP
Initial Consensus	50.00%	40.00%	10.00%	100.00%	
Searched Segment 1 ( $POD = 60\%$ )	28.57%	57.14%	14.29%	100.00%	1
Searched Segment 2 ( $POD = 30\%$ )	34.48%	48.28%	17.24%	100.00%	1
Searched Segment 2 ( $POD = 60\%$ )	48.54%	27.18%	24.27%	100.00%	2
Searched Segment 1 ( $POD = 40\%$ )	36.14%	33.73%	30.12%	100.00%	2

Notice that each time a segment is searched without success, the  $ROW$  increases, as it always must, because it is not searched.

At this stage in the search, Segment 1 has been searched by two resources, one with a 60%  $POD$ , and the other with a 40%  $POD$ . Knowing how well Segment 1 has been searched after successive unsuccessful searches is valuable information. This number is called the Cumulative Probability of Detection, denoted by  $CPOD$ .<sup>3</sup>

**Cumulative Probability of Detection:** *The  $CPOD$ , Cumulative Probability of Detection, is the probability of multiple independent resources detecting the subject in a segment, assuming the subject is in that segment.*

<sup>2</sup> Some people call this the Probability of Containment. That is incorrect. The Probability of Containment of a segment is the probability that the subject is in that segment ignoring all searches that have taken place in every other segment. Probability of Containment and Probability of Area are incompatible.

<sup>3</sup>  $CPOD$  is discussed more fully in Section 29.3 on page 247.

Unfortunately it is incorrect to just add the *POD*'s and assert that Segment 1 has been searched with a *CPOD* of  $60\% + 40\% = 100\%$ . This would mean that there is no chance that the resources missed the subject. The correct answer is 76%, and the method for obtaining this is discussed in Section 29.3 on page 247. In the same way, the *CPOD* of Segment 2 is not  $60\% + 30\% = 90\%$ , but is 72%.

So, after two Operational Periods, the status of the search is shown in Table 28.5.

**Table 28.5.** Search Status After Two OP's

Segment	Current <i>POA</i>	<i>CPOD</i>
ROW	30.12%	0%
1	36.14%	76%
2	33.73%	72%

### The Law of Diminishing Returns

It may be tempting to “clear” a segment<sup>4</sup> by repeatedly searching the same segment. This is usually an inefficient use of resources, as demonstrated by Table 28.6, which shows the *CPOD* when the same segment is searched repeatedly by resources all with a *POD* of 50%.

**Table 28.6.** Law of Diminishing Returns

Pass <i>CPOD</i> Increase in <i>CPOD</i>		
0	0.00%	
1	50.00%	50.00%
2	75.00%	25.00%
3	87.50%	12.50%
4	93.75%	6.25%
5	96.88%	3.13%
6	98.44%	1.56%
7	99.22%	0.78%
8	99.61%	0.39%
9	99.80%	0.19%
10	99.90%	0.10%

Notice, for example, that if at Pass 4, a resource with a *POD* of 50% searches the segment, the increase in *CPOD* is only  $93.75\% - 87.50\% = 6.25\%$ .

## Section 28.2 ROW—Rest of the World

As pointed out earlier, the *ROW* is the probability that the subject is out of the search area taking into account all searches that have taken place within the search area.<sup>5</sup> The concept of *ROW*, introduced by John Bownds in the 1970s, is very important to SAR incidents for a variety of reasons.

1. Each time a segment is searched without success, the *ROW* increases and can be used as a barometer of the search in two different ways.
  - a) If the *ROW* exceeds 50% there is more chance that the subject is out of the search area than in. It may be time to expand the search area.
  - b) When the *ROW* gets very high, it may be time to expand the search area or to suspend the search.

<sup>4</sup> “Clearing” a segment means having nearly 100% *CPOD* for that segment.

<sup>5</sup> This means that the probability of the subject being inside the search area at this stage is  $100 - ROW\%$ .

2. If the search area is expanded, then the *POA*'s for the new segments are taken from the *ROW*. Frequently the *ROW* is made too low in the Initial Consensus, particularly if the search area is not well-know when the consensus is taken.
3. Some regions that appear to be in the search area may actually be in the *ROW* (previously unidentified caves, mine shafts, or buildings; under surface of snow, earth, or water; fast-flowing river).
4. If a previously unknown region is found in a search segment, then the search area needs to be expanded.

### Section 28.3 Splitting a Segment

If a resource does not complete the search of its segment, then that segment is split creating two (or more) new segments. Typically this would occur if a search team is assigned to search a specific segment, but, for various reasons, is unable to search the entire segment. For example, this could occur if a mounted unit encounters a fence line that is not feasible to cross multiple times, or if there is a rapid deterioration in the weather. The debriefers expect an accurate description of that part of the segment that has been searched, together with a *POD* for it. The Incident Commander then identifies the searched region on the map, and splits the segment into two (or more) pieces, some of which have now been searched, and others not. This requires that the segments be renumbered, and is best done using Win CASIE III. Before drawing any new segments on a map, it is wise to overlay the map with a new transparency.

A segment must also be split under the following circumstances. Two teams are assigned to the same segment, one to search a specific trail within that segment and the other to search the entire segment. In this case, the trail **must** be split from the original segment creating two new segments—the trail and the old segment without the trail. The resource searching the trail returns a *POD* for the new trail segment, whereas the resource assigned to the original segment returns a *POD* for both new segments. Not splitting the original segment into two and then trying to adjust the *POD* for the entire segment based on the efforts of the resource searching the trail, invalidates the process. Assigning a *POD* to an entire segment based on searching part of that segment, is not a valid procedure.

*Assigning a POD to an entire segment based on searching part of that segment, is not a valid procedure.*

Extreme caution needs to be exercised when splitting a segment, which is illustrated by the following situation. Consider a very simple scenario where there are only two segments, Segment 1 and Segment 2. Imagine that a ground team and a helicopter are assigned to search Segment 1. The helicopter searches half of Segment 1 and has to depart. So the old Segment 1 is split into two new segments, namely new Segment 1 and new Segment 3. So

$$\text{Old Segment 1} = \text{New Segment 1} + \text{New Segment 3}.$$

If the new Segment 1 was searched by the helicopter then its *POD* is used in that segment, and no *POD* is used in the new Segment 3.

The problem occurs when the ground team returns. They were assigned to search Segment 1, but that was the old Segment 1. So what they have searched is the new Segment 1 and the new Segment 3, so *POD*'s have to be entered for both these segments.

A common mistake is to split a segment and then forget to enter the *POD*'s.

If a resource discovers a previously unknown region in a search segment then the segment is not split. In this case the search area is expanded.

## Section 28.4

## Expanding the Search Area

Expanding the search area means that part of the ROW is going to be included in the search area from now on. There are at least four circumstances that require expanding the search area.

1. If a previously unknown region is found in a search segment—but is not part of it, such as a cave, a mine shaft, or a dwelling—then the search area needs to be expanded. Were these regions known at the time the search area was identified and segmented and the consensus was taken, then those regions most likely would have been assigned their own segment number and specialized resource. In view of the fact that they were unknown at that time, they are in the ROW.
2. If the probability that the subject is out of the search area is high (that is the *ROW* is high), then consideration should be given to expanding the search area.
3. If a clue suggests that the subject is out of the search area, then consideration should be given to expanding the search area.
4. If a consensus has just been taken, and it is discovered that an important region was not included in the segmentation, then the search area can be expanded to include that region as a new segment, without having to redo the consensus.

## The Anatomy of an Area Search

So the bare bones of a typical Area Search has the following pattern.

1. **The Search Area.** The search area is defined and divided into search segments.
2. **The Consensus.** A group of experienced people create an initial consensus.
3. **Resources Deployed.** Resources are assigned to search segments, based on the current *POA*'s, initially generated by the Consensus.
4. **Subject Found.** If the subject is found, the search ends.
5. **Subject Not Found.** If the subject is not found and if the resource completed its search of the assigned segment, the resource's *POD* is estimated, and the *POA*'s are updated using Win CASIE III.
6. **Split Segment.** If a resource did not complete the search of its segment, the segment is split creating two new segments from one old segment. The (new) searched segment's *POA* is updated. Be careful.
7. **Expand Search Area.** If a previously unknown region is found in a search segment (but is not part of it), then the search area needs to be expanded.
8. **Expand Search Area.** If the probability that the subject is out of the search area (in ROW) is high, then consider either expanding the search area or suspending the search.
9. **Found Clues.** If a clue is found then its influence is estimated. This may mean that the search area must be expanded.
10. **Suspend Search.** A decision is made whether to suspend the search.
11. **Continue Search.** If the search continues then return to item 3.

## Exercises/Quizzes

**Talking Points, Check Your Understanding, and Exercises**

**28.1.** Use Win CASIE III (see Section A.7 on page 363) to confirm the results in Table 28.4 on page 236.

**28.2.** In Table 28.5 on page 237, why is the *CPOD* for the *ROW* zero?

**28.3.** Verify that the *CPOD* for Segment 2 in Table 28.5 on page 237 is correct.

**28.4.** Use Win CASIE III (see Section A.7 on page 363) to confirm the results in Table 28.6 on page 237.

**28.5.** Explain to a lay person what *ROW* is, and how it is useful in searches.

**28.6.** Explain to a lay person what *POD* is, and how it is used in searches.

**28.7.** Explain to a lay person what *CPOD* is, and how it is used in searches.

**28.8.** Explain to a lay person what *POA* is, and how it is useful in searches.

**28.9.** Explain to a lay person the difference between “Expanding the search area” and “Splitting a search segment”.

**28.10.** Explain to a lay person how the *ROW* can be used as a barometer of the search.

**Quizzes**

**28.11.** It is possible for the consensus to have  $ROW = 1 = 100\%$ . (a) True. (b) False.

**28.12.** *POA* is a measure of how well a segment has been searched. (a) True. (b) False.

**28.13.** *POD* is a measure of how well a segment has been searched by all resources. (a) True. (b) False.

**28.14.** *CPOD* is a measure of how well a segment has been searched by all resources assigned to that segment. (a) True. (b) False.

**28.15.** *POD* stands for “Possibility of Detection”. (a) True. (b) False.

**28.16.** *POA* is the probability of a subject being in a particular segment. (a) True. (b) False.

**28.17.** *POD* is the probability of a subject being in a particular segment. (a) True. (b) False.

**28.18.** *CPOD* is the probability of a subject being in a particular segment. (a) True. (b) False.

**28.19.** The probability of a subject being in a particular segment is the (a) *POA*. (b) *POD*. (c) *CPOD*. (d) *ROW*.

**28.20.** The *ROW* can be used as a barometer of the search. (a) True. (b) False.

**28.21.** When the search area is expanded, the *POA*’s of all segments are affected. (a) True. (b) False.

**28.22.** When a segment is split, the *POA*’s of all segments are affected. (a) True. (b) False.

**28.23.** Assigning a *POD* to an entire segment based on searching part of that segment, is an acceptable practice. (a) True. (b) False.

**28.24.** A team assigned to search a segment, searches only half of the segment. It returns a *POD* for the region searched. The correct procedure is to (a) Halve the *POD* and apply it to the whole segment. (b) Split the segment and apply the *POD* to the region searched. (c) Expand the search area.

**28.25.** Two teams are assigned to the same segment—one to search a trail in the segment, the other to search the entire segment. Both teams return with estimated *POD*’s. The correct way to proceed is to (a) Calculate the *CPOD* for the segment from both *POD*’s. (b) Ignore the *POD* from the team searching the trail. (c) Increase the *POD* returned by the team searching the entire segment. (d) Split the segment and apply the *POD*’s to the appropriate new segments.

**28.26.** If  $ROW = 30\%$ , then the probability that the subject is out of the search area is (a) 30%. (b) 70%. (c) Not enough information.



**28.27.** If  $ROW = 30\%$ , then the probability that the subject is in the search area is (a) 30%. (b) 70%. (c) Not enough information.

**28.28.** If  $ROW = 30\%$ , then the probability that the subject is in Segment 1 is (a) 30%. (b) 70%. (c) Not enough information.

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## CHAPTER 29

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# Probability of Detection

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### Section 29.1

#### *POD*

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As pointed out earlier, the *POD* is the probability of a resource detecting the subject in a segment, assuming the subject is in that segment. It is a measure of the efficiency of the resource searching the segment.

When a resource finishes its assignment—and assuming the subject has not been found—part of the debriefing process is to estimate a *POD* for the segment searched. The *POD* should be reported for the object of the search, whether it be a person, an evidence search, or a clandestine grave. Even though clues are important, they are usually not the object of the search, so reporting a *POD* for a clue, when searching for a subject, is irrelevant.

*The POD should be reported for the object of the search. Reporting a POD for a clue, when searching for a subject, is irrelevant.*

In addition, if the surface of a segment changes during a search, the reported *POD* must be for the surface of that segment at the time of the consensus. For example, if there was no snow on the ground at the time of the consensus, but by the time a team searches that segment a foot of snow has fallen, then the team must estimate a *POD* for the original segment, that is, for one foot below the current surface of the segment.

*If the surface of a segment changes during a search, the reported POD must be for the surface of that segment at the time of the consensus.*

The *POD* is affected by many different factors, including

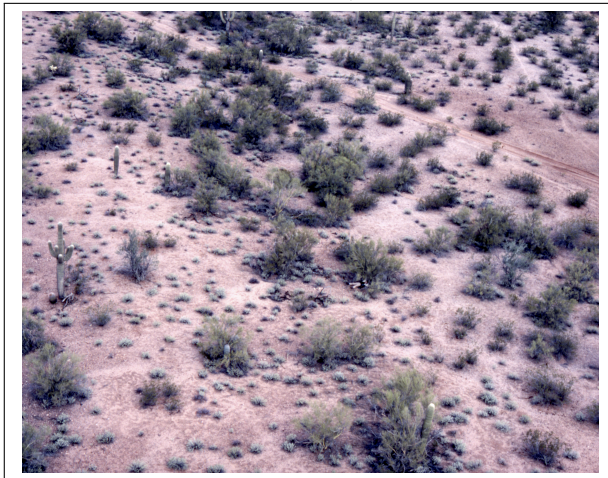
- The terrain in the segment. The *POD* for a flat segment is likely to be higher than for an uneven, crevice-pocked, or hilly segment.
- The weather. The *POD* during good weather conditions is likely to be higher than during poor weather conditions.
- The vegetation. The *POD* for sparse vegetation is likely to be higher than for dense vegetation.

- The detectability of the subject. Large subjects dressed in bright colors are more likely to be detected than small subjects in colors that blend in with the background, such as camouflage.<sup>1</sup>
- The lighting conditions. Sometimes bright, sunny conditions are a disadvantage, because the subject may be in the shadows and difficult to detect, compared to a cloudy day when there are no shadows. See Figure 29.1 and Figure 29.2.
- The capability of the resource. Experienced, fresh resources are likely to be more efficient than inexperienced, tired resources.
- The segment/team size. A small team in a large segment is likely to be less efficient than a large team in a small segment.

While there are general guidelines for estimating *POD*'s, there is no one formula that can be used. However, it is always best to err on the side of caution by using lower *POD* estimates rather than higher ones. Over-estimating *POD*'s means that the *ROW* grows artificially, contributing to the search being suspended prematurely.

*Over-estimating *POD*'s means that the *ROW* grows artificially, contributing to the search being suspended prematurely.*

Inexperienced resource (as well as experienced resources) may tend to overestimate their *POD*'s.



**Figure 29.1.** Cloudy Day—Where is the subject?



**Figure 29.2.** Sunny Day—Where is the subject?

Section 29.2  
***POD and Coverage***

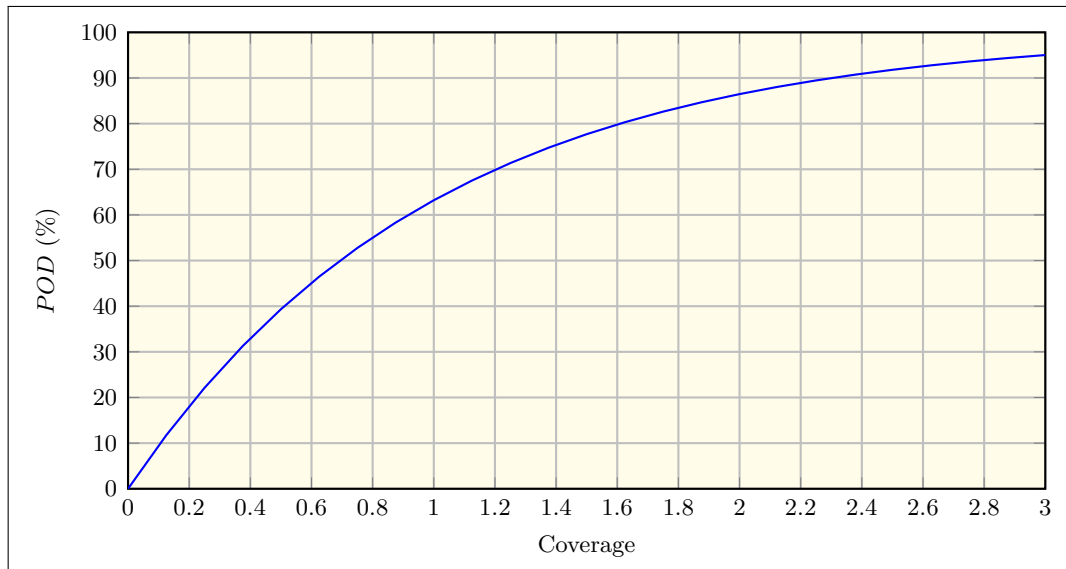
Coverage is another way of measuring the efficiency of a resource. *POD* and Coverage both measure the efficiency of a resource but in different units. In the same way that temperature can be measured in either units of Fahrenheit or Celsius, so the efficiency of a resource can be measured in either units of *POD* or Coverage.

**POD* and Coverage both measure the efficiency of a resource but in different units.*

<sup>1</sup> There is evidence that color-blind individuals have an advantage over those with normal color vision when detecting subjects dressed in camouflage. See Reference [Morgan].

Estimating the Coverage of a resource for its segment is affected by the same factors as estimating *POD*.

The mathematical relationship between *POD* and Coverage is dealt with in Appendix D on page 377. The graphical relationship between *POD* (expressed as a percentage) as a function of Coverage is shown in Figure 29.3.



**Figure 29.3.** *POD* as a function of Coverage

The important thing to realize is that this curve passes through the origin, but it is not a line. If it were a line through the origin, then doubling the Coverage would double the *POD*. It does not. A Coverage of 1 corresponds to a *POD* of about 63%, while a Coverage of 2 gives a *POD* of about 86%. So doubling the Coverage from 1 to 2 does not double a *POD* from 63% to 126%.

What is the advantage of changing units? In the case of temperature, it is more a difference of culture than anything else. However, in the case of the efficiency of a resource, there is more than culture involved. Coverage is a direct measure of the efficiency of a resource; *POD* is not.

*Coverage is a direct measure of the efficiency of a resource; *POD* is not.*

### Demonstration—Converting Coverage to *POD*

Estimate the team's *POD* if they reported a Coverage of 0.67.

#### Answer

There are many different, but equivalent, ways to estimate the *POD* from this information, of which we show two.

1. Using Figure 29.3, a Coverage of 0.67 gives a *POD* of about 48%. This is obtained by locating 0.67 on the horizontal axis (Coverage)—about half-way between 0.6 and 0.8—then drawing a vertical line until it meets the curve, and finally drawing a horizontal line, crossing the vertical axis (*POD*) between 40 and 50.
2. Win CASIE III has the capability of converting Coverage to *POD*, which requires no ability to understand graphs. With Win CASIE III running, select the menu items “What If?”, “POD And Coverage”, enter 0.67 for the “Coverage”, and finally click the “Accept” button. See Figure 29.4 on the next page, where the *POD* is 48.83%.

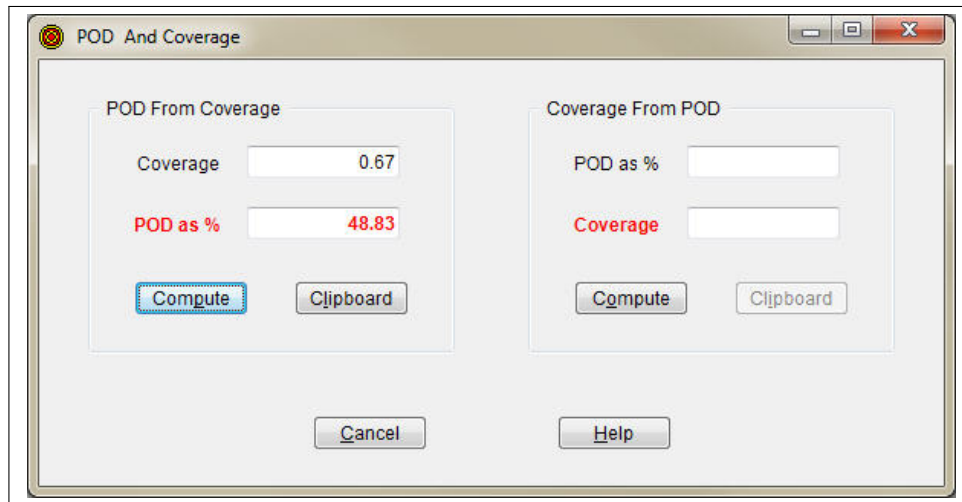


Figure 29.4. Coverage/*POD* from Coverage

Clearly using Win CASIE III requires no mathematical skills of the reader, so henceforth, Win CASIE III is used whenever possible to do any mathematical calculations.

### Effective Sweep Width

If the Coverage can be estimated then the *POD* can be determined. To estimate Coverage, the concept of Effective Sweep Width needs to be introduced.

The **Effective Sweep Width** (ESW) is the distance two searchers must be apart, as they search in a grid pattern for an object (assumed to be similar in detectability as the object being searched for), that results in a Coverage of 1, that is, a *POD* of approximately 63%.

At present, there are three different ways to estimate ESW experimentally.

1. The first way to estimate ESW is to experimentally find the average distance from a searcher's track, at which the number of non-detections of an object inside that distance equals the number of detections outside that distance, and then double that distance. It is believed that this results in an estimate of 1 ESW.
2. The second way to estimate ESW is to use Average Maximum Detection Range. AMDR is the average of 8 distances that an object can just be detected in the environment being searched. It is believed that this results in an estimate of ESW between 1.5 AMDR and 2.0 AMDR.
3. The third way to estimate ESW is to use Critical Separation discussed in Chapter 30 on page 255. CS is the average distance the team members are apart after walking in different directions from an object in the environment being searched, until each searcher can just detect the object. It is believed that this results in an estimate of ESW between 0.5 CS and 0.7 CS. Thus,

$$ESW = a CS,$$

where the number  $a$  is between 0.5 and 0.7. If the searchers also use the tactic of “purposeful wandering” discussed in Chapter 30 on page 255, it is believed that ESW is approximately equal to CS:

$$ESW \approx 1 CS.$$

The first and second methods are impractical in the field, and are not discussed further. The third is revisited in Chapter 30 on page 255.

### Coverage, Spacing, Track Spacing, and ESW

*Spacing* and *Track Spacing* mean the same thing, but are often used in different contexts: “Spacing” is typically used to describe the distance between ground searchers as they move in parallel along a constant heading or “track”. The term “Track Spacing” is typically used to describe the distance between parallel search tracks conducted by one or more aircraft. Track Spacing, however, can be properly used to describe the fixed distance between any set of parallel sweeps by a resource or multiple resources, including gird searchers, aircraft, and even air-scent K9 teams.

*Lateral Range* is one-half of the Track Spacing and is the distance that an observer would need to sweep on either side of their track.

The relationship between Coverage, Spacing, and Effective Sweep Width, ESW, is

$$Spacing = \frac{ESW}{Coverage},$$

or

$$Coverage = \frac{ESW}{Spacing}.$$

Thus, an estimate for ESW (from Critical Separation) and Spacing (how far apart the team members are when they search), gives an estimate of Coverage, and so an estimate of the *POD*.

The second of these formulas indicates the important point about Coverage. Imagine the number of searchers in a grid team is doubled, thereby halving their Spacing and doubling the Coverage. So doubling the search effort doubles the Coverage, showing that Coverage is a direct measurement of the search effort, whereas *POD* is not.

*Coverage is a direct measurement of the search effort, whereas POD is not.*

### Demonstration—Estimating *POD*

*From on site trials, a grid search team estimates its CS as 20 feet for their segment. Estimate the team’s POD if they do not use purposeful wandering and are separated by 30 feet.*

#### Answer

Here *CS* = 20 feet, *Spacing* = 30 feet, and because there is no purposeful wandering, *ESW* is between 0.5 *CS* and 0.7 *CS* feet. Win CASIE III is used to estimate the *POD* from this information. With Win CASIE III running, select the menu items “What If?”, “Coverage/POD And Spacing”, and “Coverage/POD From Spacing”, make sure the “Critical Separation” radio button is selected, and enter 30 for the “Spacing” and 20 for “CS”, and finally click the “Accept” button. See Figure 29.5 on the next page, which shows the *POD* is between about 28% and 37%, depending on whether *ESW* is approximated by 0.5 *CS* or 0.7 *CS*.



Input		Options	
Spacing(ft)	30	<input type="checkbox"/> Metric	
CS (ft)	20	<input type="radio"/> Effective Sweep Width	
		<input checked="" type="radio"/> Critical Separation	
		<input type="radio"/> Average Maximum Detection Range	

Output (Estimates)		ESW: 0.5 CS	ESW: 0.6 CS	ESW: 0.7 CS
Coverage		0.3333	0.4000	0.4667
POD %		28.35	32.97	37.29

Buttons: Accept, Cancel, Clipboard, Help

Figure 29.5. Coverage/POD from Spacing

### Section 29.3

## CPOD

The *CPOD*, **Cumulative Probability of Detection**, is the probability of multiple independent resources detecting the subject in a segment, assuming the subject is in that segment. In other words, if a segment has been searched multiple times, then the *CPOD* measures how well it has been searched in total. It is not uncommon for a search objective to specify a required *CPOD* for a specific segment by the end of an Operational Period.

There are various ways to calculate *CPOD*, all of which give the same answer, but using Win CASIE III requires no mathematical skills.

#### Demonstration—Calculating CPOD

*A helicopter searches a segment with a POD of 40% and a grid-search team searches it with a POD of 60%. What is the CPOD for the segment after these two searches?*

##### Answer

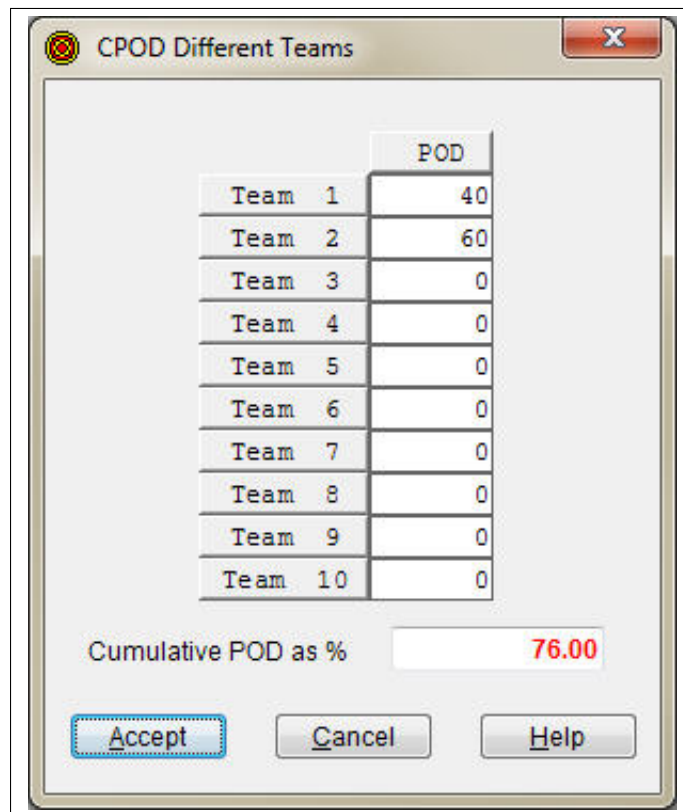
Use Win CASIE III, which has this capability built in. With Win CASIE III running, select the menu items “What If?”, “Cumulative POD”, and “Different Teams”, and enter 40 for the first team and 60 for the second. Finally click the “Accept” button. See Figure 29.6 on the next page, where the *CPOD* is 76%.

#### Demonstration—Calculating CPOD

*The Incident Commander wants to see all the high probability areas searched to a CPOD of 90% before the search is suspended. Two searches done so far in a particular segment gave a CPOD of 76%. At what POD must a third resource search that segment to achieve a CPOD of 90%?*

##### Answer

Use Win CASIE III, which has this capability built in. With Win CASIE III running, select the menu items “What If?” and “Target POD”. Enter 76 for the Current POD and 90 for the



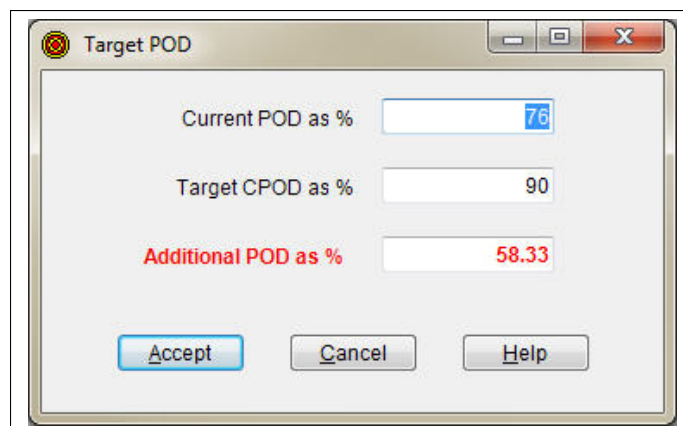
A dialog box titled "CPOD Different Teams" with a close button (X) in the top right corner. It contains a table with 10 rows, each representing a team and its Probability of Detection (POD). The table has two columns: "Team" and "POD".

Team	POD
Team 1	40
Team 2	60
Team 3	0
Team 4	0
Team 5	0
Team 6	0
Team 7	0
Team 8	0
Team 9	0
Team 10	0

Below the table, there is a label "Cumulative POD as %" followed by a text box containing the value "76.00". At the bottom of the dialog are three buttons: "Accept", "Cancel", and "Help".

Figure 29.6. *CPOD*

Target POD. Finally click the “Accept” button. See Figure 29.7, where the additional *POD* required is 58.33%.



A dialog box titled "Target POD" with standard window controls (minimize, maximize, close) in the top right corner. It contains three input fields with labels:

- "Current POD as %" with a text box containing "76".
- "Target CPOD as %" with a text box containing "90".
- "Additional POD as %" with a text box containing "58.33".

At the bottom of the dialog are three buttons: "Accept", "Cancel", and "Help".

Figure 29.7. Target *POD*

### Section 29.4

## Estimating *POD*'s

Although Critical Separation (discussed in Chapter 30 on page 255) is a valuable tool for teams searching in a grid pattern, estimating *POD*'s is more of an art than a science. Nevertheless, for some

resources there are useful aids.

## Helicopters

In the 1980's a series of experiments were performed in Pima County, Arizona, attempting to measure the effectiveness of helicopters in both desert and mountainous environments.<sup>2</sup> In all cases the helicopters used were Bell Helicopters Type HH-1H (Iriquois), widely known as "Hueys", shown in Figure 29.8.



**Figure 29.8.** An air rescue crew of Detachment 1 37<sup>th</sup> Aerospace Rescue and recovery Squadron searching the desert area east of Ragged Top Peak, near Tucson, AZ. Note the scanner's superior visibility through the open cargo door.

## Desert Searches

These experiments, see Reference [Bownds 1] for full details, were conducted north-west of Tucson in Sonoran desert terrain, as characterized by Figures 29.1 and 29.2 on page 243. A typical helicopter crew consisted of a pilot (who devoted his full attention to flying and maintaining the "creeping line" search pattern<sup>3</sup>), a co-pilot, and 2 to 4 scanners located midway on each side of the aircraft to scan at right angles to the flight path through open cargo doors. The average speed was about 60 knots, the average altitude about 175 feet, and the average track spacing was about 0.25 miles.

One experiment was performed where the subjects were in the open, waving. All were found, giving an experimental *POD* of 100%. That experiment was not repeated.

Five other experiments were completed—3 on bright sunny days and 2 on overcast days—where all subject were immobile, under cover, and unresponsive. On bright, sunny days 7 of the 24 subjects were found, giving an experimental *POD* of about 30%. On overcast days, 11 of the 16 subjects were found, giving an experimental *POD* of about 69%. The reason for this dramatic change can be understood by examining Figures 29.1 and 29.2 on page 243.

<sup>2</sup> These experiments were the joint effort of the Pima County Sheriff's Department, the United States Air Force Detachment 1 37<sup>th</sup> Aerospace Rescue and Recovery Section, and the University of Arizona Mathematics Department.

<sup>3</sup> A creeping line search pattern is where the helicopter flies a non-overlapping back-and-forth pattern moving deeper into the search area with each successive leg, until the entire search area is covered.

*Experimental POD's for subjects in the Sonoran desert.*

- For subjects in the open, waving.
  - The experimental POD was about 100%.
- For subjects immobile, under cover, and unresponsive.
  - On bright, sunny days the experimental POD was about 30%.
  - On overcast days the experimental POD was about 69%.

**Mountain Searches**

These experiments, see Reference [Bownds 2] for full details, were conducted north-east of Tucson in the Santa Catalina Mountains where the elevations are between 6,000 and 7,904 feet. See Figure 29.9. A typical helicopter crew consisted of a pilot, a co-pilot, and 2 or 3 scanners.



**Figure 29.9.** Typical vegetation in search area in Santa Catalina Mountains.

Nine experiments were conducted. Five experiments were conducted where the subjects were in an upright and waving position. Three experiments were conducted where the subjects were lying in a prone spread-eagle position. The final experiment was conducted where the subjects were immobile, under cover, and unresponsive.

*Experimental POD's for subjects in the Santa Catalina Mountains.*

- For subjects in the open who were
  - Upright and waving the experimental POD was about 60%.
  - Prone in a spread-eagle position the experimental POD was about 81%.
- Immobile, under cover, and unresponsive.
  - The experimental POD was about 0%.

## Air Scent Dogs

At present, there are no definitive ways to estimate *POD*'s for Air Scent Dogs conducting grid searches. However, Hatch Graham has proposed a methodology that might be helpful, which is described in Reference [Graham]. His proposal depends on the following factors.

- Estimating the surface wind speed in mph. This can be done using the Beaufort Wind Scale, modified by Graham, shown in Table 29.1.

**Table 29.1.** Beaufort Wind Scale

Speed	Observations
1–3 mph	Tree leaves don't move, smoke drifts slowly, sea is lightly rippled.
4–7 mph	Tree leaves rustle, flags wave slightly, small wavelets or scale waves.
8–10 mph	Leaves and twigs in constant motion, small flags extended, long unbreaking waves.
11–14 mph	Wind raises dust and loose paper.
15–25 mph	Small branches move, flags flap, waves with some whitecaps.

- Deciding whether it is day or night. In this context, night occurs from 1 hour before sunset to 1 hour after sunrise.
- Assessing the cloud cover.
- Estimating the shadow length (in feet) of a 6-foot vertical pole.
- Estimating the distance between successive grid sweeps.
- Reading Table 29.2 on the next page for teams separated by 100 meters (110 yards) and otherwise Table 29.3 on the next page.<sup>4</sup>

### Demonstration—Estimating *POD* for Air Scent Dogs

*A dog team searches a segment on a cloudless day, where the wind speed is 6 mph on average, and the shadow of a 6 foot staff is 5 feet. Estimate the *POD*'s if*

1. *The team uses parallel 110 yard sweeps.*
2. *The team uses parallel 55 yard sweeps.*

#### Answer

Looking at Table 29.2 on the next page, the relevant column occurs under “DAY”, “Clear”, “3.5—8.5” (because  $3.5 < 5 < 8.5$ ). The relevant row is “4—7 mph” (because  $4 \text{ mph} < 6 \text{ mph} < 7 \text{ mph}$ ). The column and row intersect in “B 10—30”.

1. Because the track spacing is 110 yards, the estimated *POD* is between 10% and 30%.
2. Because the track spacing is 55 yards, the estimated *POD* in Table 29.2 on the next page is not applicable. The letter “B” comes into play, and, from Table 29.3 on the next page, the estimated *POD* is read off as 55%, by identifying where the column headed “55 yards” and the row named “B” intersect.

Some comments follow about this technique.

- It would be helpful if scientific field trials were conducted to confirm that this technique generates reasonable *POD*'s. Until this exists, caution should be exercised in blindly accepting these *POD*'s.<sup>5</sup>
- Some important variables that this technique does not include are humidity and temperature. It is unlikely that dogs perform as well in an environment with a temperature of 110 °F and a humidity

<sup>4</sup> Compared to Graham's original table, in Table 29.2 on the next page, the two columns under “NIGHT” have been interchanged to make them consistent with the order of the columns under “DAY”.

<sup>5</sup> To quote Graham: “*I don't hesitate to add that the system has never undergone rigorous, scientific field trials.*”

**Table 29.2.** Graham's *POD* Estimator, Excluding Handler

SURFACE WIND SPEED	DAY									NIGHT	
	Clear or ≤ 50% Cloud or Any High Clouds			> 50% Low and Mid-level Clouds			> 50% Low Clouds			Clear or < 50% Clouds	≥ 50% Clouds
	6-foot vertical standard shadow length (in feet)										
	< 3.5	3.5-8.5	> 8.5	< 3.5	3.5-8.5	> 8.5	< 3.5	3.5-8.5	> 8.5		
1-3 mph <i>POD</i>	A 5-25	A-B 7-27	B 10-30	A-B 7-27	B 10-30	D 80-85	B 10-30	D 80-85	D 80-85	- -	- -
4-7 mph <i>POD</i>	A-B 7-27	B 10-30	C 35-45	B 10-30	C 35-45	D 80-85	C 35-45	D 80-85	D 80-85	F 95-96	E 90-92
8-10 mph <i>POD</i>	B 10-30	B-C 20-40	C 35-45	B-C 20-40	C 35-45	D 80-85	C 35-45	D 80-85	D 80-85	E 90-92	D 80-85
11-14 mph <i>POD</i>	C 35-45	C-D 55-65	D 80-85	C-D 55-65	D 80-85	D 80-85	D 80-85	D 80-85	D 80-85	D 80-85	D 80-85
15-25 mph <i>POD</i>	C 35-45	D 80-85	D 80-85	D 80-85	D 80-85	D 80-85	D 80-85	D 80-85	D 80-85	D 80-85	D 80-85

**Table 29.3.** Estimated *POD*'s for Dog, Excluding Handler

Category	100 m 110 yards	50 m 55 yards	25 m 27 yards	12.5 m 14 yards
A	5%	50%	75%	87%
B	10%	55%	77%	89%
C	35%	67%	86%	93%
D	80%	90%	95%	97%
E	90%	95%	97%	99%
F	95%	97%	99%	99%

of 5%—which is not uncommon in the Southwest—as they would in an environment with a much lower temperature and a much higher humidity.

- A segment must be “aired” of previous teams’ scents before Air Scent dogs are used in that segment.
- The dog handler is also searching at the same time, so their *POD* should also be accounted for, bearing in mind that while they are paying attention to the dog they are not searching.

## Exercises/Quizzes

Some of the following exercises/quizzes are best answered using Win CASIE III.

### Talking Points, Check Your Understanding, and Exercises

**29.1.** Describe some factors that influence the *POD*.

**29.2.** Explain the difference between *POD* and Coverage.

**29.3.** What is the *CPOD* of a *POD* of 39% and a *POD* of 77%?

**29.4.** What is the numerical difference between a *POD* of 1.00 and a *POD* of 1.00%?

**29.5.** Use Figure 29.3 on page 244 to answer the following. Two teams estimate they have the same *POD*'s, which when combined give their *CPOD* of approximately 70%. What are their individual *POD*'s?

**29.6.** A Cessna 172 must search an area of 10 sq mi for 60 minutes at a speed of 80 mph. The aircraft's Effective Sweep Width is estimated to be 500 feet. What is this aircraft's estimated Coverage and *POD*? What is the estimated Track Spacing and Lateral Range?



**29.7.** From on site trials the Critical Separation of a grid team has been determined to be 70 feet. What is a reasonable estimate for Effective Sweep Width for this team?

**29.8.** Twenty trained grid searchers are available for 8 hours. From on site trials the Critical Separation has been determined to be 100 feet. They search at 0.2 mph and want a Coverage of 0.5.

- What is the Effective Sweep Width for this team?
- What is the Spacing for this team?
- What size area can this grid team search in the allotted time?

**29.9.** A grid search team has an Effective Sweep Width of 100 feet and is told to have a *POD* of 50%. What is the team's Spacing?

**29.10.** Complete the following table.

Coverage <i>POD</i> (%)
0.00
0.25
0.50
0.75
1.00
2.00

**29.11.** Complete the following table.

<i>POD</i> Coverage
0%
20%
40%
60%
80%

**29.12.** A grid team's Effective Sweep Width is 80 feet. Complete the following table.

Spacing (ft) Coverage
40
60
80
100
120
140
160

**29.13.** A grid team's Effective Sweep Width is 80 feet. Complete the following table.

Coverage Spacing (ft)
0.25
0.50
0.75
1.00
2.00

**29.14.** What is the difference between "Spacing" and "Track Spacing"?

**29.15.** What is "Lateral Range"?

**29.16.** This is a continuation of Exercise 26.8 on page 232.

- Four resources are allocated, and are about to return after the first full Operational Period, Operational Period 1. You are asked to print 4 debriefing forms using Win CASIE III. How would you do this?
- The debriefing forms are returned to you and they contain the following information.
  - Ground Team 1 searched Segment 1 with a *POD* of 50%.
  - Ground Team 2 searched Segment 2 with a *POD* of 60%.
  - Ground Team 3 searched Segment 3 with a *POD* of 25%.
  - The Helicopter searched Segments 1 and 2 with a *POD* of 45%.
  - The subject was not found.
 Find the updated *POA*'s and *CPOD*'s.

This is continued in Exercise 29.17.

**29.17.** This is a continuation of Exercise 29.16.

- The search manager wants to see the latest *POA*'s, sorted from highest to lowest. Which is the "hottest" segment?
- The search manager wants to know the search effort by segment number, and the resources used in each segment.

This is continued in Exercise 29.18.

**29.18.** This is a continuation of Exercise 29.17.

- During Operational Period 2 the subject is found by Team 1. He was asleep under a shrub. When awoken he was disoriented, hungry, and thirsty, but otherwise in good condition. After eating and drinking, he was able to walk out with assistance. Enter this find.
- Create a Report that summarizes the search.

**29.19.** Determine the *CPOD* for a segment that is searched by three independent teams with *POD*'s of 40%, 50% and 60%.

**29.20.** At the end of an Operational Period the *CPOD* of a particular segment is 70%. The search manager wants it to be 90% after the next Operational Period. Use Win CASIE III (see Section A.7 on page 363) to determine the *POD* that the resource assigned to that segment has to attain for this to happen.

### Quizzes

**29.21.** Over-estimating *POD* (a) Has no impact on the *ROW*. (b) Makes the *ROW* artificially high. (c) Makes the *ROW* artificially low.

**29.22.** Reporting a *POD* for a clue, when searching for a subject, is important. (a) True. (b) False.

**29.23.** If the surface of a segment changes during a search, the reported *POD* must be for the surface of that segment at the time of the consensus. (a) True. (b) False.

**29.24.** Coverage is a direct measurement of the search effort, whereas *POD* is not. (a) True. (b) False.

**29.25.** The *CPOD* for a segment that is searched by two independent teams with *PODs* of 30% and 80% is (a) 100%. (b) 86%. (c) 110%. (d) 88%.

**29.26.** The *CPOD* for a segment that is searched by two independent teams with *PODs* of 60% and 70% is (a) 130%. (b) 86%. (c) 100%. (d) 88%.

**29.27.** To obtain the *CPOD* from two *POD*'s, just add the *POD*'s. (a) True. (b) False.

**29.28.** To obtain the Cumulative Coverage from two Coverages, just add the Coverages. (a) True. (b) False.

**29.29.** If the probability that the subject is not in a particular segment is 60%, then the *POA* for that segment is (a) 60%. (b) 40%. (c) Not enough information.

**29.30.** If the probability that the subject is not in a particular segment is 60%, then the *CPOD* for that segment is (a) 60%. (b) 40%. (c) Not enough information.

**29.31.** A *POD* of 30% by a team for a segment means that (a) If the subject is in that search segment, then there is a 30% chance of finding the subject. (b) The chances of the subject being in that segment is 30%.

**29.32.** A *POA* of 30% for a segment means that (a) If the subject is in that search segment, then there is a 30% chance of finding the subject. (b) The chances of the subject being in that segment is 30%.

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## CHAPTER 30

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### Searching Segments

#### Grid Searching

In contrast to the Hasty Search where Routes and Locations are searched, the Area Search focuses on searching segments. Segments are distinct pieces of the search area that have defined boundaries and should have been crafted so that they can be searched by a team in one operational period (about 6 hours of active searching). The purpose of developing segments in the search area is to achieve accountability and to quantify the amount of search effort expended.

Resources identified to search a particular segment are selected by the terrain type or other conditions present in the segment. For example, relatively flat or rolling terrain may be suitable for mounted SAR teams to search while rugged canyon country may require mountain rescue type teams. It is important to match the terrain and conditions in the segment with the appropriate resource so that the search objectives are met.

Once an Area Search is undertaken it is assumed that the subject of the search is no longer mobile. The subject may be responsive or unresponsive. As a result the search of a segment is more systematic. Resources use Area Search Tactics rather than Hasty Tactics to conduct the systematic search. Examples of Area Search Tactics include

- Ground Sweep Search—Critical Separation is employed.
  - Visual Sweep or Sound Sweep may be employed.
- Aerial Sweep Search.
- Hyperspectral Camera Analysis.
- High Resolution Camera Analysis.

During an Area Search some Hasty Tactics might still be used especially if a clue such as a track is found by the team conducting the segment search. If a track is found a Tracking Team may be brought in to follow the track while the team assigned to the segment continues their assignment.

Search teams that are assigned to search a segment should have a designated team leader who receives a briefing from the Incident Management Team about the assignment. The leader should then brief the rest of the team and assign any subordinate tasks such as communication and primary navigation. The leader is charged with the overall responsibility for the team including making sure that the team conducts the segment search in the way requested by the Incident Management Team and ensuring that the region searched is documented on the map or GPS and reporting any clues found to the Incident Command Post. If the search of the segment is not completed it is imperative that the team leader be able to show what was searched and identify the reasons that the entire segment could not be searched during the operational period. Following the completion of the assignment the team

leader must report to the Plans Section so that a debriefing can be conducted. It is helpful if the team leader completes an ICS 214 Unit Log documenting important occurrences during the assignment.

### Ground Sweep Search

The Ground Sweep Search is a line search where searchers on a team are spaced an equal distance apart along a line according to a Critical Separation determination (described on page 258) and the team makes parallel sweeps through a segment to cover the entire segment. This type of search is also called a Grid Search. See Figures 30.1 to 30.2 on pages 256–257. A typical grid search team should consist of a team leader and no more than seven team members. On occasion, several grid search teams may be assigned to work together to search a segment. In that situation the team leaders should coordinate their actions to complete the assignment. The closer together the searchers are spaced the higher the theoretical *POD*. However, tight spacing of the searchers may not be the most efficient use of the SAR resources available.

*A typical grid search team should consist of a team leader and no more than seven team members.*

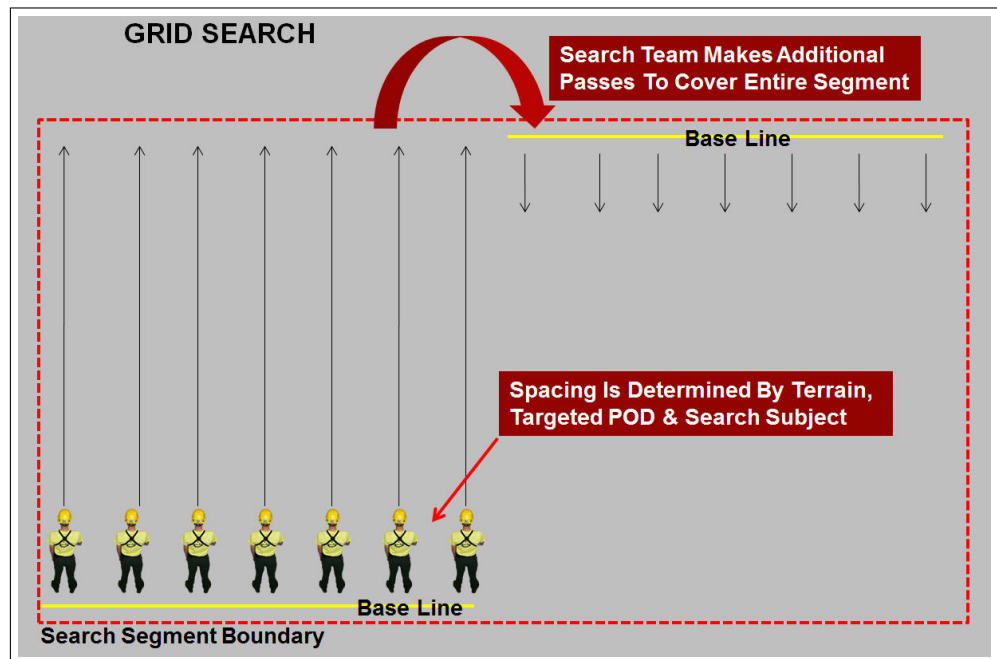


Figure 30.1. Grid Search—In Theory

While conducting the sweep the team may employ only a visual sweep or a sound sweep. The Visual Sweep involves searching the segment while relying primarily on visual observation of the segment. This technique is used if the subject is immobile and unresponsive. The Sound Sweep technique involves searching the segment using both audio and visual observations. One method for conducting a Sound Sweep search is to have the team searching the segment stop every couple of minutes to yell or blow whistles simultaneously and then **wait** from 30 seconds up to a minute listening for a response.<sup>1</sup> If no response is heard the team continues to move through the segment. This technique is effective if the subject of the search is responsive. The search team should be constantly looking for clues, including

<sup>1</sup> Be aware that not everyone's hearing is perfect.



**Figure 30.2.** Grid Search—In Practice

audio-, visual-, and scent-related, during the sweep. If a clue is located the entire team should stop while the clue is investigated, documented, and reported to the Incident Command Post. Once the disposition of the clue is determined the team then continues the sweep. A team may make several sweeps to cover the search segment entirely.

The goal of a Ground Sweep Search is to achieve the highest *POD* possible given the conditions. The goal is not to cover the segment as fast as possible.

The Ground Sweep Search is best conducted by experienced and trained SAR personnel. However, if non-trained SAR personnel such as other law enforcement or military personnel are available and properly equipped then they can be given some basic training on the technique and then used in a Ground Sweep Search under the supervision of a SAR team leader.

It is helpful if the personnel on the ends of the Ground Sweep Team flag their path as they make sweeps so that the team can remain oriented when they make another sweep. A GPS is also helpful if the track log is turned on so that the personnel on the ends can ensure that the team is making a subsequent sweep immediately adjacent to the completed sweep.

## Grid Search Planning

Sometimes the Incident Management Team needs to know how large an area a grid team can search, or how long it will take, or how many searchers are needed. Grid Search Planning Formulas<sup>2</sup> are used to answer these questions, and they calculate any one of the following four quantities when the Speed and the remaining three quantities are known.

1. The *Area* of the segment to be searched.
2. The number of *Hours* the search will take.
3. The *Number of Searchers* in the resource.
4. The *Spacing* between the searchers.

Although the formulas on page 379 could be used, a tool is available in Win CASIE III to do this. This tool, called “Grid Search Planning”, is found under the “What If” menu.

### Demonstration—Using “Grid Search Planning” in Win CASIE III

*An Incident Commander wants to know how many searchers are needed to search a segment that has an area of 0.25 square miles, if they can spend 6 hours in the field, are spaced 50 feet apart, and walk at 0.2 mph (that is, they travel about 18 feet in a minute).*

### Answer

<sup>2</sup> See the formulas on page 379.

Filling in the appropriate boxes in Win CASIE III gives Figure 30.3. Pressing “Accept” shows that the number of searchers required is 22.

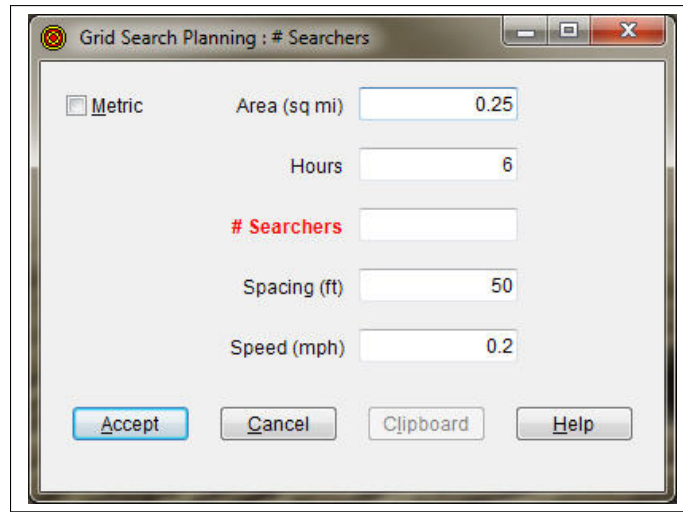


Figure 30.3. “Grid Search Planning” in Win CASIE III

## Aerial Sweep Search

Aircraft may be used to conduct segment searches in addition to or in lieu of ground searchers. The tactics used by air resources are different for a segment search as compared to a Hasty Search. The aircraft conducts a systematic pattern of passes over the search segment in order to search the complete segment. It is important that the aircraft crew members be able to determine the segment boundaries. Aerial Sweep Searches are most successful in locating responsive subjects that are able to signal the aircraft in some fashion.

## High Resolution Camera Analysis

There has been some success in flying over a search segment and photographing it with high resolution cameras. Once on the ground the photos are studied and may be examined by reversing the image (making it appear as a negative) to look for anomalies or objects that stand out. If an object of interest is identified a resource is sent to the area to investigate the object.

## Searcher Spacing During a Segment Search

One of the important questions that arises during a Segment Search is how far apart to space the searchers. There are different ways to determine the spacing but Critical Separation is the most practical method for use during search operations so it is the only one that is discussed here.

## Critical Separation

The Critical Separation (CS) method was developed by Dave Perkins and Pete Roberts, see Reference [Perkins 1]. This is a relatively fast way to determine searcher spacing that generates a *POD* of about 50%, and should be conducted in a representative piece of terrain that is similar in topography and vegetation to the segment to be searched.



To determine the spacing an object similar to the object being searched for is placed on the ground in the representative piece of terrain and the members of the search team move away from the object in different directions keeping it just barely in sight. The distance from the object to each searcher is then measured and all the distances are averaged. This average distance represents 0.5 CS since the searcher would be scanning an area equal to the distance to the object both to the left and right of the searcher. One CS is equivalent to twice the distance from the searcher to the object.

*One CS is equivalent to twice the distance from the searcher to the object.*

Searchers assigned to a segment space themselves at 1 CS apart and then make sweeps through the segment attempting to keep the original spacing. To boost the chances of finding the search subject Perkins and Roberts introduced the idea of Purposeful Wandering to the Ground Sweep Search that uses Critical Separation. Purposeful Wandering allows the searchers on a segment search that are spaced according to Critical Separation to deviate from their straight line track to look at objects that attract their attention or may conceal the subject such as bushes, rocks, and trees, before returning to the place where they left their centerline. In general the Critical Separation should be maintained as the sweep progresses through the segment.

Often when a Segment Search is conducted searcher spacing of 1 CS is requested but other distances are possible.

## Searching Segments Conclusion

Segments may be searched several times by the same or different resources to increase the *CPOD*. If possible, avoid searching a segment multiple times using the same team because they may subconsciously feel that they had searched it adequately before and then have a reduced effectiveness based on those feelings. If the same team is used to search a segment that they have previously searched it may be helpful to have the team approach the segment from a different angle and to reinforce with them that they did a good job searching the first time but the segment is still a high probability area that needs to be searched again. Searching a segment more than once is not necessarily a commentary about the inadequacy of the previous search effort.

## Exercises/Quizzes

Some of the following exercises/quizzes are best answered using Win CASIE III.

### Talking Points, Check Your Understanding, and Exercises

**30.1.** In planning the search for a clandestine grave in an area of 0.2 square miles, the search manager wants the grid-searchers to be separated by 8 feet and to search at 0.25 mph for 8 hours. How many searchers are required?

**30.2.** A Cessna 172 searches an area of 10 sq mi at a speed of 80 mph with a track spacing of 500 feet. How long does this take?

**30.3.** A Cessna 172 searches an area of 10 sq mi in one hour at a speed of 80 mph. What is its Track Spacing?

**30.4.** Given the following assumptions, determine how large an area can be searched: 30 trained grid searchers are available for 8 hours. They take about 3.5 hours to travel 1 mile and they are spaced 65 feet apart.

**Quizzes**

**30.5.** Once an Area Search is undertaken it is assumed that the subject of the search is no longer mobile. (a) True. (b) False.

**30.6.** The goal of a Ground Sweep Search is to cover the segment as fast as possible. (a) True. (b) False.

**30.7.** One Critical Separation is equivalent to twice the distance from the searcher to the object. (a) True. (b) False.

**30.8.** During an Area Search a track is found by the team conducting the segment search. They should (a) Stop their assignment and follow the track. (b) Request a Tracking Team to help them follow the track. (c) Request a Tracking Team while they continue with their assignment.

**30.9.** On occasion, several grid search teams may be assigned to work together to search a segment. (a) True. (b) False.

**30.10.** A typical grid search team should consist of a team leader and no more than seven team members. (a) True. (b) False.

**30.11.** How many people are needed to search a segment of 1 sq mi if they search for 4 hours, walk at 0.3 mph, and are 100 feet apart? (a) 66. (b) 44. (c) 50. (d) 100.

**30.12.** A team of 7 grid search a segment of 0.25 sq miles for 7 hours, walking at 0.3 mph. How far apart are they? (a) 70 feet. (b) 80 feet. (c) 90 feet. (d) 100 feet.

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## CHAPTER 31

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### Debriefing Resources—Area Searches

Debriefing SAR resources following an Area Search assignment is a critical step in good search management. Time and thought went into developing the Area Search assignment so evaluating the results of that assignment must be a priority for the Incident Management Team. There can be a tendency for teams to want to leave the incident after their task is complete but the assignment is not finished until the debrief is conducted.

*The assignment is not finished until the debrief is conducted.*

The Debriefing Checklist that was presented in Chapter 9 on page 93 still applies when debriefing Area Search assignments, except that the resource is now asked to evaluate their Probability of Detection (*POD*).

#### **Debriefing Resources Checklist**

1. Who was involved in the debriefing?
2. What was their assignment?
3. What time did they begin?
4. What did they accomplish?
5. Was the assignment/segment completed?
6. What is the Probability of Detection for the resource on the assignment?
7. What time did they finish?
8. Any difficulties or areas they could not search adequately?
9. Any clues found?
  - a) Where?
  - b) What?
  - c) What did they do?
  - d) Where is it now?
10. Any hazards observed in the area.
11. Any communications problems.
12. Comments. For example, what would the team suggest for future actions in the segment.

A form that is useful for documenting the debriefing is the ICS 204B SAR Debriefing Form shown in Figure 9.1 on page 94. However, now the sections that request “POD” information apply and must not be ignored.

The debriefing is done by the Planning Section staff. The team should be allowed to rest between the completion of their field assignment and the debrief if they want one. They may need to get refreshments before the interview is conducted. Often only the team leader is interviewed. In addition to filling out the ICS 204B the debriefer should collect any maps with notations on them, the team's ICS 214 Unit Log, and if the team was using a GPS or multiple GPS's in tracking mode the track logs should be downloaded to confirm the area searched.

When discussing the Probability of Detection during the debriefing interview it is helpful to remind the personnel being debriefed what that means. It has been observed that some teams thought the *POD* was a measure of how much of the segment was searched rather than the probability of finding the search subject if they were in that segment. When debriefing, the debriefer should not ask leading questions such as "Was your *POD* 40% or 50%?".

It is important to determine whether or not the entire assigned segment was searched. If the segment was not completed a *POD* provided by the team is only valid for the region actually searched and not the entire segment. Splitting the segment is a possibility so that the *POD* for the region searched can be input into Win CASIE III.

Inexperienced teams may overestimate their *POD*'s. The debriefer should be mindful of this and probe further with additional questions to gauge the effectiveness of the search. The debriefer may elect to revise the teams stated *POD* based on the totality of the debriefing interview and personal knowledge of the assignment and the conditions in the search segment. The *POD* values are entered into Win CASIE III in order to update the *POA*'s and it is critical that any over-estimations be corrected by this stage so that segments are not discounted during future Operational Periods because of earlier inflated *POD*'s.

*Inexperienced teams may overestimate their POD's.*

All data collected during the debriefing is used by the Incident Management Team to develop future search assignments. Both the debriefer and the team leader need to realize the importance of the debriefing process and take it seriously.

A package consisting of the ICS 204B, the ICS 214, a copy of the ICS 204, and a map with notations and/or GPS track downloads should be added to the incident documentation for each team that is debriefed.

## Exercises/Quizzes

### Talking Points, Check Your Understanding, and Exercises

#### Quizzes

**31.1.** One CS is equivalent to twice the distance from the searcher to the object. (a) True.

(b) False.

**31.2.** A search team's assignment is not finished until the debrief is conducted. (a) True. (b) False.

**31.3.** A search team's debriefing is done by the Operation Section staff. (a) True. (b) False.

## Reference Materials

To predict the behavior of ordinary people in advance, you only have to assume that they will always try to escape a disagreeable situation with the smallest possible expenditure of intelligence.

*Friedrich Nietzsche*

# CHAPTER 32

## Lost Person Data

Section 32.1

Lost Person Behavior

Table 32.1. Lost Person Behavior<sup>1</sup>

Children 1–3	<p>They are unaware of the concept of being “lost”. Navigational skills and sense of direction are almost nonexistent. They tend to wander aimlessly. They often seek out the most convenient location to lie down and go to sleep:</p> <ul style="list-style-type: none"><li>• Inside a log.</li><li>• Under a thick bush.</li><li>• Under an overhanging rock.</li><li>• Under a picnic table.</li><li>• Inside an automobile trunk.</li><li>• Inside an abandoned appliance.</li></ul> <p>They are almost always very difficult to detect, as they are frequently out of sight and will rarely answer searchers’ calls. Because they tend to seek shelter in poor weather, their chances of survival are often quite good. However, their temperature coping mechanisms are not as strong as older children so their urgency factor rating is high.</p> <p>Children (all ages) are rarely able to find their own way out of the woods.</p> <p><b>Implications for search planning:</b> a highly thorough search may be necessary. As small children rarely travel far, containment is not usually a high priority when search resources are scarce.</p>
Children 4–6	<p>They are capable of traveling farther than younger children.</p> <p>They have a concept of being lost and will generally try to return home or go back to someplace familiar.</p> <p>They are frequently drawn away from homes or campsites by animals, following older children, or just exploring.</p> <p>Similar to younger children, they will usually seek shelter when tired, at nightfall, or when the weather becomes bad.</p> <p>Having been taught to avoid strangers, few children of this age will answer searchers calling their name, nor will they show themselves when searchers are near.</p> <p>Children (all ages) are rarely able to find their own way out of the woods.</p> <p><b>Implications for search planning:</b> a highly thorough search may be required, with searchers focusing on visual clues.</p>



<b>Children 7–12</b>	<p>Their navigational and directional skills are much more developed than those of the younger child, and they are learning to construct primitive “mental maps” of their environments, which may be highly inaccurate.</p> <p>They frequently become lost while attempting a short cut to a familiar location. They may become extremely upset and confused when lost, seeming to react very irrationally. Lost children of this age frequently resort to trail running, which may take them some distance from the PLS. Subjects of this age may respond more maturely if accompanied by a friend or sibling.</p> <p>Children (all ages) are rarely able to find their own way out of the woods.</p> <p><b>Statistical data:</b> an analysis of 9 cases of missing children (7-12 yrs) by Hill (1996) revealed that:</p> <ul style="list-style-type: none"> <li>• 89% (8 out of 9) survived.</li> <li>• 55% (5 out of 9) of the cases involved 2 or more subjects.</li> <li>• No child of this category found his/her own way out of the woods.</li> </ul> <p><b>Implications for search planning:</b> because of the distance they tend to travel, combined with their panicky state, the search for a child of this age can be particularly difficult. Containment of trails, roadways, and other travel aids is a top priority.</p>
<b>Climbers</b>	<p>They are usually well equipped and self sufficient. They tend to remain on or near designated routes. A common factor for missing climbers is weather or hazardous conditions which limit their capabilities. Other important factors are falling debris and avalanches.</p> <p><b>Implications for search planning:</b> technical expertise is usually needed for both search and rescue (or recovery) of climbers.</p>
<b>Despondents</b>	<p>These are individuals with a history of depression or suicide attempts, or who are explicitly described by family or friends as having been severely depressed or suicidal just before the incident. It is not usually their intention to travel very far, but to find a place where they can be alone and possibly contemplate suicide. Despondent individuals are frequently located at the interface between two types of terrain (for example, forest and meadow), and sometimes in a “scenic location” where they can sit and meditate, such as on a hill overlooking a lake or city. Despondents will rarely answer searchers’ calls, and will sometimes avoid or even hide from search teams. There is an extremely high fatality rate for this category, as despondents rarely take steps to protect themselves from the weather, and, in addition, drugs or alcohol may be involved.</p> <p><b>Statistical data:</b> an analysis of 16 cases of missing despondents by Hill (1996) revealed that:</p> <ul style="list-style-type: none"> <li>• None walked out to safety on their own.</li> <li>• None of the cases involved two or more subjects.</li> <li>• Only 35% survived (the remainder died from exposure or suicide).</li> </ul> <p><b>Implications for search planning:</b> the search for a despondent individual, even in moderate weather, should be considered highly urgent, likely requiring medical treatment and rescue. Containment is not normally a high priority. While the search area may not be particularly large, the search should be thorough, as these subjects are often hard to detect and may not respond to sounds. Focus on likely spots and visual search methods.</p>
<b>Elderly</b>	<p>It is important not to underestimate the older subject merely because he or she is over the age of 65. Studies of elderly outdoor sportsmen, such as hunters, hikers, and fishermen, reveal that they are capable of traveling just as far when lost as younger subjects (Hill, 1992). More importantly, the elderly subject often behaves more rationally when lost than does his/her younger counterpart. The elderly subject may be more willing to build a shelter and prepare to be rescued by searchers. However, if the older person has Alzheimer’s disease or some other form of dementia, then the incident should be treated as a walkaway situation.</p> <p>Therefore, for adult subjects, it is the Lost Person’s Category, not his or her age as such, that is significant for search planning.</p>

<b>Fishermen</b>	<p>Shore fishermen often become lost while traveling on a trail to or from their fishing site. Boat fishermen sometimes become disoriented while trying to find the spot from which they launched their boat. They may become overcome by darkness and forced to land in some unfamiliar location. There is a somewhat higher possibility of drowning for boat fishermen than for shore fishermen, especially if there is alcohol involved.</p> <p><b>Statistical data:</b> an analysis of 25 cases of missing fishermen by Hill (1996) revealed that:</p> <ul style="list-style-type: none"> <li>• 88% of subjects survived (the remainder died of drowning or exposure).</li> <li>• 25% found their own way back to safety.</li> <li>• 32% of the cases involved 2 or more subjects.</li> </ul> <p><b>Implications for search planning:</b> a thorough investigation is imperative. For shore fishermen, identify the subject's favorite fishing sites, and whether he/she liked to move around a lot. Direction of wind and current may be important for locating the landing sites of lost boaters.</p>
<b>Hikers</b>	<p>Hikers are trail-oriented and often become lost when their trail is obscured for some reason, or when they encounter a confusing junction of intersecting paths.</p> <p>Because of their reliance on trails, hikers tend to travel farther than other lost person categories, although extreme distances are less frequent than for hunters.</p> <p>They are often less prepared and “woods-wise” than hunters and fishermen.</p> <p><b>Statistical data:</b> an analysis of 501 cases of lost or overdue hikers (Mitchell, 1985) revealed the following characteristics:</p> <ul style="list-style-type: none"> <li>• Only about 40% were considered to be adequately equipped.</li> <li>• 92% did not travel after the first 24 hours.</li> <li>• Between 30% and 40% traveled at night.</li> <li>• About 40% were located by a “hasty search”.</li> </ul> <p>An analysis of 24 cases of missing hikers (adults only) by Hill (1996) revealed that:</p> <ul style="list-style-type: none"> <li>• 29% found their own way back to safety.</li> <li>• 92% survived.</li> <li>• 42% of the cases involved two or more subjects.</li> </ul> <p><b>Implications for search planning:</b> containment is a top priority, especially trail blocks. Clue-aware searchers should be tasked to run all likely trails, paths, roads, and similar travel aids.</p>

<b>Hunters</b>	<p>Their concentration on game often distracts them from navigation. Hunters frequently become disoriented while chasing wounded game into thick areas of trees or brush. They tend to overextend themselves in darkness and push beyond their physical abilities. When game laws prescribe the wearing of “hunter orange”, these subjects can be easily detected from a distance or from a helicopter.</p> <p>Many hunters will fire shots if they believe searchers are looking for them, and will respond to sounds if they are able. Due to ego or game laws, many hunters will go to great lengths to walk out unassisted by search teams. The “typical” hunter will attempt to build a shelter at night, then walk out of the woods at daybreak. On average, about one in three lost hunters will manage to find their own way out.</p> <p><b>Statistical data:</b> an analysis of 167 cases of lost or overdue hunters by Mitchell (1985) revealed the following characteristics:</p> <ul style="list-style-type: none"> <li>• One in three missing hunters was overtaken by nightfall.</li> <li>• 39% followed a natural drainage.</li> <li>• Between 45% and 80% traveled at night.</li> <li>• 90% did not travel after the first 24 hours.</li> <li>• Between 25% and 45% found their own way out of the woods.</li> </ul> <p>An analysis of 100 cases of lost or overdue hunters by Hill (1996) revealed that:</p> <ul style="list-style-type: none"> <li>• 16% of the cases involved 2 or more subjects.</li> <li>• 93% survived.</li> <li>• 24% found their own way out of the woods.</li> </ul> <p><b>Implications for search planning:</b> containment is a priority, as some hunters travel long distances on trails or woods roads. Attraction methods ( sirens, whistles, gunshots) may also be effective. Also look for clues off the trails, such as in drainages or along river banks.</p>
<b>Miscellaneous</b>	<p>This category includes gatherers (for example, mushrooms, berries, other fruit), nature photographers, rock hounds, and people engaged in some outdoor occupational activity, such as surveyors, forestry employees, conservation officers, and park rangers. Many are inadequately equipped or clothed for an extended duration outdoors. Many subjects in this category are found away from trails, depending on the nature of the activity in which they had been involved. They are frequently located near natural boundaries, such as rivers and lake shores.</p> <p><b>Statistical data:</b> an analysis of 26 cases of lost persons engaging in miscellaneous outdoor activity by Hill (1996) revealed that:</p> <ul style="list-style-type: none"> <li>• 96% survived.</li> <li>• 23% of the cases involved two or more subjects.</li> <li>• 31% of subjects found their own way back to safety.</li> </ul> <p><b>Implications for search planning:</b> investigation is especially important for a subject of this “mixed bag” category. Effort should be made to identify the relevant locations which may have attracted the person, as these may be the most likely to contain clues.</p>

<b>Skiers</b>	<p>Most are young and in fairly good physical condition. They are usually well equipped and dressed for the weather. Most become lost because they took the wrong route, or misjudged time and/or distance.</p> <p>Some skiers are made immobile by injury and may be vulnerable to hypothermia. They are usually wearing brightly colored clothing, which makes them highly detectable against the snow. With the advent of ski areas charging the lost person for search and rescue services, more skiers may use searchers as “offset aiming points” so they may find their own way out and avoid costs.</p> <p><b>Statistical data:</b> an analysis of 26 cases of lost persons engaging in miscellaneous outdoor activity by Hill (1996) revealed that:</p> <ul style="list-style-type: none"> <li>• 50% found their own way back to safety.</li> <li>• When found by search teams, only 50% were mobile.</li> <li>• 83% stopped moving within the first 24 hours.</li> <li>• Between 30% and 45% traveled at night.</li> </ul> <p><b>Implications for search planning:</b> visual trackers should be especially effective for locating missing skiers.</p>
<b>Walkaways</b>	<p>These are individuals who “walk away” from a constant-care situation, whether a hospital or a residence. This includes people with senile dementia (for example, Alzheimer’s disease), mentally retarded individuals, as well as person suffering from some debilitating form of mental illness (for example, psychosis). They rarely understand they are lost, and their wanderings may seem non-purposeful or at least non-predictable. They are almost never dressed appropriately for wet or severe weather conditions. They rarely respond to callers, and in some instances, such as with mentally retarded subjects, they may hide or even run from searchers. Persons suffering from Alzheimer’s disease (or related illnesses) may be attempting to return to some former home or place where they once enjoyed being (however far away that place may be). They often walk in a straight line until running into a barrier, then turn and continue in another directions (the so-called “pinball effect”). Eventually, they become entangled in brush or mired in mud, unable to continue. Some have even walked straight into a lake and drowned. Walkaways who are allowed some independence by an institution (or a person managing home care) with respect to going outside unsupervised, may travel farther than persons requiring more supervision. The fatality rate for subjects in this category is extremely high.</p> <p><b>Statistical data on Walkaways.</b> An analysis of 22 cases of missing walkaways (general category) by Hill (1996) revealed that:</p> <ul style="list-style-type: none"> <li>• 45% were found dead (from exposure or drowning).</li> <li>• None walked out to safety on their own.</li> <li>• None called for help or answered searchers’ calls.</li> </ul> <p><b>Statistical data on Alzheimer’s patients in particular:</b> An analysis of 25 incidents involving missing Alzheimer’s patients revealed the following characteristics:</p> <ul style="list-style-type: none"> <li>• Average age was 73 years (59% male).</li> <li>• Not one Alzheimer’s subject called for help from searchers.</li> <li>• 28% were found dead.</li> <li>• They were found a median distance of 1/2 mile from the PLS.</li> </ul> <p><b>Implications for search planning:</b> the search for a walkaway should be considered highly urgent. Man-trackers and trailing dogs may be especially effective, with air scent dog teams employed in high probability areas with dense vegetation. Because walkaways are usually very difficult to detect, often hidden under brush or in thickly treed areas, a highly thorough search may be necessary. Alzheimer’s patients, mentally retarded individuals, and other institutionalized walkaways are often found somewhere on the grounds of their respective institutions, so a thorough search should begin there. Containment of Alzheimer’s patients is not normally a high priority, compared to other lost person categories, as these walkaways seldom travel great distances. However, be warned that some allegedly “frail” Alzheimer’s patients have traveled much farther than their caretakers had expected. As well, mentally retarded subjects have been known to hide from searchers and to flee when spotted. Recurring discrete patrols focusing on visual searching may be helpful.</p>

<b>Youths 13–15</b>	<p>Frequently become lost in groups of two or more people, while engaged in exploring or some other “adventuring” activity. When in groups, they will rarely travel very far. They will usually respond to searchers’ calls. They often resort to direction sampling, looking for some familiar place or landmark.</p> <p><b>Statistical data:</b> an analysis of 20 cases of missing youths by Hill (1996) revealed that:</p> <ul style="list-style-type: none"> <li>• 60% of the cases involved 2 or more missing subjects.</li> <li>• All subjects survived.</li> <li>• Only 10% found their own way out of the woods.</li> </ul> <p><b>Implications for search planning:</b> containment is not usually a high priority unless the subject is alone.</p>
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**Table 32.2.** Overview Lost Person Behavior

<b>Overview: Lost Adults</b>	<ul style="list-style-type: none"> <li>• Will bushwhack when they are “positive” they know the right direction.</li> <li>• Will usually stay on a trail if not absolutely certain of the correct direction.</li> <li>• May climb a hill to improve their view.</li> <li>• Rarely move around randomly.</li> <li>• Rarely attempt to travel in an arbitrary straight line.</li> <li>• Will rarely reverse direction on a trail unless absolutely certain they have been going the wrong way.</li> <li>• May attempt to apply “woods wisdom”, such as traveling downstream.</li> <li>• May “regress” to less effective methods when panicky.</li> </ul>
<b>Overview: Lost Children</b>	<ul style="list-style-type: none"> <li>• Have relatively poor “mental maps” of their environment.</li> <li>• Will usually search for familiar places rather than for routes (travel aids).</li> <li>• Are rarely good at judging direction or distance.</li> <li>• Often become lost when taking a “short cut” (ages 7 to 12).</li> <li>• Will often try “trail running” (ages 7 to 12).</li> <li>• May move randomly or unsystematically (ages 1 to 6).</li> <li>• May be extremely panicky.</li> <li>• Are rarely able to find their own way out of the woods.</li> <li>• Rarely answer searchers calling their name.</li> </ul>

<sup>1</sup> Courtesy of Ken Hill, as quoted in NASAR’s “Managing The Lost Person Incident”.

**Lost Person Behavior Distance Traveled****Arizona**

**Be cautious when using data with only a few cases.**

All distances in miles.



**Table 32.2.** Distances Traveled by Lost Persons in Arizona, USA

Mission Category	Cases	Min	25%	50%	75%	100%	Mean
Aircraft Crashed	12	0.00	0.46	3.43	12.24	36.48	8.09
Aircraft Missing	1	66.07	66.07	66.07	66.07	66.07	66.07
Aircraft Overdue	0	0.00	0.00	0.00	0.00	0.00	0.00
ELT ELT	3	2.88	3.93	4.98	21.52	38.05	15.30
PLB PLB	7	0.01	0.06	2.07	4.98	17.47	4.20
Search Alzheimer	160	0.01	0.38	1.33	2.41	74.22	2.88
Search Camper	35	0.02	0.62	1.54	5.48	50.2	4.74
Search Canyoning	6	0.83	0.85	1.70	18.58	18.78	7.07
Search Child (1-3)	13	0.09	0.21	0.64	1.13	2.23	0.81
Search Child (4-6)	17	0.18	0.49	0.95	2.09	3.79	1.4
Search Child (7-12)	67	0.05	0.43	1.29	3.72	16.40	2.48
Search Despondent	92	0.01	0.24	0.80	5.04	99.45	4.42
Search Elderly	71	0.02	0.35	1.41	7.59	72.02	7.91
Search Hiker	1290	0.01	0.76	1.57	3.36	78.14	3.02
Search Hunter	100	0.01	0.74	2.25	4.83	69.93	4.35
Search Mental	112	0.01	0.36	1.55	3.54	97.75	5.25
Search Other	75	0.05	0.79	2.02	4.38	43.44	5.58
Search Overdue	35	0.06	1.63	4.51	13.07	25.73	7.10
Search Runner	6	0.02	0.47	1.69	9.31	18.96	5.37
Search Snow ski board	29	0.32	0.71	1.23	2.13	2.55	1.25
Search Suspended	2	0.75	1.87	2.98	4.10	5.21	2.98
Search UDA	19	0.10	0.21	2.96	7.22	36.32	5.02
Search Walkaway	149	0.01	0.49	2.31	6.58	138.64	6.61
Search Youth (13-15)	40	0.04	0.42	1.08	4.64	18.66	2.86
Vehicle 2-wheel	43	0.02	2.78	8.94	20.48	157.85	21.39
Vehicle 4-wheel	65	0.06	3.67	9.16	17.53	99.25	12.77
Vehicle ATV	21	0.15	1.64	6.31	10.45	21.07	6.51
Vehicle Bike	9	0.83	1.19	2.99	7.11	16.73	5.02
Vehicle Horseback	4	0.21	0.23	0.32	1.05	1.84	0.67
Vehicle Motorcycle	13	1.65	3.38	11.08	17.34	40.84	12.18
Vehicle Tractor	1	1.69	1.69	1.69	1.69	1.69	1.69
Vehicle UTV	9	1.33	1.42	7.18	11.66	15.33	6.84
Water Boater / Kayak	7	0.01	0.16	4.22	18.72	21.46	8.83
Water Bystander	1	1.12	1.12	1.12	1.12	1.12	1.12
Water Canoer	1	0.06	0.06	0.06	0.06	0.06	0.06
Water Fisherman	1	0.05	0.05	0.05	0.05	0.05	0.05
Water Rafter	3	1.11	3.48	5.84	8.14	10.44	5.80
Water Swimmer	3	0.02	0.09	0.15	12.13	24.10	8.09
Water Tuber	2	0.09	0.28	0.47	0.66	0.85	0.47

Collected by the Arizona Department of Emergency and Military Affairs (AZDEMA), 2009–June 2024. Compiled by Robert Stuckenschneider, PhD.

The compiler’s musings, data update, and notes regarding Table 32.2:

- We have eliminated the outlier grouping in the Hunter category, As more data has been gathered, the large value for the maximum isn’t as unusual as it first appeared.
- We have eliminated the Not Necessary category. Although Not Necessary still exists, it does not provide any useful information regarding search distances.

- The latest data is still having issues. There are far too many distances equal to zero. Although that can certainly happen, there were far too many zeroes to be statistically probable. I know Sgt. Aaron Dick has some thoughts about how to rectify those pesky zeroes.
- In a search for a group of individuals, the data presented to us showed multiple, separate searches, but not different mission numbers, for each individual in the group. To minimize skewing of the data, we made every effort to sort through the data and condense the data into a single search only. If the single search found individuals from the same group at different locations, with a separation distance of greater than or equal to 0.1 mile, then we treated it as a multiple search.
- I took the time to do some further statistical analyses, hoping to find some positive trends. Unfortunately, there was nothing worth sharing. Although, some categories seemed to show the distances to the subject were declining, others showed an increase. None, were statistically significant.

Explanation of Table 32.2 on the previous page. Look at the row for Hikers. There were 1290 people in this category. 25% of them were found within a circle of radius 0.76 mi centered at the IPP. 50% were found within a 1.57 mi radius, 75% within a 3.36 mi radius, and 100% within a 78.14 mi radius. None were found within 0.01 mi of the IPP.

## Nova Scotia

**Table 32.3.** Distances Traveled by Lost Persons in Nova Scotia, Canada

Category	Cases	25%	50%	75%	90%	Range	Survived
Children (1–6)	16	0.50 km 0.31 mi	1.03 km 0.64 mi	1.81 km 1.12 mi	2.02 km 1.26 mi	0.10–2.65 km 0.06–1.65 mi	100%
Children (7–12)	15	0.80 km 0.50 mi	1.48 km 0.92 mi	2.50 km 1.55 mi	3.20 km 1.99 mi	0.14–8.00 km 0.09–4.97 mi	96%
Youths (13–15)	23	0.86 km 0.53 mi	1.49 km 0.93 mi	3.00 km 1.86 mi	4.18 km 2.60 mi	0.40–7.00 km 0.25–4.35 mi	100%
Misc. Adults	49	0.75 km 0.47 mi	1.70 km 1.06 mi	3.57 km 2.22 mi	7.82 km 4.86 mi	0.10–19.00 km 0.06–11.81 mi	98%
Despondents	26	0.40 km 0.25 mi	0.81 km 0.50 mi	1.28 km 0.80 mi	1.60 km 0.99 mi	0.10–3.38 km 0.06–2.10 mi	54%
Dementia	41	0.40 km 0.25 mi	1.00 km 0.62 mi	1.46 km 0.91 mi	2.40 km 1.49 mi	0.10–5.43 km 0.06–3.37 mi	73%
Fishermen	38	0.92 km 0.57 mi	1.77 km 1.10 mi	4.15 km 2.58 mi	6.01 km 3.73 mi	0.45–17.70 km 0.28–11.00 mi	91%
Hikers	53	1.35 km 0.84 mi	2.23 km 1.39 mi	4.80 km 2.98 mi	7.52 km 4.67 mi	0.22–24.00 km 0.14–14.91 mi	94%
Hunters	127	1.30 km 0.81 mi	2.39 km 1.49 mi	3.83 km 2.38 mi	8.00 km 4.97 mi	0.10–19.31 km 0.06–12.00 mi	94%

Compiled by Ken Hill, Halifax Regional SAR, August, 2006.

Explanation of Table 32.3. Look at the row for Children (1–6). There were 16 children in this category. 25% of them were found within a circle of radius 0.31 mi centered at the IPP. 50% were found within a 0.64 mi radius, 75% within a 1.12 mi radius, 90% within a 1.26 mi radius, and 100% within a 1.65 mi radius. None were found within 0.06 mi of the IPP.

## Forested Wilderness Areas in U.S.

**Table 32.4.** Distances Traveled for Lost Persons in Forested Wilderness Areas in U.S.

Category	Cases	Hilly or Mountainous Terrain					Flat Terrain				
		Median	25%	50%	75%	Max	Median	25%	50%	75%	Max
Children (1–6 yrs)	22	0.3 ↓	0.1 ↑ 0.5 ↓	0.5 ↑ 0.5 ↓	1.5 ↑ 1.4 ↓	89% 1.6 ↑ 2.6 ↓	1.1	1.0–1.6	0.6–1.7	0.5–2.1	0.0–2.2
Children (6–12 yrs)	24	1.6 ↓	1.0 ↓ 2.0 ↓	0.5 ↑ 2.1 ↓	2.0 ↑ 4.0 ↓	92% 2.6 ↑ 4.1 ↓	1.2	0.8–1.2	0.7–2.0	0.2–2.2	0.0–3.0
Elderly	24	1.2 ↓	0.5 ↓ 1.8 ↓	0.0 2.4 ↓	0.4 ↑ 2.6 ↓		1.0	0.8–1.0	0.7–1.2	0.1–1.3	0.0–3.0
Hikers	44	2.5 ↓	2.0 ↓ 3.0 ↓	0.6 ↓ 2.0 ↓	0.4 ↑ 6.1 ↓		2.0	1.4–2.4	1.0–3.2	0.2–3.3	0.0–4.0
Hunters	100	2.0 ↓	1.8 ↓ 2.8 ↓	0.7 ↓ 3.1 ↓	0.8 ↑ 4.0 ↓	93% 3.0 ↑ 6.0 ↓	1.6	1.0–1.6	0.9–2.2	0.1–2.3	0.0–3.0
Misc.	15	1.6 ↓	0.6 ↓ 1.6 ↓	0.0 3.0 ↓	1.4 ↑ 3.1 ↓	84% 2.5 ↑ 3.2 ↓	1.6	1.1–1.6	0.5–1.8	0.1–2.8	0.0–4.0

Table 32.4 is a summary of some of the work of Syrotuck, see Reference [Syrotuck].

Explanation of Table 32.4. Look at the row for Children (1–6). There were 22 children in this category. The median distance from the IPP for this category in Hilly or Mountainous Terrain was 0.3 miles downwards, and in flat terrain was 1.1 miles. 25% of the subjects in Hilly or Mountainous Terrain were found between 0.1 miles upwards and 0.5 miles downwards from the IPP, whereas in flat terrain they were found between 1.0 and 1.6 miles from the IPP.

### Section 32.3 Survivability

To quote Syrotuck (see Reference [Syrotuck, page 57]): *“It is difficult to predict who will and who will not survive under a given set of circumstances.”*

By analyzing data from New York and Washington State, Syrotuck found that, **of those subjects who died**,

- 45% were dead within 1 day.
- 74% were dead within 2 days.
- 83% were dead within 3 days.
- 92% were dead within 4 days.
- The remaining 8% took longer than 4 days to die.

He also found that

- 4% of children died in good weather, whereas 66.6% died in bad weather.<sup>2</sup>
- 11% of adults died in good weather, whereas 53.3% died in bad weather.
- 35% of the elderly died in good weather, whereas 67% died in bad weather.

Kelley (see Reference [Kelley, pages 20–33]) also studied survivability and concluded that subjects<sup>3</sup> who died from hypothermia survived for a maximum of

<sup>2</sup> Bad weather is defined as temperatures below 45°F at any time while the subject is lost combined with some rain or snow, or temperatures above 45°F with extensive rain.

<sup>3</sup> Kelley defines a subject as being a 25-year-old male wearing clothing similar to a suit.

- 3 days when the temperature<sup>4</sup> was 0°F.
- 4 days when the temperature was 10°F.
- 6 days when the temperature was 20°F.
- 8 days when the temperature was 30°F.

However, at all these temperatures some subjects died from hypothermia on the first day—some within hours of being lost.

Adolph (see Reference [Adolph]) studied the days of expected survival of immobile, responsive subjects (these were military personnel who were not lost) in a desert environment in terms of the amount of water available. See Table 32.5.

**Table 32.5.** Days of Expected Survival in Terms of Available Quarts of Water and Temperature in Shade

Max. Temp °F	0	1	2	4	10	20
120	2	2	2	2.5	3	4.5
110	3	3	3.5	4	5	7
100	5	5.5	6	7	9.5	13.5
90	7	8	9	10.5	15	23
80	9	10	11	13	19	29

Explanation of Table 32.5. Look at the row for 120°F. Subjects who had 0, 1, or 2 quarts of water available, had a life expectancy of 2 days. Those who had 4, 10, or 20 quarts of water available, had a life expectancy of 2.5, 3, or 4.5 days respectively.

Having said all this, be aware that there are some amazing survival stories. For example, on May 8, 2011, 56-year-old Rita Chretien of Penticton, B.C., was found after being lost for 48 days in the Nevada backcountry. The Chretiens were en route from their Penticton home to a Las Vegas trade show on March 19, 2011, when their 2000 Chevrolet Astro van became stuck on a muddy U.S. Forest Service road in a cold, untamed, mountainous, remote region near where Oregon, Idaho and Nevada meet. They got lost because they were “foolishly following a GPS without a lot of experience”. Her husband went searching for help on March 22, but did not return. Rita survived for more than seven weeks by staying put, eating snow and granola bars. On May 16, 2011, the search for her husband, Albert, was suspended until weather and snow conditions improved.<sup>5</sup>

<sup>4</sup> This temperature includes the effects of wind chill.  
<sup>5</sup> In August 2011, Elko County sheriff’s deputies ended their efforts to locate Albert Chretien after attempts continued to offer no clues to the missing man’s whereabouts. “We’re assuming that he is deceased and that his remains have been scattered,” said Elko County Sheriff’s Lt. Marvin Morton. On September 29, 2012, his remains were found in a secluded area about 7 miles west of the vehicle by a pair of local hunters. The remains were intact and had not been scattered by animals. Chretien had been heading in the right direction and was not too far from a road, but his journey was likely hampered by deep snow.

I have been impressed with the urgency of doing.  
Knowing is not enough; we must apply. Being willing  
is not enough; we must do.

*Leonardo da Vinci*

## CHAPTER 33

### Search Urgency Rating Chart

This chart is based on the work of Bill Wade. See Reference [Setnicka, pages 60–62].

**Table 33.1.** Search Urgency Rating Chart

Factors	Rating
AGE OF SUBJECT:	
Very Young	1
Very Old	1
Other	2 – 3
MEDICAL CONDITION OF SUBJECT:	
Known/Suspected injured, ill, or mental problem	1 – 2
Healthy	3
Known fatality	3
NUMBER OF SUBJECTS:	
One alone	1
More than one (unless separated)	2 – 3
SUBJECT EXPERIENCE PROFILE:	
Not experienced, does not know area	1
Not experienced, knows area	1 – 2
Experienced, not familiar with area	2
Experienced, knows area	3
WEATHER PROFILE:	
Past and/or existing hazardous weather	1
Predicted hazardous weather (less than 8 hrs.)	1 – 2
Predicted hazardous weather (more than 8 hrs.)	2
No hazardous weather predicted	3
EQUIPMENT PROFILE	
Inadequate for environment and weather	1
Questionable for environment and weather	1 – 2
Adequate for environment and weather	3
TERRAIN/HAZARDS PROFILE	
Known hazardous terrain or other hazards	1
Few or no hazards	2 – 3
<b>TOTAL:</b> (between 7 and 21)	



One number in each category (row) is selected. In some categories there is a choice of numbers, for example, under “AGE OF SUBJECT:”, “Other”, either a “2” or a “3” can be selected. After selection, the numbers are totalled giving the numerical rating. The lower the numerical rating, the higher the relative emergency. See Figure 33.1. All ratings are relative and their total indicates a possible relative urgency.

<b>7</b>	<b>14</b>	<b>21</b>
<b>Highest Urgency</b>	<b>Intermediate Urgency</b>	<b>Lowest Urgency</b>

**Figure 33.1.** Relative urgency and numerical rating

All other factors bearing on the incident need to be evaluated by the Incident Commander to establish the final emergency level. However, if any of the categories in Table 33 on the previous page is rated a “1”, then consider responding immediately with high priority. Otherwise, the preponderance of checked categories provides an indication of the urgency level.

In the event that there is more than one missing subject, a single search urgency rating chart is completed based on the worst case situation for each person in the group. This errs on the side of caution and generates a higher urgency rating compared to any individual in the group. The possibility that a group has split should always be considered and investigated.

Table 33 on the previous page is available in Win CASIE III (see Section A.7 on page 363) or in ICS-SAR (see Section A.4 on page 360).

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## CHAPTER 34

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### Investigation Checklist

Win CASIE III (see Section A.7 on page 363) contains a suggested investigation check list, which is reproduced here.

- Complete LPQ
  - Photo
  - DMV/Motor Vehicle Photo and Physical Identifiers/Registered Vehicles
  - Local photographic studios and cameras for images
  - Internet (Social Sites, GOOGLE search engine)
  - Footwear Investigation
  - Missing in the past/circumstances
  - Cash on person?
  - On medication? If so, name of doctor.
  - Leave note/keep diary?
  - English speaking?
  - Afraid of someone in a uniform?
  - Afraid of water?
- Complete Missing Person Flyer
  - Release to Public
- Cell Phone
  - Which one?
  - Carrier?
  - Tracking capability?
  - Know how to call home?
- GPS/PLB/SPOT?
  - ID/Provider
- Email
- Check Public Transportation
  - Road: Buses, Coaches, Taxis, Car rental centers
  - Rail: Trains
  - Air: Aircraft
  - Water: Ferries
  - Interchanges
- Access to a vehicle, bicycle, horse, boat, airplane, ATV, snowmobile?
- Notify Adjacent Agencies

- Background/Criminal History of subject
- Background/Criminal History of reporting party
- NCIC/State Crime Information Center Entry
- Offline Search
- Financial records
  - ATM
  - Credit/Debit Cards
  - Tax liens
  - Video surveillance footage from business
- Computer: Home/Work/Library/School
- Reverse 911
- Neighborhood watch
- If subject is child
  - Issue Amber alert
  - Check SORT (Sex Offender Registration & Tracking System)
  - Contact <http://www.achild dismissing.org>
  - Stop trash pick-up in area so receptacles can be checked easily
    - ◊ Have landfill separate recently picked up trash from rest of landfill
    - ◊ If assistance is needed in landfill search, contact NCMEC
  - The school they attend and the names of teacher and school administrator.
- If subject is elderly
  - Check for nametag, ankle bracelet transmitter
  - Contact <http://www.achild dismissing.org>
- If subject is disabled, or college student, contact <http://www.achild dismissing.org>
- If subject is 21 or younger call National Center for Missing & Exploited Children (NCMEC) - 1-800-THE-LOST
- If foul-play is suspected, stop trash pick-up in area so receptacles can be checked easily
  - Have landfill separate recently picked up trash from rest of landfill
  - If assistance is needed in landfill search, contact NCMEC
- Contact Friends/Family/School teachers/Classmates/Business associates/Family physician/Recreation associates
- Check Subscription Database, such as Autotrack
- Check whether at Facility (if not there leave description of subject, in case admitted later)
  - Hospitals
  - Mortuaries
  - Jails
  - Lodgings
  - Care centers
  - Mental health facilities
  - Detox centers
  - Battered women's shelters
  - Homeless shelters
  - County Protective Services
  - Photos/security camera footage of subject at facility
- All family pets accounted for?
  - What type of pet is missing? Pet's name?
  - Could pet pose a threat to searchers?

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## CHAPTER 35

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### Initial Response Checklist

This checklist<sup>1</sup> is an attempt to enumerate all the items that need attention during the Initial Response phase of a search.

1. Take the initial report (from dispatcher or reporting party) about what has happened. See Item 1 on page 108.
2. Document everything using the Initial Note in Win CASIE III (see Section A.7 on page 364).
3. On arrival take command. Announce name of Incident Commander and location of Command Post. Identify and protect IPP.
4. Issue a BOLO (be on lookout for), an ATL (attempt to locate), or a stop and check welfare request. Depending on the scenario and likely mode of travel, start with local agencies and the highway patrol in the immediate surrounding area. If the subject might be in a vehicle widen the area. Get the person entered into NCIC as a missing person so that if they are contacted by law enforcement the officer will be alerted that the person is missing.
5. Gather information about the missing person. Complete initial LPQ (see Section 4.2 on page 55).
  - a) Name, age, gender, nickname.
  - b) Address.
  - c) Physical description. The minimum information required includes height, build, racial type, facial appearance (beard or moustache, glasses, hair color, length and style) and any distinguishing marks or features.
  - d) Clothing worn. Style, make and color of all clothing that the missing person was wearing, including footwear.
  - e) Items carried. This means either items relating to the activity that the subject was undertaking or personal effects; give sufficient detail to enable an identification to be made if anything is found; include such things as cell phone (if possible with number), personal locator beacon, satellite emergency notification device (SEND), money (how much), ATM or credit cards, and keys; it might be necessary to check their home or room to get this information.
  - f) Capability/health/medication. This includes such things as:
    - i. The subject's level of mobility.
    - ii. The distance they could travel.
    - iii. Were they on regular medication? Have they got it with them? When did they last take it? When is their next dose due? What happens if they miss a dose?
    - iv. Do they have full control of all their faculties?

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<sup>1</sup> This chapter is based on the ideas of Dave Perkins and Pete Roberts (Reference [Perkins 2]), and Paul Anderson (Reference [Anderson 1]). Used with permission.

- v. Do they always behave rationally?
    - vi. What would they most likely do in a stressful situation, such as being lost?
  - g) Habits/hobbies/interests/likely activities. Any information that could indicate what the subject might have been doing or where they might have gone.
  - h) Previous relevant history. Have they gone missing before? If they have when was it, where did it happen, what happened and where were they found?
  - i) Identify the location of scent articles for dog handlers to collect when they arrive on scene. Whenever possible, allow the dog handlers to collect items.
6. Confirm that this is a single-subject search. If not refer to Chapter 20 on page 195.
7. Determine the search urgency using the Search Urgency Rating Chart shown in Table 33 on page 276. Decide whether to start search, or continue investigation.
8. Evaluate the information, marking on map as appropriate.
- a) IPP.
  - b) Command Post.
  - c) LPB.
  - d) Distance traveled.
  - e) Locations mentioned in initial report.
  - f) Barriers. A Barrier is a feature that restricts travel in a given direction or brings about a change of direction. It could be natural or man-made. A feature that constitutes a barrier for one person may not be for another so LPB category characteristics need to be considered. It may be worth marking any features on the map that constitute a barrier. Barrier examples are:
    - i. A body of water that could not be easily crossed.
    - ii. A steep incline.
    - iii. Thick vegetation; this might be the edge of a forested area.
    - iv. Security fencing around some facility such as an airport or railway track.
    - v. A highway with continuous traffic.
    - vi. Any point at which there is an easy alternative, for example, suppose that at a road junction there is a road to the left and a road to the right; going straight across would mean climbing a fence to get into a field; the road going left to right could be thought of as a barrier.
  - g) Likely Spots (Attractions, Magnets). A Likely Spot is some feature that is likely to attract the missing person. Examples are:
    - i. Places of interest.
    - ii. Viewpoints.
    - iii. Travel aids such as trails, roads, utility corridors, and drainages.
    - iv. Places to shelter.
    - v. Somewhere associated with past experience.
    - vi. An isolated feature such as a lone tree.
    - vii. The interface between two types of terrain or vegetation.
    - viii. The sight or sound of civilization from a “wilderness” location.
    - ix. Lights at night.
  - h) Hazards. A Hazard is a place where the missing person could be in danger, for example rivers or bodies of water; very steep ground; quarries; old mine shafts; locations where there might be dangerous machinery, such as areas where logging is taking place, railway tracks or sidings; and areas of potentially difficult navigation.
    - i) Terrain and accessibility.
    - j) Land ownership.
    - k) History of incidents like this in the area.
9. Size up the incident and create scenarios.

- a) Scenarios. A Scenario is a plausible story that describes what might have happened. Their purpose is to help to decide where to search.
    - i. It should fit with the known facts.
    - ii. It should be a real possibility.
    - iii. It should be in general agreement with LPB characteristics.
    - iv. It should suggest where the missing person might have gone and how they got there.
  - b) Comments about creating scenarios.
    - i. To paraphrase Syrotuck in Reference [Syrotuck, page 21]: “*Put yourself in the subject’s shoes*”. “*If you were that age, that height, that frame of mind, and in that situation, what might you do?*”
    - ii. Aim to create at least three of them, although five or six is usually better.
    - iii. If possible involve someone who knows the area.
  - c) Scenarios constitute an important part of the process and need to be documented. See Figure 5.2 on page 69 for a suggested form.
    - i. Scenario Details. Write down any scenarios that may describe what has happened to the missing person. Write them in any order. Include the assumed state of the subject: mobile, immobile, responsive, unresponsive.
    - ii. Priority. Give each scenario some indication of how likely it is that it describes what actually happened. Base the priorities on what is known about the missing person, information gleaned from the map, local knowledge and information from LPB characteristics. Use numbers to indicate priority (1 for the highest, 2 for next highest, and so on).
  - d) It is perfectly acceptable to have scenarios that take the missing person out of the immediate vicinity, for example they might have gone home or they might have had an accident and be in a local hospital.
  - e) Routes and Locations. It can help to visualize the scope of the problem by drawing the scenarios on the map.
    - i. Mark any travel aids that the scenarios suggest the missing person might have followed. Remember that there may be more than one route to get from the Initial Planning Point to a possible destination.
    - ii. Mark any locations suggested by these scenarios. These can be specific, for example a particular building, a well-known viewpoint, or general, for example the edge of a wood or the shore of a lake.
10. Develop an appropriate response.
- a) Develop Incident Objectives. Initial Response Objectives are similar.
    - i. Ensure responder safety.
    - ii. Control the size and complexity of the incident.
    - iii. Resolve the incident as quickly as possible.
  - b) Add to ICS 201 (see Section 36 on page 288).
  - c) Spend time looking at the map and visualizing how the search plan will take shape.
    - i. Where should containment and attraction teams be placed, and how will they get there?
    - ii. How will any travel aids marked be searched and what is the best way to search the locations that have been identified?
    - iii. It might be that some of the tasks in the plan will need special resources that are not normally available. Add to ICS 201 (see Section 36 on page 288).
11. Implement an appropriate response.
- a) Request resources.
  - b) Create check-in. Identify resources already on scene.
  - c) Identify staging area.
12. Assign Resources.



- a) Tactics should be achievable with available resources. If not, immediately order the additional resources needed.
  - b) Tactical assignments.
    - i. Who—resource assigned.
    - ii. What—task to be accomplished.
    - iii. Where—location of assignment.
    - iv. When—time frame for accomplishment.
    - v. How—how well (the standard).
    - vi. Why—relationship of task to Incident Objectives.
  - c) Add to ICS 201 (see Section 36 on page 288).
13. Brief Resources
- a) Incident summary, including:
    - i. Incident history.
    - ii. Missing person profile and photo.
    - iii. Map showing IPP and current assignment.
    - iv. Actions to date.
    - v. Clues found.
    - vi. Terrain.
    - vii. Weather.
    - viii. Hazards and safety.
    - ix. Possible media presence.
    - x. Possible family presence.
    - xi. Actions to take if the subject is found.
    - xii. Rescue and medical plans.
  - b) Assignment details: where to go, what to do, and what to document. Type of clues to look for.
  - c) Type of subject to base tactics on:
    - i. Mobile or immobile.
    - ii. Responsive or unresponsive.
  - d) Transport to and from their assignment.
  - e) Personal equipment to take.
  - f) Team equipment to take.
  - g) Communications.
  - h) Debriefing.
    - i. Where to return to.
    - ii. Who to talk to.
    - iii. What questions will be asked.
14. Communicate the current situation and actions to the dispatcher.
15. Obtain a mission number from AZDEMA SARFORCE.
16. Continue with investigation. Make a list of further information needed, who should get information, when requested, the response, when response received. See Figure 35.1 on the next page for a suggested form.

Investigation Questions				
Question	Source	Time requested	Outcome	Time received

Name	Signature	Date	Time
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Figure 35.1. Investigation questions form

17. Track the resources.
18. Start planning for the first full operational period, Operational Period 1. Begin to generate an Incident Action Plan (see Chapter 13 on page 130).
19. Debrief resources.
  - a) Who was involved in the debriefing?
  - b) What was their assignment?
  - c) What time did they begin?
  - d) What did they accomplish?
  - e) How likely were they to have seen the missing person?
  - f) What time did they finish?
  - g) Any difficulties or areas they could not search adequately?
  - h) Any clues found?
    - i. Where?
    - ii. What?
    - iii. What did they do?
    - iv. Where is it now?
  - i) Hazards observed in the area.
  - j) Communications problems.
  - k) Comments. For example, what would the team suggest if this task was done again: type of resource, how to search.
20. Document the incident events.
21. Evaluate the success of the initial efforts.
  - a) Is the plan working? If not, why not?
  - b) Are more resources needed?
  - c) How much time will it take to control the incident?
  - d) What influences will affect success?
    - i. Weather.
    - ii. Hazards.
    - iii. Terrain.
    - iv. Vegetation.
    - v. Skilled resource availability.
  - e) How can the unexpected be dealt with? (The “What if” Game.)
22. Revise the plan and obtain the needed resources. If the plan is working, (Incident Objectives being met) continue. If plan is not working, change it and get additional help.

- a) Most common problem is not escalating early enough.
  - b) Better to have resources available in reserve than not enough.
23. Escalate the incident response appropriately.
24. Consider incident support needs.
- a) Logistics.
    - i. Food, water, and sanitation.
    - ii. Transportation.
    - iii. Special equipment.
    - iv. Camp, medical, and security needs.
  - b) Finance.
  - c) Documentation.
    - i. Use ICS 201 (see Section 36 on page 288), and the Initial Note in Win CASIE III (see Section A.7 on page 364).
    - ii. Document at least
      - A. Incident Objectives.
      - B. Tactics.
      - C. Major decisions and actions (time & date).
      - D. Weather.
      - E. Hazards/problems.
      - F. Facilities established.
      - G. Resources on scene and resources ordered.
      - H. Incident organization.
25. If the missing person is found:
- a) The first priority is to ensure that the condition of the person is stabilized and that they are handed over to an appropriate authority for additional treatment if necessary.
  - b) The search teams can then be recalled and stood down after debrief. Some of them may need to be handled with care and consideration.
  - c) Ensure that all persons are accounted for after the incident.
  - d) Ensure that all of the incident documentation is completed and passed to the relevant authority.
26. The end of the Initial Response. There is no hard and fast rule that determines when the end of the Initial Response is reached, but it is characterized by some of the following:
- a) All of the search tasks relating to the Initial Response scenarios have been completed and some tasks may have been repeated using a different resource.
  - b) Creating more scenarios is being considered.
  - c) Widening the search and involving additional resources is being considered.
  - d) The transition from searching routes and locations to searching areas is being considered.
27. The end of the Initial Response often involves a change in the personnel managing the incident. It is important that
- a) All documentation relating to what has happened so far is available for them.
  - b) They have had a verbal briefing from a member of the Initial Response management team.
  - c) They have been made aware of any tasks from the Initial Response that are either incomplete or need following up, for example areas reported by searchers in debriefing that are worth re-searching.

Points to remember as the Initial Response Incident Commander.

- Most incidents are resolved by the initial response effort.
- The Initial Response Incident Commander is a supervisor and a leader.
- Do not get bogged down in “doing”—delegate and manage.

- Communicate with resources and dispatcher.
- Think and plan ahead.
- Keep adequate numbers of resources in reserve.
- Escalate the response early. If the Incident Commander is not sure that the incident can be resolved in the Initial Response Operational Period, call for assistance now.
- If the search goes beyond a hasty search, and local resources are strained, then it is highly recommended that the Incident Commander request immediate assistance (either for search resources or for management personnel or both) from other counties. Requests are made either between sheriffs (in which case AZDEMA should be notified as a courtesy), or through AZDEMA.

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## CHAPTER 36

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### ICS Forms

All 2010 ICS forms can be downloaded in PDF format as one document directly from FEMA at <http://www.fema.gov/emergency/nims/JobAids.shtm>. The same forms in Microsoft® Word format can be downloaded as one document from <http://www.saraz.org/SARAZNew/> under the *External Link* menu item. Individual forms can be accessed from Win CASIE III, see Section A.7 on page 363, or from ICS-SAR, see Section A.4 on page 360.

The PDF 2010 ICS forms are documents that can be completed electronically using Adobe® Reader. However, a completed document can only be printed. It cannot be saved, which is a problem if the document is partially completed. This problem can be circumvented by downloading the program “PDF-XChange Lite” from [http://www.tracker-software.com/free\\_lite\\_home.html](http://www.tracker-software.com/free_lite_home.html). Loading an ICS Form into this allows the user to partially complete it, save it, and complete it at a later date.

PDF Forms with multiple pages have boxes such as “Incident Name”, “Date and Time Prepared”, and “Prepared By” repeated at the top of every page. If these boxes are completed on the first page, then the corresponding boxes on subsequent pages are automatically populated.





**Figure 36.2.** ICS 201—Pages 3 and 4

## Instructions for Completing ICS Form 201—Incident Briefing

**ICS 201****Incident Briefing**

**Purpose.** The Incident Briefing (ICS 201) provides the Incident Commander (and the Command and General Staffs) with basic information regarding the incident situation and the resources allocated to the incident. In addition to a briefing document, the ICS 201 also serves as an initial action worksheet. It serves as a permanent record of the initial response to the incident.

**Preparation.** The briefing form is prepared by the Incident Commander for presentation to the incoming Incident Commander along with a more detailed oral briefing.

**Distribution.** Ideally, the ICS 201 is duplicated and distributed before the initial briefing of the Command and General Staffs or other responders as appropriate. The "Map/Sketch" and "Current and Planned Actions, Strategies, and Tactics" sections (pages 1–2) of the briefing form are given to the Situation Unit, while the "Current Organization" and "Resource Summary" sections (pages 3–4) are given to the Resources Unit.

**Notes:**

- The ICS 201 can serve as part of the initial Incident Action Plan (IAP).
- If additional pages are needed for any form page, use a blank ICS 201 and repaginate as needed.

Block Number	Block Title	Instructions
1	<b>Incident Name</b>	Enter the name assigned to the incident.
2	<b>Incident Number</b>	Enter the number assigned to the incident.
3	<b>Date/Time Initiated</b> • Date, Time	Enter date initiated (month/day/year) and time initiated (using the 24-hour clock).
4	<b>Map/Sketch</b> (include sketch, showing the total area of operations, the incident site/area, impacted and threatened areas, overflight results, trajectories, impacted shorelines, or other graphics depicting situational status and resource assignment)	Show perimeter and other graphics depicting situational status, resource assignments, incident facilities, and other special information on a map/sketch or with attached maps. Utilize commonly accepted ICS map symbology.  If specific geospatial reference points are needed about the incident's location or area outside the ICS organization at the incident, that information should be submitted on the Incident Status Summary (ICS 209).  North should be at the top of page unless noted otherwise.
5	<b>Situation Summary and Health and Safety Briefing</b> (for briefings or transfer of command): Recognize potential incident Health and Safety Hazards and develop necessary measures (remove hazard, provide personal protective equipment, warn people of the hazard) to protect responders from those hazards.	Self-explanatory.
6	<b>Prepared by</b> • Name • Position/Title • Signature • Date/Time	Enter the name, ICS position/title, and signature of the person preparing the form. Enter date (month/day/year) and time prepared (24-hour clock).
7	<b>Current and Planned Objectives</b>	Enter the objectives used on the incident and note any specific problem areas.

Figure 36.3. ICS 201 Instructions Page 1

Block Number	Block Title	Instructions
8	<b>Current and Planned Actions, Strategies, and Tactics</b> <ul style="list-style-type: none"> <li>Time</li> <li>Actions</li> </ul>	Enter the current and planned actions, strategies, and tactics and time they may or did occur to attain the objectives. If additional pages are needed, use a blank sheet or another ICS 201 (Page 2), and adjust page numbers accordingly.
9	<b>Current Organization</b> (fill in additional organization as appropriate) <ul style="list-style-type: none"> <li>Incident Commander(s)</li> <li>Liaison Officer</li> <li>Safety Officer</li> <li>Public Information Officer</li> <li>Planning Section Chief</li> <li>Operations Section Chief</li> <li>Finance/Administration Section Chief</li> <li>Logistics Section Chief</li> </ul>	<ul style="list-style-type: none"> <li>Enter on the organization chart the names of the individuals assigned to each position.</li> <li>Modify the chart as necessary, and add any lines/spaces needed for Command Staff Assistants, Agency Representatives, and the organization of each of the General Staff Sections.</li> <li>If Unified Command is being used, split the Incident Commander box.</li> <li>Indicate agency for each of the Incident Commanders listed if Unified Command is being used.</li> </ul>
10	<b>Resource Summary</b>	Enter the following information about the resources allocated to the incident. If additional pages are needed, use a blank sheet or another ICS 201 (Page 4), and adjust page numbers accordingly.
	• Resource	Enter the number and appropriate category, kind, or type of resource ordered.
	• Resource Identifier	Enter the relevant agency designator and/or resource designator (if any).
	• Date/Time Ordered	Enter the date (month/day/year) and time (24-hour clock) the resource was ordered.
	• ETA	Enter the estimated time of arrival (ETA) to the incident (use 24-hour clock).
	• Arrived	Enter an "X" or a checkmark upon arrival to the incident.
	• Notes (location/assignment/status)	Enter notes such as the assigned location of the resource and/or the actual assignment and status.

Figure 36.4. ICS 201 Instructions Page 2

## ICS 202—Incident Objectives

<b>INCIDENT OBJECTIVES (ICS 202)</b>		
<b>1. Incident Name:</b>	<b>2. Operational Period:</b> Date From: _____ Date To: _____ Time From: _____ Time To: _____	
<b>3. Objective(s):</b>		
<b>4. Operational Period Command Emphasis:</b>		
General Situational Awareness		
<b>5. Site Safety Plan Required?</b> Yes <input type="checkbox"/> No <input type="checkbox"/> <b>Approved Site Safety Plan(s) Located at:</b>		
<b>6. Incident Action Plan</b> (the items checked below are included in this Incident Action Plan):		
<input type="checkbox"/> ICS 202 <input type="checkbox"/> ICS 203 <input type="checkbox"/> ICS 204 <input type="checkbox"/> ICS 205 <input type="checkbox"/> ICS 205A	<input type="checkbox"/> ICS 206 <input type="checkbox"/> ICS 207 <input type="checkbox"/> ICS 208 <input type="checkbox"/> Map/Chart <input type="checkbox"/> Weather Forecast/Tides/Currents	<b>Other Attachments:</b> <input type="checkbox"/> _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____
<b>7. Prepared by:</b> Name: _____ Position/Title: _____ Signature:		
<b>8. Approved by Incident Commander:</b> Name: _____ Signature:		
ICS 202	IAP Page _____	Date/Time: _____

Figure 36.5. ICS 202



## Instructions for Completing ICS Form 202—Incident Objectives

### ICS 202 Incident Objectives

**Purpose.** The Incident Objectives (ICS 202) describes the basic incident strategy, incident objectives, command emphasis/priorities, and safety considerations for use during the next operational period.

**Preparation.** The ICS 202 is completed by the Planning Section following each Command and General Staff meeting conducted to prepare the Incident Action Plan (IAP). In case of a Unified Command, one Incident Commander (IC) may approve the ICS 202. If additional IC signatures are used, attach a blank page.

**Distribution.** The ICS 202 may be reproduced with the IAP and may be part of the IAP and given to all supervisory personnel at the Section, Branch, Division/Group, and Unit levels. All completed original forms must be given to the Documentation Unit.

**Notes:**

- The ICS 202 is part of the IAP and can be used as the opening or cover page.
- If additional pages are needed, use a blank ICS 202 and repaginate as needed.

Block Number	Block Title	Instructions
1	Incident Name	Enter the name assigned to the incident. If needed, an incident number can be added.
2	Operational Period <ul style="list-style-type: none"> <li>• Date and Time From</li> <li>• Date and Time To</li> </ul>	Enter the start date (month/day/year) and time (using the 24-hour clock) and end date and time for the operational period to which the form applies.
3	Objective(s)	Enter clear, concise statements of the objectives for managing the response. Ideally, these objectives will be listed in priority order. These objectives are for the incident response for this operational period as well as for the duration of the incident. Include alternative and/or specific tactical objectives as applicable.  Objectives should follow the SMART model or a similar approach: <u>S</u> pecific – Is the wording precise and unambiguous? <u>M</u> easurable – How will achievements be measured? <u>A</u> ction-oriented – Is an action verb used to describe expected accomplishments? <u>R</u> ealistic – Is the outcome achievable with given available resources? <u>T</u> ime-sensitive – What is the timeframe?
4	Operational Period Command Emphasis	Enter command emphasis for the operational period, which may include tactical priorities or a general weather forecast for the operational period. It may be a sequence of events or order of events to address. This is not a narrative on the objectives, but a discussion about where to place emphasis if there are needs to prioritize based on the Incident Commander's or Unified Command's direction. Examples: Be aware of falling debris, secondary explosions, etc.
	General Situational Awareness	General situational awareness may include a weather forecast, incident conditions, and/or a general safety message. If a safety message is included here, it should be reviewed by the Safety Officer to ensure it is in alignment with the Safety Message/Plan (ICS 208).
5	Site Safety Plan Required? Yes <input type="checkbox"/> No <input type="checkbox"/>	Safety Officer should check whether or not a site safety plan is required for this incident.
	Approved Site Safety Plan(s) Located At	Enter the location of the approved Site Safety Plan(s).

Figure 36.6. ICS 202 Instructions—Page 1

Block Number	Block Title	Instructions
6	<b>Incident Action Plan</b> (the items checked below are included in this Incident Action Plan): <input type="checkbox"/> ICS 202 <input type="checkbox"/> ICS 203 <input type="checkbox"/> ICS 204 <input type="checkbox"/> ICS 205 <input type="checkbox"/> ICS 205A <input type="checkbox"/> ICS 206 <input type="checkbox"/> ICS 207 <input type="checkbox"/> ICS 208 <input type="checkbox"/> Map/Chart <input type="checkbox"/> Weather Forecast/Tides/Currents <u>Other Attachments:</u>	Check appropriate forms and list other relevant documents that are included in the IAP.  <input type="checkbox"/> ICS 202 – Incident Objectives <input type="checkbox"/> ICS 203 – Organization Assignment List <input type="checkbox"/> ICS 204 – Assignment List <input type="checkbox"/> ICS 205 – Incident Radio Communications Plan <input type="checkbox"/> ICS 205A – Communications List <input type="checkbox"/> ICS 206 – Medical Plan <input type="checkbox"/> ICS 207 – Incident Organization Chart <input type="checkbox"/> ICS 208 – Safety Message/Plan
7	<b>Prepared by</b> <ul style="list-style-type: none"> <li>• Name</li> <li>• Position/Title</li> <li>• Signature</li> </ul>	Enter the name, ICS position, and signature of the person preparing the form. Enter date (month/day/year) and time prepared (24-hour clock).
8	<b>Approved by Incident Commander</b> <ul style="list-style-type: none"> <li>• Name</li> <li>• Signature</li> <li>• Date/Time</li> </ul>	In the case of a Unified Command, one IC may approve the ICS 202. If additional IC signatures are used, attach a blank page.

Figure 36.7. ICS 202 Instructions—Page 2

## ICS 203—Organization Assignment List

<b>ORGANIZATION ASSIGNMENT LIST (ICS 203)</b>			
<b>1. Incident Name:</b>		<b>2. Operational Period:</b> Date From: _____ Date To: _____ Time From: _____ Time To: _____	
<b>3. Incident Commander(s) and Command Staff:</b>		<b>7. Operations Section:</b>	
IC/UCs		Chief	
		Deputy	
Deputy		Staging Area	
Safety Officer		<b>Branch</b>	
Public Info. Officer		Branch Director	
Liaison Officer		Deputy	
<b>4. Agency/Organization Representatives:</b>		Division/Group	
Agency/Organization	Name	Division/Group	
		Division/Group	
		Division/Group	
		Division/Group	
		Division/Group	
		<b>Branch</b>	
		Branch Director	
		Deputy	
<b>5. Planning Section:</b>		Division/Group	
Chief		Division/Group	
Deputy		Division/Group	
Resources Unit		Division/Group	
Situation Unit		Division/Group	
Documentation Unit		<b>Branch</b>	
Demobilization Unit		Branch Director	
Technical Specialists		Deputy	
		Division/Group	
		Division/Group	
		Division/Group	
<b>6. Logistics Section:</b>		Division/Group	
Chief		Division/Group	
Deputy		<b>Air Operations Branch</b>	
<b>Support Branch</b>		Air Ops Branch Dir.	
Director			
Supply Unit			
Facilities Unit		<b>8. Finance/Administration Section:</b>	
Ground Support Unit		Chief	
<b>Service Branch</b>		Deputy	
Director		Time Unit	
Communications Unit		Procurement Unit	
Medical Unit		Comp/Claims Unit	
Food Unit		Cost Unit	
<b>9. Prepared by: Name:</b> _____		<b>Position/Title:</b> _____ <b>Signature:</b>	
ICS 203	IAP Page _____	<b>Date/Time:</b> _____	

**Figure 36.8. ICS 203**



## Instructions for Completing ICS Form 203—Organization Assignment List

**ICS 203****Organization Assignment List**

**Purpose.** The Organization Assignment List (ICS 203) provides ICS personnel with information on the units that are currently activated and the names of personnel staffing each position/unit. It is used to complete the Incident Organization Chart (ICS 207) which is posted on the Incident Command Post display. An actual organization will be incident or event-specific. **Not all positions need to be filled.** Some blocks may contain more than one name. The size of the organization is dependent on the magnitude of the incident, and can be expanded or contracted as necessary.

**Preparation.** The Resources Unit prepares and maintains this list under the direction of the Planning Section Chief. Complete only the blocks for the positions that are being used for the incident. If a trainee is assigned to a position, indicate this with a "T" in parentheses behind the name (e.g., "A. Smith (T)").

**Distribution.** The ICS 203 is duplicated and attached to the Incident Objectives (ICS 202) and given to all recipients as part of the Incident Action Plan (IAP). All completed original forms must be given to the Documentation Unit.

**Notes:**

- The ICS 203 serves as part of the IAP.
- If needed, more than one name can be put in each block by inserting a slash.
- If additional pages are needed, use a blank ICS 203 and repaginate as needed.
- ICS allows for organizational flexibility, so the Intelligence/Investigations Function can be embedded in several different places within the organizational structure.

Block Number	Block Title	Instructions
1	<b>Incident Name</b>	Enter the name assigned to the incident.
2	<b>Operational Period</b> <ul style="list-style-type: none"> <li>• Date and Time From</li> <li>• Date and Time To</li> </ul>	Enter the start date (month/day/year) and time (using the 24-hour clock) and end date and time for the operational period to which the form applies.
3	<b>Incident Commander(s) and Command Staff</b> <ul style="list-style-type: none"> <li>• IC/UCs</li> <li>• Deputy</li> <li>• Safety Officer</li> <li>• Public Information Officer</li> <li>• Liaison Officer</li> </ul>	Enter the names of the Incident Commander(s) and Command Staff. Label Assistants to Command Staff as such (for example, "Assistant Safety Officer"). For all individuals, use at least the first initial and last name. For Unified Command, also include agency names.
4	<b>Agency/Organization Representatives</b> <ul style="list-style-type: none"> <li>• Agency/Organization</li> <li>• Name</li> </ul>	Enter the agency/organization names and the names of their representatives. For all individuals, use at least the first initial and last name.
5	<b>Planning Section</b> <ul style="list-style-type: none"> <li>• Chief</li> <li>• Deputy</li> <li>• Resources Unit</li> <li>• Situation Unit</li> <li>• Documentation Unit</li> <li>• Demobilization Unit</li> <li>• Technical Specialists</li> </ul>	Enter the name of the Planning Section Chief, Deputy, and Unit Leaders after each position title. List Technical Specialists with an indication of specialty. If there is a shift change during the specified operational period, list both names, separated by a slash. For all individuals, use at least the first initial and last name.

Figure 36.9. ICS 203 Instructions—Page 1

Block Number	Block Title	Instructions
6	<b>Logistics Section</b> <ul style="list-style-type: none"> <li>• Chief</li> <li>• Deputy</li> </ul> <b>Support Branch</b> <ul style="list-style-type: none"> <li>• Director</li> <li>• Supply Unit</li> <li>• Facilities Unit</li> <li>• Ground Support Unit</li> </ul> <b>Service Branch</b> <ul style="list-style-type: none"> <li>• Director</li> <li>• Communications Unit</li> <li>• Medical Unit</li> <li>• Food Unit</li> </ul>	<p>Enter the name of the Logistics Section Chief, Deputy, Branch Directors, and Unit Leaders after each position title.</p> <p>If there is a shift change during the specified operational period, list both names, separated by a slash.</p> <p>For all individuals, use at least the first initial and last name.</p>
7	<b>Operations Section</b> <ul style="list-style-type: none"> <li>• Chief</li> <li>• Deputy</li> <li>• Staging Area</li> </ul> <b>Branch</b> <ul style="list-style-type: none"> <li>• Branch Director</li> <li>• Deputy</li> <li>• Division/Group</li> </ul> <b>Air Operations Branch</b> <ul style="list-style-type: none"> <li>• Air Operations Branch Director</li> </ul>	<p>Enter the name of the Operations Section Chief, Deputy, Branch Director(s), Deputies, and personnel staffing each of the listed positions. For Divisions/Groups, enter the Division/Group identifier in the left column and the individual's name in the right column.</p> <p>Branches and Divisions/Groups may be named for functionality or by geography. For Divisions/Groups, indicate Division/Group Supervisor. Use an additional page if more than three Branches are activated.</p> <p>If there is a shift change during the specified operational period, list both names, separated by a slash.</p> <p>For all individuals, use at least the first initial and last name.</p>
8	<b>Finance/Administration Section</b> <ul style="list-style-type: none"> <li>• Chief</li> <li>• Deputy</li> <li>• Time Unit</li> <li>• Procurement Unit</li> <li>• Compensation/Claims Unit</li> <li>• Cost Unit</li> </ul>	<p>Enter the name of the Finance/Administration Section Chief, Deputy, and Unit Leaders after each position title.</p> <p>If there is a shift change during the specified operational period, list both names, separated by a slash.</p> <p>For all individuals, use at least the first initial and last name.</p>
9	<b>Prepared by</b> <ul style="list-style-type: none"> <li>• Name</li> <li>• Position/Title</li> <li>• Signature</li> <li>• Date/Time</li> </ul>	<p>Enter the name, ICS position, and signature of the person preparing the form. Enter date (month/day/year) and time prepared (24-hour clock).</p>

Figure 36.10. ICS 203 Instructions—Page 2

ICS 204—Field Assignment

<b>ASSIGNMENT LIST (ICS 204)</b>				
1. Incident Name: _____		2. Operational Period: Date From: _____ Date To: _____ Time From: _____ Time To: _____		3.  Branch: _____  Division: _____  Group: _____  Staging Area: _____
4. Operations Personnel: <u>Name</u> _____ <u>Contact Number(s)</u> _____ Operations Section Chief: _____ Branch Director: _____ Division/Group Supervisor: _____				
5. Resources Assigned:		# of Persons	Contact (e.g., phone, pager, radio frequency, etc.)	Reporting Location, Special Equipment and Supplies, Remarks, Notes, Information
Resource Identifier	Leader			
6. Work Assignments:				
7. Special Instructions:				
8. Communications (radio and/or phone contact numbers needed for this assignment):				
Name/Function _____ Primary Contact: indicate cell, pager, or radio (frequency/system/channel) _____ _____ / _____ _____ / _____ _____ / _____ _____ / _____				
9. Prepared by: Name: _____ Position/Title: _____ Signature: _____				
ICS 204	IAP Page _____	Date/Time: _____		

**Figure 36.11.** ICS 204



## Instructions for Completing ICS Form 204—Field Assignment

### ICS 204 Assignment List

**Purpose.** The Assignment List(s) (ICS 204) informs Division and Group supervisors of incident assignments. Once the Command and General Staffs agree to the assignments, the assignment information is given to the appropriate Divisions and Groups.

**Preparation.** The ICS 204 is normally prepared by the Resources Unit, using guidance from the Incident Objectives (ICS 202), Operational Planning Worksheet (ICS 215), and the Operations Section Chief. It must be approved by the Incident Commander, but may be reviewed and initialed by the Planning Section Chief and Operations Section Chief as well.

**Distribution.** The ICS 204 is duplicated and attached to the ICS 202 and given to all recipients as part of the Incident Action Plan (IAP). In some cases, assignments may be communicated via radio/telephone/fax. All completed original forms must be given to the Documentation Unit.

**Notes:**

- The ICS 204 details assignments at Division and Group levels and is part of the IAP.
- Multiple pages/copies can be used if needed.
- If additional pages are needed, use a blank ICS 204 and repaginate as needed.

Block Number	Block Title	Instructions
1	<b>Incident Name</b>	Enter the name assigned to the incident.
2	<b>Operational Period</b> <ul style="list-style-type: none"> <li>• Date and Time From</li> <li>• Date and Time To</li> </ul>	Enter the start date (month/day/year) and time (using the 24-hour clock) and end date and time for the operational period to which the form applies.
3	<b>Branch</b> <b>Division</b> <b>Group</b> <b>Staging Area</b>	This block is for use in a large IAP for reference only.  Write the alphanumeric abbreviation for the Branch, Division, Group, and Staging Area (e.g., "Branch 1," "Division D," "Group 1A") in large letters for easy referencing.
4	<b>Operations Personnel</b> <ul style="list-style-type: none"> <li>• Name, Contact Number(s) <ul style="list-style-type: none"> <li>– Operations Section Chief</li> <li>– Branch Director</li> <li>– Division/Group Supervisor</li> </ul> </li> </ul>	Enter the name and contact numbers of the Operations Section Chief, applicable Branch Director(s), and Division/Group Supervisor(s).
5	<b>Resources Assigned</b>	Enter the following information about the resources assigned to the Division or Group for this period:
	• Resource Identifier	The identifier is a unique way to identify a resource (e.g., ENG-13, IA-SCC-413). If the resource has been ordered but no identification has been received, use TBD (to be determined).
	• Leader	Enter resource leader's name.
	• # of Persons	Enter total number of persons for the resource assigned, including the leader.
	• Contact (e.g., phone, pager, radio frequency, etc.)	Enter primary means of contacting the leader or contact person (e.g., radio, phone, pager, etc.). Be sure to include the area code when listing a phone number.
5 (continued)	• Reporting Location, Special Equipment and Supplies, Remarks, Notes, Information	Provide special notes or directions specific to this resource. If required, add notes to indicate: (1) specific location/time where the resource should report or be dropped off/picked up; (2) special equipment and supplies that will be used or needed; (3) whether or not the resource received briefings; (4) transportation needs; or (5) other information.

**Figure 36.12.** ICS 204 Instructions—Page 1

**Figure 36.13.** ICS 204 Instructions—Page 2

ICS 205—Incident Radio Communications Plan

**Figure 36.14.** ICS 205



## Instructions for Completing ICS Form 205—Incident Radio Communications Plan

### ICS 205

#### Incident Radio Communications Plan

**Purpose.** The Incident Radio Communications Plan (ICS 205) provides information on all radio frequency or trunked radio system talkgroup assignments for each operational period. The plan is a summary of information obtained about available radio frequencies or talkgroups and the assignments of those resources by the Communications Unit Leader for use by incident responders. Information from the Incident Radio Communications Plan on frequency or talkgroup assignments is normally placed on the Assignment List (ICS 204).

**Preparation.** The ICS 205 is prepared by the Communications Unit Leader and given to the Planning Section Chief for inclusion in the Incident Action Plan.

**Distribution.** The ICS 205 is duplicated and attached to the Incident Objectives (ICS 202) and given to all recipients as part of the Incident Action Plan (IAP). All completed original forms must be given to the Documentation Unit. Information from the ICS 205 is placed on Assignment Lists.

#### Notes:

- The ICS 205 is used to provide, in one location, information on all radio frequency assignments down to the Division/Group level for each operational period.
- The ICS 205 serves as part of the IAP.

Block Number	Block Title	Instructions
1	Incident Name	Enter the name assigned to the incident.
2	Date/Time Prepared	Enter date prepared (month/day/year) and time prepared (using the 24-hour clock).
3	Operational Period <ul style="list-style-type: none"> <li>• Date and Time From</li> <li>• Date and Time To</li> </ul>	Enter the start date (month/day/year) and time (using the 24-hour clock) and end date and time for the operational period to which the form applies.
4	Basic Radio Channel Use	Enter the following information about radio channel use:
	Zone Group	
	Channel Number	Use at the Communications Unit Leader's discretion. Channel Number (Ch #) may equate to the channel number for incident radios that are programmed or cloned for a specific Communications Plan, or it may be used just as a reference line number on the ICS 205 document.
	Function	Enter the Net function each channel or talkgroup will be used for (Command, Tactical, Ground-to-Air, Air-to-Air, Support, Dispatch).
	Channel Name/Trunked Radio System Talkgroup	Enter the nomenclature or commonly used name for the channel or talk group such as the National Interoperability Channels which follow DHS frequency Field Operations Guide (FOG).
	Assignment	Enter the name of the ICS Branch/Division/Group/Section to which this channel/talkgroup will be assigned.
	RX (Receive) Frequency (N or W)	Enter the Receive Frequency (RX Freq) as the mobile or portable subscriber would be programmed using xxx.xxxx out to four decimal places, followed by an "N" designating narrowband or a "W" designating wideband emissions.  The name of the specific trunked radio system with which the talkgroup is associated may be entered across all fields on the ICS 205 normally used for conventional channel programming information.
	RX Tone/NAC	Enter the Receive Continuous Tone Coded Squelch System (CTCSS) subaudible tone (RX Tone) or Network Access Code (RX NAC) for the receive frequency as the mobile or portable subscriber would be programmed.

Figure 36.15. ICS 205 Instructions—Page 1



Block Number	Block Title	Instructions
<b>4</b> (continued)	TX (Transmit) Frequency (N or W)	Enter the Transmit Frequency (TX Freq) as the mobile or portable subscriber would be programmed using xxx.xxxx out to four decimal places, followed by an "N" designating narrowband or a "W" designating wideband emissions.
	TX Tone/NAC	Enter the Transmit Continuous Tone Coded Squelch System (CTCSS) subaudible tone (TX Tone) or Network Access Code (TX NAC) for the transmit frequency as the mobile or portable subscriber would be programmed.
	Mode (A, D, or M)	Enter "A" for analog operation, "D" for digital operation, or "M" for mixed mode operation.
	Remarks	Enter miscellaneous information concerning repeater locations, information concerning patched channels or talkgroups using links or gateways, etc.
<b>5</b>	<b>Special Instructions</b>	Enter any special instructions (e.g., using cross-band repeaters, secure-voice, encoders, private line (PL) tones, etc.) or other emergency communications needs). If needed, also include any special instructions for handling an incident within an incident.
<b>6</b>	<b>Prepared by</b> (Communications Unit Leader) <ul style="list-style-type: none"> <li>• Name</li> <li>• Signature</li> <li>• Date/Time</li> </ul>	Enter the name and signature of the person preparing the form, typically the Communications Unit Leader. Enter date (month/day/year) and time prepared (24-hour clock).

Figure 36.16. ICS 205 Instructions—Page 2

## ICS 205A—Communications List

[illegible]

**Figure 36.17. ICS 205A**

## Instructions for Completing ICS Form 205A—Communications List

### ICS 205A Communications List

**Purpose.** The Communications List (ICS 205A) records methods of contact for incident personnel. While the Incident Radio Communications Plan (ICS 205) is used to provide information on all radio frequencies down to the Division/Group level, the ICS 205A indicates all methods of contact for personnel assigned to the incident (radio frequencies, phone numbers, pager numbers, etc.), and functions as an incident directory.

**Preparation.** The ICS 205A can be filled out during check-in and is maintained and distributed by Communications Unit personnel. This form should be updated each operational period.

**Distribution.** The ICS 205A is distributed within the ICS organization by the Communications Unit, and posted as necessary. All completed original forms must be given to the Documentation Unit. If this form contains sensitive information such as cell phone numbers, it should be clearly marked in the header that it contains sensitive information and is not for public release.

**Notes:**

- The ICS 205A is an optional part of the Incident Action Plan (IAP).
- This optional form is used in conjunction with the ICS 205.
- If additional pages are needed, use a blank ICS 205A and repaginate as needed.

Block Number	Block Title	Instructions
1	Incident Name	Enter the name assigned to the incident.
2	Operational Period <ul style="list-style-type: none"> <li>• Date and Time From</li> <li>• Date and Time To</li> </ul>	Enter the start date (month/day/year) and time (using the 24-hour clock) and end date and time for the operational period to which the form applies.
3	Basic Local Communications Information <ul style="list-style-type: none"> <li>• Incident Assigned Position</li> <li>• Name</li> <li>• Method(s) of Contact (phone, pager, cell, etc.)</li> </ul>	Enter the communications methods assigned and used for personnel by their assigned ICS position. Enter the ICS organizational assignment. Enter the name of the assigned person. For each assignment, enter the radio frequency and contact number(s) to include area code, etc. If applicable, include the vehicle license or ID number assigned to the vehicle for the incident (e.g., HAZMAT 1, etc.).
4	Prepared by <ul style="list-style-type: none"> <li>• Name</li> <li>• Position/Title</li> <li>• Signature</li> <li>• Date/Time</li> </ul>	Enter the name, ICS position, and signature of the person preparing the form. Enter date (month/day/year) and time prepared (24-hour clock).

Figure 36.18. ICS 205A Instructions

## ICS 206—Medical Plan

<b>MEDICAL PLAN (ICS 206)</b>							
<b>1. Incident Name:</b>		<b>2. Operational Period:</b> Date From: _____ Time From: _____			Date To: _____ Time To: _____		
<b>3. Medical Aid Stations:</b>							
Name	Location	Contact Number(s)/Frequency	Paramedics on Site?				
			<input type="checkbox"/> Yes <input type="checkbox"/> No				
			<input type="checkbox"/> Yes <input type="checkbox"/> No				
			<input type="checkbox"/> Yes <input type="checkbox"/> No				
			<input type="checkbox"/> Yes <input type="checkbox"/> No				
			<input type="checkbox"/> Yes <input type="checkbox"/> No				
			<input type="checkbox"/> Yes <input type="checkbox"/> No				
<b>4. Transportation (indicate air or ground):</b>							
Ambulance Service	Location	Contact Number(s)/Frequency	Level of Service				
			<input type="checkbox"/> ALS <input type="checkbox"/> BLS				
			<input type="checkbox"/> ALS <input type="checkbox"/> BLS				
			<input type="checkbox"/> ALS <input type="checkbox"/> BLS				
			<input type="checkbox"/> ALS <input type="checkbox"/> BLS				
<b>5. Hospitals:</b>							
Hospital Name	Address, Latitude & Longitude if Helipad	Contact Number(s)/ Frequency	Travel Time		Trauma Center	Burn Center	Helipad
			Air	Ground			
					<input type="checkbox"/> Yes Level: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
					<input type="checkbox"/> Yes Level: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
					<input type="checkbox"/> Yes Level: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
					<input type="checkbox"/> Yes Level: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
					<input type="checkbox"/> Yes Level: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>6. Special Medical Emergency Procedures:</b>							
<input type="checkbox"/> Check box if aviation assets are utilized for rescue. If assets are used, coordinate with Air Operations.							
<b>7. Prepared by (Medical Unit Leader):</b> Name: _____ Signature:							
<b>8. Approved by (Safety Officer):</b> Name: _____ Signature:							
ICS 206	IAP Page _____	Date/Time: _____					

Figure 36.19. ICS 206



## Instructions for Completing ICS Form 206—Medical Plan

**ICS 206  
Medical Plan**

**Purpose.** The Medical Plan (ICS 206) provides information on incident medical aid stations, transportation services, hospitals, and medical emergency procedures.

**Preparation.** The ICS 206 is prepared by the Medical Unit Leader and reviewed by the Safety Officer to ensure ICS coordination. If aviation assets are utilized for rescue, coordinate with Air Operations.

**Distribution.** The ICS 206 is duplicated and attached to the Incident Objectives (ICS 202) and given to all recipients as part of the Incident Action Plan (IAP). Information from the plan pertaining to incident medical aid stations and medical emergency procedures may be noted on the Assignment List (ICS 204). All completed original forms must be given to the Documentation Unit.

**Notes:**

- The ICS 206 serves as part of the IAP.
- This form can include multiple pages.

Block Number	Block Title	Instructions
1	<b>Incident Name</b>	Enter the name assigned to the incident.
2	<b>Operational Period</b> <ul style="list-style-type: none"> <li>• Date and Time From</li> <li>• Date and Time To</li> </ul>	Enter the start date (month/day/year) and time (using the 24-hour clock) and end date and time for the operational period to which the form applies.
3	<b>Medical Aid Stations</b>	Enter the following information on the incident medical aid station(s):
	• Name	Enter name of the medical aid station.
	• Location	Enter the location of the medical aid station (e.g., Staging Area, Camp Ground).
	• Contact Number(s)/Frequency	Enter the contact number(s) and frequency for the medical aid station(s).
	• Paramedics on Site? <input type="checkbox"/> Yes <input type="checkbox"/> No	Indicate (yes or no) if paramedics are at the site indicated.
4	<b>Transportation</b> (indicate air or ground)	Enter the following information for ambulance services available to the incident:
	• Ambulance Service	Enter name of ambulance service.
	• Location	Enter the location of the ambulance service.
	• Contact Number(s)/Frequency	Enter the contact number(s) and frequency for the ambulance service.
	• Level of Service <input type="checkbox"/> ALS <input type="checkbox"/> BLS	Indicate the level of service available for each ambulance, either ALS (Advanced Life Support) or BLS (Basic Life Support).

Figure 36.20. ICS 206 Instructions—Page 1

Block Number	Block Title	Instructions
5	<b>Hospitals</b>	Enter the following information for hospital(s) that could serve this incident:
	• Hospital Name	Enter hospital name and identify any predesignated medivac aircraft by name a frequency.
	• Address, Latitude & Longitude if Helipad	Enter the physical address of the hospital and the latitude and longitude if the hospital has a helipad.
	• Contact Number(s)/ Frequency	Enter the contact number(s) and/or communications frequency(s) for the hospital.
	• Travel Time • Air • Ground	Enter the travel time by air and ground from the incident to the hospital.
	• Trauma Center <input type="checkbox"/> Yes Level: _____	Indicate yes and the trauma level if the hospital has a trauma center.
	• Burn Center <input type="checkbox"/> Yes <input type="checkbox"/> No	Indicate (yes or no) if the hospital has a burn center.
	• Helipad <input type="checkbox"/> Yes <input type="checkbox"/> No	Indicate (yes or no) if the hospital has a helipad. Latitude and Longitude data format need to compliment Medical Evacuation Helicopters and Medical Air Resources
6	<b>Special Medical Emergency Procedures</b>	Note any special emergency instructions for use by incident personnel, including (1) who should be contacted, (2) how should they be contacted; and (3) who manages an incident within an incident due to a rescue, accident, etc. Include procedures for how to report medical emergencies.
	<input type="checkbox"/> Check box if aviation assets are utilized for rescue. If assets are used, coordinate with Air Operations.	Self explanatory. Incident assigned aviation assets should be included in ICS 220.
7	<b>Prepared by (Medical Unit Leader)</b> • Name • Signature	Enter the name and signature of the person preparing the form, typically the Medical Unit Leader. Enter date (month/day/year) and time prepared (24-hour clock).
8	<b>Approved by (Safety Officer)</b> • Name • Signature • Date/Time	Enter the name of the person who approved the plan, typically the Safety Officer. Enter date (month/day/year) and time reviewed (24-hour clock).

Figure 36.21. ICS 206 Instructions—Page 2



## INCIDENT CHECK-IN LIST (ICS 211)

[illegible]

**Figure 36.22.** ICS 211

## Instructions for Completing ICS Form 211—Incident Check-In List

### ICS 211 Incident Check-In List

**Purpose.** Personnel and equipment arriving at the incident can check in at various incident locations. Check-in consists of reporting specific information, which is recorded on the Check-In List (ICS 211). The ICS 211 serves several purposes, as it: (1) records arrival times at the incident of all overhead personnel and equipment, (2) records the initial location of personnel and equipment to facilitate subsequent assignments, and (3) supports demobilization by recording the home base, method of travel, etc., for resources checked in.

**Preparation.** The ICS 211 is initiated at a number of incident locations including: Staging Areas, Base, and Incident Command Post (ICP). Preparation may be completed by: (1) overhead at these locations, who record the information and give it to the Resources Unit as soon as possible, (2) the Incident Communications Center Manager located in the Communications Center, who records the information and gives it to the Resources Unit as soon as possible, (3) a recorder from the Resources Unit during check-in to the ICP. As an option, the ICS 211 can be printed on colored paper to match the designated Resource Status Card (ICS 219) colors. The purpose of this is to aid the process of completing a large volume of ICS 219s. The ICS 219 colors are:

- 219-1: Header Card – Gray (used only as label cards for T-Card racks)
- 219-2: Crew/Team Card – Green
- 219-3: Engine Card – Rose
- 219-4: Helicopter Card – Blue
- 219-5: Personnel Card – White
- 219-6: Fixed-Wing Card – Orange
- 219-7: Equipment Card – Yellow
- 219-8: Miscellaneous Equipment/Task Force Card – Tan
- 219-10: Generic Card – Light Purple

**Distribution.** ICS 211s, which are completed by personnel at the various check-in locations, are provided to the Resources Unit, Demobilization Unit, and Finance/Administration Section. The Resources Unit maintains a master list of all equipment and personnel that have reported to the incident.

**Notes:**

- Also available as 8½ x 14 (legal size) or 11 x 17 chart.
- Use reverse side of form for remarks or comments.
- If additional pages are needed for any form page, use a blank ICS 211 and repaginate as needed.
- Contact information for sender and receiver can be added for communications purposes to confirm resource orders. Refer to 213RR example (Appendix B)

Block Number	Block Title	Instructions
1	Incident Name	Enter the name assigned to the incident.
2	Incident Number	Enter the number assigned to the incident.
3	<b>Check-In Location</b> <input type="checkbox"/> Base <input type="checkbox"/> Staging Area <input type="checkbox"/> ICP <input type="checkbox"/> Helibase <input type="checkbox"/> Other	Check appropriate box and enter the check-in location for the incident. Indicate specific information regarding the locations under each checkbox. ICP is for Incident Command Post. Other may include...
4	<b>Start Date/Time</b> • Date • Time	Enter the date (month/day/year) and time (using the 24-hour clock) that the form was started.

Figure 36.23. ICS 211 Instructions—Page 1



Block Number	Block Title	Instructions
	<b>Check-In Information</b>	Self explanatory.
5	List single resource personnel (overhead) by agency and name, OR list resources by the following format	Enter the following information for resources: OPTIONAL: Indicate if resource is a single resource versus part of Strike Team or Task Force. Fields can be left blank if not necessary.
	• State	Use this section to list the home State for the resource.
	• Agency	Use this section to list agency name (or designator), and individual names for all single resource personnel (e.g., ORC, ARL, NYPD).
	• Category	Use this section to list the resource category based on NIMS, discipline, or jurisdiction guidance.
	• Kind	Use this section to list the resource kind based on NIMS, discipline, or jurisdiction guidance.
	• Type	Use this section to list the resource type based on NIMS, discipline, or jurisdiction guidance.
	• Resource Name or Identifier	Use this section to enter the resource name or unique identifier. If it is a Strike Team or a Task Force, list the unique Strike Team or Task Force identifier (if used) on a single line with the component resources of the Strike Team or Task Force listed on the following lines. For example, for an Engine Strike Team with the call sign "XLT459" show "XLT459" in this box and then in the next five rows, list the unique identifier for the five engines assigned to the Strike Team.
	• ST or TF	Use ST or TF to indicate whether the resource is part of a Strike Team or Task Force. See above for additional instructions.
6	<b>Order Request #</b>	The order request number will be assigned by the agency dispatching resources or personnel to the incident. Use existing protocol as appropriate for the jurisdiction and/or discipline, since several incident numbers may be used for the same incident.
7	<b>Date/Time Check-In</b>	Enter date (month/day/year) and time of check-in (24-hour clock) to the incident.
8	<b>Leader's Name</b>	<ul style="list-style-type: none"> <li>For equipment, enter the operator's name.</li> <li>Enter the Strike Team or Task Force leader's name.</li> <li>Leave blank for single resource personnel (overhead).</li> </ul>
9	<b>Total Number of Personnel</b>	Enter total number of personnel associated with the resource. Include leaders.
10	<b>Incident Contact Information</b>	Enter available contact information (e.g., radio frequency, cell phone number, etc.) for the incident.
11	<b>Home Unit or Agency</b>	Enter the home unit or agency to which the resource or individual is normally assigned (may not be departure location).
12	<b>Departure Point, Date and Time</b>	Enter the location from which the resource or individual departed for this incident. Enter the departure time using the 24-hour clock.
13	<b>Method of Travel</b>	Enter the means of travel the individual used to bring himself/herself to the incident (e.g., bus, truck, engine, personal vehicle, etc.).
14	<b>Incident Assignment</b>	Enter the incident assignment at time of dispatch.
15	<b>Other Qualifications</b>	Enter additional duties (ICS positions) pertinent to the incident that the resource/individual is qualified to perform. Note that resources should not be reassigned on the incident without going through the established ordering process. This data may be useful when resources are demobilized and remobilized for another incident.

Figure 36.24. ICS 211 Instructions—Page 2

Block Number	Block Title	Instructions
16	Data Provided to Resources Unit	Enter the date and time that the information pertaining to that entry was transmitted to the Resources Unit, and the initials of the person who transmitted the information.
17	Prepared by <ul style="list-style-type: none"> <li>• Name</li> <li>• Position/Title</li> <li>• Signature</li> <li>• Date/Time</li> </ul>	Enter the name, ICS position/title, and signature of the person preparing the form. Enter date (month/day/year) and time prepared (24-hour clock).

## ICS 214—Activity Log

[illegible]

**Figure 36.26.** ICS 214



## Instructions for Completing ICS Form 214—Activity Log

**ICS 214  
Activity Log**

**Purpose.** The Activity Log (ICS 214) records details of notable activities at any ICS level, including single resources, equipment, Task Forces, etc. These logs provide basic incident activity documentation, and a reference for any after-action report.

**Preparation.** An ICS 214 can be initiated and maintained by personnel in various ICS positions as it is needed or appropriate. Personnel should document how relevant incident activities are occurring and progressing, or any notable events or communications.

**Distribution.** Completed ICS 214s are submitted to supervisors, who forward them to the Documentation Unit. All completed original forms must be given to the Documentation Unit, which maintains a file of all ICS 214s. It is recommended that individuals retain a copy for their own records.

**Notes:**

- The ICS 214 can be printed as a two-sided form.
- Use additional copies as continuation sheets as needed, and indicate pagination as used.

Block Number	Block Title	Instructions
1	<b>Incident Name</b>	Enter the name assigned to the incident.
2	<b>Operational Period</b> <ul style="list-style-type: none"> <li>• Date and Time From</li> <li>• Date and Time To</li> </ul>	Enter the start date (month/day/year) and time (using the 24-hour clock) and end date and time for the operational period to which the form applies.
3	<b>Name</b>	Enter the title of the organizational unit or resource designator (e.g., Facilities Unit, Safety Officer, Strike Team).
4	<b>ICS Position</b>	Enter the name and ICS position of the individual in charge of the Unit.
5	<b>Home Agency (and Unit)</b>	Enter the home agency of the individual completing the ICS 214. Enter a unit designator if utilized by the jurisdiction or discipline.
6	<b>Resources Assigned</b> <ul style="list-style-type: none"> <li>• Name</li> <li>• ICS Position</li> <li>• Home Agency (and Unit)</li> </ul>	Enter the following information for resources assigned: <ul style="list-style-type: none"> <li>Use this section to enter the resource's name. For all individuals, use at least the first initial and last name. Cell phone number for the individual can be added as an option.</li> <li>Use this section to enter the resource's ICS position (e.g., Finance Section Chief).</li> <li>Use this section to enter the resource's home agency and/or unit (e.g., Des Moines Public Works Department, Water Management Unit).</li> </ul>
7	<b>Activity Log</b> <ul style="list-style-type: none"> <li>• Date/Time</li> <li>• Notable Activities</li> </ul>	<ul style="list-style-type: none"> <li>Enter the time (24-hour clock) and briefly describe individual notable activities. Note the date as well if the operational period covers more than one day.</li> <li>Activities described may include notable occurrences or events such as task assignments, task completions, injuries, difficulties encountered, etc.</li> <li>This block can also be used to track personal work habits by adding columns such as "Action Required," "Delegated To," "Status," etc.</li> </ul>
8	<b>Prepared by</b> <ul style="list-style-type: none"> <li>• Name</li> <li>• Position/Title</li> <li>• Signature</li> <li>• Date/Time</li> </ul>	Enter the name, ICS position/title, and signature of the person preparing the form. Enter date (month/day/year) and time prepared (24-hour clock).

Figure 36.27. ICS 214 Instructions

## ICS 215—Operational Planning Worksheet

OPERATIONAL PLANNING WORKSHEET (ICS 215)																	
1. Incident Name:			2. Operational Period: Date From: _____ Date To: _____ Time From: _____ Time To: _____														
3. Branch	4. Division, Group, or Other	5. Work Assignment & Special Instructions	6. Resources											7. Overhead Position(s)	8. Special Equipment & Supplies	9. Reporting Location	10. Requested Arrival Time
			Req. Have Need														
			Req. Have Need														
			Req. Have Need														
			Req. Have Need														
			Req. Have Need														
			Req. Have Need														
			Req. Have Need														
			Req. Have Need														
			11. Total Resources Required														14. Prepared by:
			12. Total Resources Have on Hand														Name: _____
			13. Total Resources Need To Order														Position/Title: _____
																	Signature: _____
																	Date/Time: _____

**Figure 36.28.** ICS 215



## Instructions for Completing ICS Form 215—Operational Planning Worksheet

### ICS 215 Operational Planning Worksheet

**Purpose.** The Operational Planning Worksheet (ICS 215) communicates the decisions made by the Operations Section Chief during the Tactics Meeting concerning resource assignments and needs for the next operational period. The ICS 215 is used by the Resources Unit to complete the Assignment Lists (ICS 204) and by the Logistics Section Chief for ordering resources for the incident.

**Preparation.** The ICS 215 is initiated by the Operations Section Chief and often involves logistics personnel, the Resources Unit, and the Safety Officer. The form is shared with the rest of the Command and General Staffs during the Planning Meeting. It may be useful in some disciplines or jurisdictions to prefill ICS 215 copies prior to incidents.

**Distribution.** When the Branch, Division, or Group work assignments and accompanying resource allocations are agreed upon, the form is distributed to the Resources Unit to assist in the preparation of the ICS 204. The Logistics Section will use a copy of this worksheet for preparing requests for resources required for the next operational period.

**Notes:**

- This worksheet can be made into a wall mount.
- Also available as 8½ x 14 (legal size) and 11 x 17 chart.
- If additional pages are needed, use a blank ICS 215 and repaginate as needed.

Block Number	Block Title	Instructions
1	Incident Name	Enter the name assigned to the incident.
2	Operational Period <ul style="list-style-type: none"> <li>• Date and Time From</li> <li>• Date and Time To</li> </ul>	Enter the start date (month/day/year) and time (using the 24-hour clock) and end date and time for the operational period to which the form applies.
3	Branch	Enter the Branch of the work assignment for the resources.
4	Division, Group, or Other	Enter the Division, Group, or other location (e.g., Staging Area) of the work assignment for the resources.
5	Work Assignment & Special Instructions	Enter the specific work assignments given to each of the Divisions/Groups and any special instructions, as required.
6	Resources	Complete resource headings for category, kind, and type as appropriate for the incident. The use of a slash indicates a single resource in the upper portion of the slash and a Strike Team or Task Force in the bottom portion of the slash.
	• Required	Enter, for the appropriate resources, the number of resources by type (engine, squad car, Advanced Life Support ambulance, etc.) required to perform the work assignment.
	• Have	Enter, for the appropriate resources, the number of resources by type (engines, crew, etc.) available to perform the work assignment.
	• Need	Enter the number of resources needed by subtracting the number in the "Have" row from the number in the "Required" row.
7	Overhead Position(s)	List any supervisory and nonsupervisory ICS position(s) not directly assigned to a previously identified resource (e.g., Division/Group Supervisor, Assistant Safety Officer, Technical Specialist, etc.).
8	Special Equipment & Supplies	List special equipment and supplies, including aviation support, used or needed. This may be a useful place to monitor span of control.
9	Reporting Location	Enter the specific location where the resources are to report (Staging Area, location at incident, etc.).
10	Requested Arrival Time	Enter the time (24-hour clock) that resources are requested to arrive at the reporting location.

Figure 36.29. ICS 215 Instructions—Page 1

Block Number	Block Title	Instructions
11	Total Resources Required	Enter the total number of resources required by category/kind/type as preferred (e.g., engine, squad car, ALS ambulance, etc.). A slash can be used again to indicate total single resources in the upper portion of the slash and total Strike Teams/ Task Forces in the bottom portion of the slash.
12	Total Resources Have on Hand	Enter the total number of resources on hand that are assigned to the incident for incident use. A slash can be used again to indicate total single resources in the upper portion of the slash and total Strike Teams/Task Forces in the bottom portion of the slash.
13	Total Resources Need To Order	Enter the total number of resources needed. A slash can be used again to indicate total single resources in the upper portion of the slash and total Strike Teams/Task Forces in the bottom portion of the slash.
14	Prepared by <ul style="list-style-type: none"> <li>• Name</li> <li>• Position/Title</li> <li>• Signature</li> <li>• Date/Time</li> </ul>	Enter the name, ICS position, and signature of the person preparing the form. Enter date (month/day/year) and time prepared (24-hour clock).

Figure 36.30. ICS 215 Instructions—Page 2

## ICS 215A—Incident Action Plan Safety Analysis

<b>INCIDENT ACTION PLAN SAFETY ANALYSIS (ICS 215A)</b>				
1. Incident Name:		2. Incident Number:		
3. Date/Time Prepared:		4. Operational Period:		
Date:	Time:	Date From:	Date To:	
		Time From:	Time To:	
5. Incident Area	6. Hazards/Risks		7. Mitigations	
8. Prepared by (Safety Officer): Name: _____		Signature: _____		
Prepared by (Operations Section Chief): Name: _____		Signature: _____		
ICS 215A		Date/Time: _____		

Figure 36.31. ICS 215A



## Instructions for Completing ICS Form 215A—Incident Action Plan Safety Analysis

### ICS 215A Incident Action Plan Safety Analysis

**Purpose.** The purpose of the Incident Action Plan Safety Analysis (ICS 215A) is to aid the Safety Officer in completing an operational risk assessment to prioritize hazards, safety, and health issues, and to develop appropriate controls. This worksheet addresses communications challenges between planning and operations, and is best utilized in the planning phase and for Operations Section briefings.

**Preparation.** The ICS 215A is typically prepared by the Safety Officer during the incident action planning cycle. When the Operations Section Chief is preparing for the tactics meeting, the Safety Officer collaborates with the Operations Section Chief to complete the Incident Action Plan Safety Analysis. This worksheet is closely linked to the Operational Planning Worksheet (ICS 215). Incident areas or regions are listed along with associated hazards and risks. For those assignments involving risks and hazards, mitigations or controls should be developed to safeguard responders, and appropriate incident personnel should be briefed on the hazards, mitigations, and related measures. Use additional sheets as needed.

**Distribution.** When the safety analysis is completed, the form is distributed to the Resources Unit to help prepare the Operations Section briefing. All completed original forms must be given to the Documentation Unit.

**Notes:**

- This worksheet can be made into a wall mount, and can be part of the IAP.
- If additional pages are needed, use a blank ICS 215A and repaginate as needed.

Block Number	Block Title	Instructions
1	<b>Incident Name</b>	Enter the name assigned to the incident.
2	<b>Incident Number</b>	Enter the number assigned to the incident.
3	<b>Date/Time Prepared</b>	Enter date (month/day/year) and time (using the 24-hour clock) prepared.
4	<b>Operational Period</b> <ul style="list-style-type: none"> <li>• Date and Time From</li> <li>• Date and Time To</li> </ul>	Enter the start date (month/day/year) and time (24-hour clock) and end date and time for the operational period to which the form applies.
5	<b>Incident Area</b>	Enter the incident areas where personnel or resources are likely to encounter risks. This may be specified as a Branch, Division, or Group.
6	<b>Hazards/Risks</b>	List the types of hazards and/or risks likely to be encountered by personnel or resources at the incident area relevant to the work assignment.
7	<b>Mitigations</b>	List actions taken to reduce risk for each hazard indicated (e.g., specify personal protective equipment or use of a buddy system or escape routes).
8	<b>Prepared by (Safety Officer and Operations Section Chief)</b> <ul style="list-style-type: none"> <li>• Name</li> <li>• Signature</li> <li>• Date/Time</li> </ul>	Enter the name of both the Safety Officer and the Operations Section Chief, who should collaborate on form preparation. Enter date (month/day/year) and time (24-hour clock) reviewed.

Figure 36.32. ICS 215A Instructions

## ICS 220—Air Operations Summary

<b>AIR OPERATIONS SUMMARY (ICS 220)</b>									
<b>1. Incident Name:</b>		<b>2. Operational Period:</b> Date From: _____ Date To: _____ Time From: _____ Time To: _____		<b>3. Sunrise:</b>		<b>Sunset:</b>			
<b>4. Remarks</b> (safety notes, hazards, air operations special equipment, etc.):		<b>5. Ready Alert Aircraft:</b> Medivac: _____ New Incident: _____		<b>6. Temporary Flight Restriction Number:</b> Altitude: _____ Center Point: _____		<b>9. Fixed-Wing</b> (category/kind/type, make/model, N#, base):  Air Tactical Group Supervisor Aircraft:			
		<b>8. Frequencies:</b>		<b>FM</b>					
		Air/Air Fixed-Wing		AM					
		Air/Air Rotary-Wing – Flight Following		Other Fixed-Wing Aircraft:					
<b>7. Personnel:</b>		Phone Number:							
Air Operations Branch Director				Air/Ground					
Air Support Group Supervisor				Command					
Air Tactical Group Supervisor				Deck Coordinator					
Helicopter Coordinator				Take-Off & Landing Coordinator					
Helibase Manager				Air Guard					
<b>10. Helicopters</b> (use additional sheets as necessary):									
FAA N#	Category/Kind/Type	Make/Model	Base	Available	Start	Remarks			
<b>11. Prepared by: Name:</b> _____		<b>Position/Title:</b> _____		<b>Signature:</b> _____					
<b>ICS 220, Page 1</b>		<b>Date/Time:</b> _____							

Figure 36.33. ICS 220



## Instructions for Completing ICS Form 220—Air Operations Summary

### ICS 220

#### Air Operations Summary

**Purpose.** The Air Operations Summary (ICS 220) provides the Air Operations Branch with the number, type, location, and specific assignments of helicopters and air resources.

**Preparation.** The ICS 220 is completed by the Operations Section Chief or the Air Operations Branch Director during each Planning Meeting. General air resources assignment information is obtained from the Operational Planning Worksheet (ICS 215), which also is completed during each Planning Meeting. Specific designators of the air resources assigned to the incident are provided by the Air and Fixed-Wing Support Groups. If aviation assets would be utilized for rescue or are referenced on the Medical Plan (ICS 206), coordinate with the Medical Unit Leader and indicate on the ICS 206.

**Distribution.** After the ICS 220 is completed by Air Operations personnel, the form is given to the Air Support Group Supervisor and Fixed-Wing Coordinator personnel. These personnel complete the form by indicating the designators of the helicopters and fixed-wing aircraft assigned missions during the specified operational period. This information is provided to Air Operations personnel who, in turn, give the information to the Resources Unit.

**Notes:**

- If additional pages are needed for any form page, use a blank ICS 220 and repaginate as needed.

Block Number	Block Title	Instructions
1	<b>Incident Name</b>	Enter the name assigned to the incident.
2	<b>Operational Period</b> <ul style="list-style-type: none"> <li>• Date and Time From</li> <li>• Date and Time To</li> </ul>	Enter the start date (month/day/year) and time (using the 24-hour clock) and end date and time for the operational period to which the form applies.
3	<b>Sunrise/Sunset</b>	Enter the sunrise and sunset times.
4	<b>Remarks</b> (safety notes, hazards, air operations special equipment, etc.)	Enter special instructions or information, including safety notes, hazards, and priorities for Air Operations personnel.
5	<b>Ready Alert Aircraft</b> <ul style="list-style-type: none"> <li>• Medivac</li> <li>• New Incident</li> </ul>	Identify ready alert aircraft that will be used as Medivac for incident assigned personnel and indicate on the Medical Plan (ICS 206). Identify aircraft to be used for new incidents within the area or new incident(s) within an incident.
6	<b>Temporary Flight Restriction Number</b> <ul style="list-style-type: none"> <li>• Altitude</li> <li>• Center Point</li> </ul>	Enter Temporary Flight Restriction Number, altitude (from the center point), and center point (latitude and longitude). This number is provided by the Federal Aviation Administration (FAA) or is the order request number for the Temporary Flight Restriction.
7	<b>Personnel</b> <ul style="list-style-type: none"> <li>• Name</li> <li>• Phone Number</li> </ul>	Enter the name and phone number of the individuals in Air Operations.
	Air Operations Branch Director	
	Air Support Group Supervisor	
	Air Tactical Group Supervisor	
	Helicopter Coordinator	
	Helibase Manager	

Figure 36.34. ICS 220 Instructions—Page 1



Block Number	Block Title	Instructions
8	<b>Frequencies</b> • AM • FM	Enter primary air/air, air/ground (if applicable), command, deck coordinator, take-off and landing coordinator, and other radio frequencies to be used during the incident.
	Air/Air Fixed-Wing	
	Air/Air Rotary-Wing – Flight Following	Flight following is typically done by Air Operations.
	Air/Ground	
	Command	
	Deck Coordinator	
	Take-Off & Landing Coordinator	
	Air Guard	
9	<b>Fixed-Wing</b> (category/kind/type, make/model, N#, base)	Enter the category/kind/type based on NIMS, discipline, or jurisdiction guidance, make/model, N#, and base of air assets allocated to the incident.
	Air Tactical Group Supervisor Aircraft	
	Other Fixed-Wing Aircraft	
10	<b>Helicopters</b>	Enter the following information about the helicopter resources allocated to the incident.
	FAA N#	Enter the FAA N#.
	Category/Kind/Type	Enter the helicopter category/kind/type based on NIMS, discipline, or jurisdiction guidance.
	Make/Model	Enter the make and model of the helicopter.
	Base	Enter the base where the helicopter is located.
	Available	Enter the time the aircraft is available.
	Start	Enter the time the aircraft becomes operational.
	Remarks	
11	<b>Prepared by</b> • Name • Position/Title • Signature • Date/Time	Enter the name, ICS position, and signature of the person preparing the form. Enter date (month/day/year) and time prepared (24-hour clock).
12	<b>Task/Mission/Assignment</b> (category/kind/type and function includes: air tactical, reconnaissance, personnel transport, search and rescue, etc.)	Enter the specific assignment (e.g., water or retardant drops, logistical support, or availability status for a specific purpose, support backup, recon, Medivac, etc.). If applicable, enter the primary air/air and air/ground radio frequency to be used. Mission assignments may be listed by priority.
	Category/Kind/Type and Function	
	Name of Personnel or Cargo (if applicable) or Instructions for Tactical Aircraft	
	Mission Start	
	Fly From	Enter the incident location or air base the aircraft is flying from.
	Fly To	Enter the incident location or air base the aircraft is flying to.

Figure 36.35. ICS 220 Instructions—Page 2

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## CHAPTER 37

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### A Sample IAP

This chapter includes a sample Incident Action Plan. This IAP is a fictional mission and is intended to demonstrate the use of the ICS forms for an incident.

**Background:** On February 12<sup>th</sup>, 2011 a snowboarder named Mike Stephen was snowboarding within the ski area at Arizona Mountain Ski Area. At approximately 1400 Mike decided to venture into the backcountry outside of the ski area boundary. He left the ski area at the top of Chairlift 1 on Agassiz Peak and headed to the area known locally as the “Southside”.

Mike is from Tucson and is not familiar with the area. According to the reporting party he was equipped with a Burton snowboard that is white and blue in color with black bindings. Mike was wearing black snowboarding pants, a red jacket, a black helmet, black gloves, and goggles. The reporting party believed that Mike had some trail mix and a sports drink with him but did not have any other equipment and was not wearing an avalanche beacon. Mike’s cell phone was found in the reporting party’s vehicle which is at the lodge parking lot.

February 12<sup>th</sup> was a blue sky day following three days of heavy snowfall and some wind. There is no avalanche forecasting center in the area but the avalanche conditions were believed to be high based on observations by the ski patrol and other local backcountry users. Avalanche and winter conditions are a concern for Mike and the responding search and rescue teams.

Hasty search efforts were started after the initial notification which occurred at 1600 on February 12<sup>th</sup> when Mike did not meet the reporting party as planned at the lodge. The search urgency was high due to the hazardous weather. Hasty search continued through 0600 on February 13<sup>th</sup>. During the late night of February 12<sup>th</sup> into the early morning of February 13<sup>th</sup> the transition occurred from a Route and Location Search to an Area Search. Additional overhead staff were assigned to the incident management team. The search area was identified and segmented, a consensus was performed, and an IAP was developed for Operational Period 1 which started at 0600 on February 13<sup>th</sup>.

<b>STEPHEN SEARCH</b>
<b>OPERATIONAL PERIOD 1</b>
<b>02/13/11</b>
<b>0600-1800</b>

**Figure 37.1.** Part of IAP Cover Sheet

<b>INCIDENT OBJECTIVES (ICS 202)</b>																	
<b>1. Incident Name:</b> STEPHEN SAR	<b>2. Operational Period:</b> Date From: 02/13/11      Date To: 02/13/11 Time From: 0600      Time To: 1800																
<b>3. Objective(s):</b> 1. PROVIDE FOR THE SAFETY OF INCIDENT PERSONNEL AND THE PUBLIC THROUGHOUT THE INCIDENT. 2. ESTABLISH AND MAINTAIN CONTAINMENT OF THE SEARCH AREA BY 0800 ON 02/13/11. 3. BASED ON SURVIVABILITY, TERRAIN, AND HAZARDS SEARCH SEGMENTS IN SEARCH AREA TO CPOD OF 70% BY 1800 ON 02/20/11.																	
<b>4. Operational Period Command Emphasis:</b> PROVIDE ACCURATE AND TIMELY PUBLIC INFORMATION THROUGHOUT THE INCIDENT.																	
General Situational Awareness BE AWARE OF HAZARDOUS WINTER WEATHER CONDITIONS AND COLD INJURY/ILLNESS. BE AWARE OF SIGNIFICANT AVALANCHE DANGER IN THE AREA AND USE APPROPRIATE PPE AND AVALANCHE AVOIDANCE TECHNIQUES.																	
<b>5. Site Safety Plan Required?</b> Yes <input type="checkbox"/> No <input type="checkbox"/> <b>Approved Site Safety Plan(s) Located at:</b>																	
<b>6. Incident Action Plan</b> (the items checked below are included in this Incident Action Plan): <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">X ICS 203</td> <td style="width: 33%;">□ ICS 207</td> <td style="width: 34%;">Other Attachments:</td> </tr> <tr> <td>X ICS 204</td> <td>□ ICS 208</td> <td>X ICS 214</td> </tr> <tr> <td>X ICS 205</td> <td>X Map/Chart</td> <td>□</td> </tr> <tr> <td>□ ICS 205A</td> <td>X Weather Forecast/Tides/Currents</td> <td>□</td> </tr> <tr> <td>X ICS 206</td> <td></td> <td>□</td> </tr> </table>			X ICS 203	□ ICS 207	Other Attachments:	X ICS 204	□ ICS 208	X ICS 214	X ICS 205	X Map/Chart	□	□ ICS 205A	X Weather Forecast/Tides/Currents	□	X ICS 206		□
X ICS 203	□ ICS 207	Other Attachments:															
X ICS 204	□ ICS 208	X ICS 214															
X ICS 205	X Map/Chart	□															
□ ICS 205A	X Weather Forecast/Tides/Currents	□															
X ICS 206		□															
<b>7. Prepared by:</b> Name: <u>AARON DICK</u> Position/Title: <u>PSC</u> Signature: <u>Aaron Dick</u>																	
<b>8. Approved by Incident Commander:</b> Name: <u>ERIC JOHNSON</u> Signature: <u>Eric Johnson</u>																	
ICS 202	IAP Page <u>2</u>	Date/Time: <u>02/12/11 2300</u>															

Figure 37.2. IAP 202

<b>ORGANIZATION ASSIGNMENT LIST (ICS 203)</b>				
<b>1. Incident Name:</b> STEPHEN SAR		<b>2. Operational Period:</b> Date From: 02/13/11      Date To: 02/13/11 Time From: 0600      Time To: 1800		
<b>3. Incident Commander(s) and Command Staff:</b>		<b>7. Operations Section:</b>		
IC/UCs	ERIC JOHNSON	Chief	JESSE ROBINSON	
		Investigations	JIM COFFEY	
Deputy		Staging Area		
Safety Officer	SHAWN DE GAN	<b>Branch</b>		
Public Info. Officer	GERRY BLAIR	Branch Director		
Liaison Officer		Deputy		
<b>4. Agency/Organization Representatives:</b>		Search Group	BARKY HEALER	
Agency/Organization	Name	Containment Group	BILL PEAK	
USFS	FORREST SMITH	Rescue Group	WALDO KING	
ADEM	JAMES LANGSTON	Division/Group		
		Division/Group		
		<b>Branch</b>		
		Branch Director		
		Deputy		
<b>5. Planning Section:</b>		Division/Group		
Chief	AARON DICK	Division/Group		
Deputy		Division/Group		
Resources Unit		Division/Group		
Situation Unit		Division/Group		
Documentation Unit		<b>Branch</b>		
Demobilization Unit		Branch Director		
Technical Specialists	DAVID LOVELOCK (WINCASIE)	Deputy		
	STORMY WEATHER (NWS)	Division/Group		
		Division/Group		
		Division/Group		
<b>6. Logistics Section:</b>		Division/Group		
Chief	LARRY LARKIN	Division/Group		
Deputy		<b>Air Operations Branch</b>		
<b>Support Branch</b>		Air Ops Branch Dir.	KENT PHILLIPS	
Director				
Supply Unit				
Facilities Unit		<b>8. Finance/Administration Section:</b>		
Ground Support Unit		Chief	PENNY PINCHER	
<b>Service Branch</b>		Deputy		
Director		Time Unit		
Communications Unit		Procurement Unit		
Medical Unit		Comp/Claims Unit		
Food Unit		Cost Unit		
<b>9. Prepared by:</b> Name: AARON DICK      Position/Title: PSC      Signature: AARON DICK				
ICS 203	IAP Page 3	Date/Time: 02/12/11 0100		

Figure 37.3. IAP 203



<b>ASSIGNMENT LIST (ICS 204)</b>				
<b>1. Incident Name:</b> STEPHEN SAR		<b>2. Operational Period:</b> Date From: 02/13/11      Date To: 02/13/11 Time From: 0600      Time To: 1800		<b>3. Branch:</b>
<b>4. Operations Personnel:</b> <u>Name</u> <u>Contact Number(s)</u> Operations Section Chief: <u>JESSE ROBINSON</u> <u>928-555-0001</u> Branch Director: Division/Group Supervisor: <u>BILL PEAK</u> <u>928-555-0002</u>			<b>Division:</b>  <b>Group: Containment</b>  <b>Staging Area:</b>	
<b>5. Resources Assigned:</b>		<b># of Persons</b>	<b>Contact (e.g., phone, pager, radio frequency, etc.)</b>	<b>Reporting Location, Special Equipment and Supplies, Remarks, Notes, Information</b>
<b>Resource Identifier</b>	<b>Leader</b>			
Containment 1	Bill Street	2	SAR Frequency	FS516/FS522 intersection
Containment 2	Bob Mitchell	2	SAR Frequency	US180 between FS516 and Peak View Pullout
Containment 3	Jim Dandy	2	SAR Frequency	Kachina Trailhead at ASB
<b>6. Work Assignments:</b> Containment 1: Provide containment and interview any persons exiting the backcountry on FS522 at the intersection with FS516. Containment 2: Patrol US180 between FS516 and Peak View Pullout watching for skiers exiting backcountry onto US180. Containment 3: Provide containment at the Kachina Trailhead at the Arizona Snowbowl. Any parties exiting the trail should be interviewed.				
<b>7. Special Instructions:</b> All interviews should include subjects name, address, and phone number for re-contact by investigators if needed.				
<b>8. Communications (radio and/or phone contact numbers needed for this assignment):</b>				
<u>Name/Function</u>		<u>Primary Contact: indicate cell, pager, or radio (frequency/system/channel)</u>		
Bill Street	/ Rocky Road	SAR Frequency or 928-555-9999		
Bob Mitchell	/ Don Thomas	SAR Frequency or 928-555-9998		
Jim Dandy	/ Buzz Phillips	SAR Frequency or 928-555-9997		
ICP	/	Coconino 2ADAM Freq or 928-555-7777		
<b>9. Prepared by:</b> Name: <u>Aaron Dick</u> Position/Title: <u>PSC</u> Signature: <u>Aaron Dick</u>				
ICS 204	IAP Page <u>4</u>	Date/Time: <u>02/12/11 2330</u>		

Figure 37.4. IAP 204

<b>ASSIGNMENT LIST (ICS 204)</b>				
<b>1. Incident Name:</b> STEPHEN SAR		<b>2. Operational Period:</b> Date From: 02/13/11      Date To: 02/13/11 Time From: 0600      Time To: 1800		<b>3. Branch:</b>
<b>4. Operations Personnel:</b> <u>Name</u> <u>Contact Number(s)</u> Operations Section Chief: <u>JESSE ROBINSON</u> <u>928-555-0001</u> Branch Director: _____ Division/Group Supervisor: <u>BARKY HEALER</u> <u>928-555-0003</u>			<b>Division:</b>  <b>Group: Search</b>  <b>Staging Area:</b>	
<b>5. Resources Assigned:</b>		<b># of Persons</b>	<b>Contact (e.g., phone, pager, radio frequency, etc.)</b>	<b>Reporting Location, Special Equipment and Supplies, Remarks, Notes, Information</b>
<b>Resource Identifier</b>	<b>Leader</b>			
Search S/T 4	Paul Sanderson	6	SAR Frequency	FS516/US180
Search S/T 5	Scott Kuhr	6	SAR Frequency	FS516/US180
Search S/T 6	Ken Herron	6	SAR Frequency	FS516/US180
<b>6. Work Assignments:</b> Search S/T 4 will search segment 3 starting at the top of the segment and make cross slope passes as they progress downhill.  Search S/T 5 will search segment 4 starting at southeast corner working east to west.  Search S/T 6 will search segment 5 starting at top of segment and working downslope.				
<b>7. Special Instructions:</b> All clues should be reported to the ICP. Any avalanche debris should be probed and a beacon search conducted. All personnel should have appropriate avalanche rescue equipment including a beacon, shovel, and probe.				
<b>8. Communications (radio and/or phone contact numbers needed for this assignment):</b>				
<u>Name/Function</u>		<u>Primary Contact: indicate cell, pager, or radio (frequency/system/channel)</u>		
Paul Sanderson /		SAR Frequency or 928-555-9996		
Scott Kuhr /		SAR Frequency or 928-555-9995		
Ken Herron /		SAR Frequency or 928-555-9994		
ICP /		Coconino 2ADAM or 928-555-7777		
<b>9. Prepared by:</b> Name: <u>Aaron Dick</u> Position/Title: <u>PSC</u> Signature: <u>Aaron Dick</u>				
ICS 204	IAP Page <u>5</u>	Date/Time: <u>02/12/11 2330</u>		

Figure 37.5. IAP 204



<b>ASSIGNMENT LIST (ICS 204)</b>														
<b>1. Incident Name:</b> STEPHEN SAR		<b>2. Operational Period:</b> Date From: 02/13/11      Date To: 02/13/11 Time From: 0600      Time To: 1800		<b>3. Branch:</b>										
<b>4. Operations Personnel:</b> <u>Name</u> <u>Contact Number(s)</u> Operations Section Chief: <u>JESSE ROBINSON</u> 928-555-0001 Branch Director: Division/Group Supervisor: <u>WALDO KING</u> 928-555-0004			<b>Division:</b>  <b>Group: Rescue</b> <b>Staging Area:</b> <b>FS516/US180</b>											
<b>5. Resources Assigned:</b>		<b># Persons</b>	<b>Contact (e.g., phone, pager, radio frequency, etc.)</b>	<b>Reporting Location, Special Equipment and Supplies, Remarks, Notes, Information</b>										
<b>Resource Identifier</b>	<b>Leader</b>													
Rescue T/F 7	Randy Marlatt	8	SAR Frequency	FS516/US180										
<b>6. Work Assignments:</b> Rescue T/F 7 will stand-by at the Staging for deployment into the field once the subject is located or a search team/member becomes incapacitated and requires rescue.														
<b>7. Special Instructions:</b> Snowcat and Snowmobiles should be fueled and ready for response once a subject is located.														
<b>8. Communications</b> (radio and/or phone contact numbers needed for this assignment): <table style="width: 100%; border: none;"> <tr> <td style="border-bottom: 1px solid black; width: 35%;">Name/Function</td> <td style="border-bottom: 1px solid black; width: 65%;">Primary Contact: indicate cell, pager, or radio (frequency/system/channel)</td> </tr> <tr> <td>Randy Marlatt      /</td> <td>SAR Frequency or 928-555-9990</td> </tr> <tr> <td>ICP      /</td> <td>Coconino 2ADAM or 928-555-7777</td> </tr> <tr> <td>       /</td> <td> </td> </tr> <tr> <td>       /</td> <td> </td> </tr> </table>					Name/Function	Primary Contact: indicate cell, pager, or radio (frequency/system/channel)	Randy Marlatt      /	SAR Frequency or 928-555-9990	ICP      /	Coconino 2ADAM or 928-555-7777	/		/	
Name/Function	Primary Contact: indicate cell, pager, or radio (frequency/system/channel)													
Randy Marlatt      /	SAR Frequency or 928-555-9990													
ICP      /	Coconino 2ADAM or 928-555-7777													
/														
/														
<b>9. Prepared by:</b> Name: <u>Aaron Dick</u> Position/Title: <u>PSC</u> Signature: <u>Aaron Dick</u>														
<b>ICS 204</b>	<b>IAP Page</b> <u>6</u>	<b>Date/Time:</b> <u>02/13/11 2330</u>												

Figure 37.6. IAP 204

<b>ASSIGNMENT LIST (ICS 204)</b>														
<b>1. Incident Name:</b> STEPHEN SAR		<b>2. Operational Period:</b> Date From: 02/14/11      Date To: 02/14/11 Time From: 0600      Time To: 1800		<b>3. Branch:</b>										
<b>4. Operations Personnel:</b> <u>Name</u> <u>Contact Number(s)</u> Operations Section Chief: <u>JESSE ROBINSON</u> <u>928-555-0001</u> Branch Director: _____ Division/Group Supervisor: _____			<b>Division:</b>  <b>Group:</b>  <b>Staging Area:</b>											
<b>5. Resources Assigned:</b>		<b># of Persons</b>	Contact (e.g., phone, pager, radio frequency, etc.)	Reporting Location, Special Equipment and Supplies, Remarks, Notes, Information										
Resource Identifier	Leader													
INVESTIGATIONS	JIM COFFEY	3	928-555-0101											
<b>6. Work Assignments:</b> This unit will conduct background investigation on missing subject and follow-up on clues developed through the investigation and by search resources in the field.  If a deceased subject is located or evidence of a crime is uncovered in the field the Investigations Unit will provide direction to on-scene resources for processing the scene.														
<b>7. Special Instructions:</b> Investigators that plan to deploy into the field should have appropriate PPE.														
<b>8. Communications</b> (radio and/or phone contact numbers needed for this assignment): <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%; border-bottom: 1px solid black;">Name/Function</td> <td style="width: 60%; border-bottom: 1px solid black;">Primary Contact: indicate cell, pager, or radio (frequency/system/channel)</td> </tr> <tr> <td>Tom Gumshoe /</td> <td>928-555-0104</td> </tr> <tr> <td>Jim Sleuth /</td> <td>928-555-0105</td> </tr> <tr> <td>Jim Coffey /</td> <td>928-555-0101</td> </tr> <tr> <td>/</td> <td></td> </tr> </table>					Name/Function	Primary Contact: indicate cell, pager, or radio (frequency/system/channel)	Tom Gumshoe /	928-555-0104	Jim Sleuth /	928-555-0105	Jim Coffey /	928-555-0101	/	
Name/Function	Primary Contact: indicate cell, pager, or radio (frequency/system/channel)													
Tom Gumshoe /	928-555-0104													
Jim Sleuth /	928-555-0105													
Jim Coffey /	928-555-0101													
/														
<b>9. Prepared by:</b> Name: <u>Aaron Dick</u> Position/Title: <u>PSC</u> Signature: <u>Aaron Dick</u>														
ICS 204	IAP Page <u>7</u>	Date/Time: <u>02/12/11 2330</u>												

Figure 37.7. IAP 204

Incident Radio Communications Plan (ICS 205)										
<b>1. Incident Name:</b> STEPHEN SAR				<b>2. Date/Time Prepared:</b> Date: 02/13/11 Time: 2300				<b>3. Operational Period:</b> Date From: 02/14/11      Date To: 02/14/11 Time From: 0600      Time To: 1800		
<b>4. Basic Radio Channel Use:</b>										
Zone Grp.	Ch #	Function	Channel Name/Trunked Radio System Talkgroup	Assignment	RX Freq N or W	RX Tone/NAC	TX Freq N or W	TX Tone/NAC	Mode (A, D, or M)	Remarks
	1	COMMAND	COCONINO 2ADAM	COMMAND	155.835	110.1	155.210	110.1	A	
	2	TACTICAL	STATE SAR	GROUND SEARCH	155.160	NA	155.160	NA	A	
	3	GROUND TO AIR	VFIRE21 (FIRE MUT. AID)	AIR OPS	154.280	100.0	154.280	100.0	A	
	4	TACTICAL	COCONINO 1ADAM	INVESTIGATION	155.490	101.3	154.200	101.3	A	
	5	AIR TO AIR	MULTICOM	AIR OPS	122.850	NA	122.850	NA	A	
<b>5. Special Instructions:</b>										
<b>6. Prepared by</b> (Communications Unit Leader): Name: <u>Larry Larkin</u> Signature: <u>Larry Larkin</u>										
ICS 205			IAP Page _____			Date/Time: <u>02/13/11 2315</u>				

Figure 37.8. IAP 205

<b>MEDICAL PLAN (ICS 206)</b>							
<b>1. Incident Name:</b> STEPHEN SAR			<b>2. Operational Period:</b> Date From: 02/14/11 Time From: 0600		Date To: 02/14/11 Time To: 1800		
<b>3. Medical Aid Stations:</b>							
Name	Location	Contact Number(s)/Frequency	Paramedics on Site?				
			<input type="checkbox"/> Yes <input type="checkbox"/> No				
			<input type="checkbox"/> Yes <input type="checkbox"/> No				
			<input type="checkbox"/> Yes <input type="checkbox"/> No				
			<input type="checkbox"/> Yes <input type="checkbox"/> No				
<b>4. Transportation</b> (indicate air or ground):							
Ambulance Service	Location	Contact Number(s)/Frequency	Level of Service				
GUARDIAN MEDICAL	FLAGSTAFF	1-800-555-1111	<input checked="" type="checkbox"/> ALS <input type="checkbox"/> BLS				
GUARDIAN AIR	FLAGSTAFF AIRPORT	1-800-555-2222	<input checked="" type="checkbox"/> ALS <input type="checkbox"/> BLS				
			<input type="checkbox"/> ALS <input type="checkbox"/> BLS				
			<input type="checkbox"/> ALS <input type="checkbox"/> BLS				
<b>5. Hospitals:</b>							
Hospital Name	Address, Latitude & Longitude if Helipad	Contact Number(s)/Frequency	Travel Time		Trauma Center	Burn Center	Helipad
			Air	Ground			
FLAGSTAFF MEDICAL CNTR	1200 N. BEAVER ST	1-800-555-3333	5MIN	20MIN	<input checked="" type="checkbox"/> Yes Level: <u>1</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
MARICOPA MEDICAL CNTR	2601 E Roosevelt St Phoenix, AZ	1-800-555-4444	1HR	2HR	<input checked="" type="checkbox"/> Yes Level: _____	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
					<input type="checkbox"/> Yes Level: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
					<input type="checkbox"/> Yes Level: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>6. Special Medical Emergency Procedures:</b> IF AN INJURY OCCURS NOTIFY SUPERVISOR AND BRANCH DIRECTOR WITH ASSESSMENT AND LOCATION OF THE INCIDENT. BRANCH DIRECTOR AND OSC WILL DETERMINE APPROPRIATE EVACUATION METHOD.							
<input checked="" type="checkbox"/> Check box if aviation assets are utilized for rescue. If assets are used, coordinate with Air Operations.							
<b>7. Prepared by</b> (Medical Unit Leader): Name: _____ Signature: _____							
<b>8. Approved by</b> (Safety Officer): Name: <u>Shawn Degan</u> Signature: <u>Shawn Degan</u>							
ICS 206		IAP Page _____		Date/Time: 02/13/11 2230			

Figure 37.9. IAP 206



<b>SAFETY MESSAGE/PLAN (ICS 208)</b>		
<b>1. Incident Name:</b> STEPHEN SAR	<b>2. Operational Period:</b> Date From: 02/14/11      Date To: 02/14/11 Time From: 0600                      Time To: 1800	
<b>3. Safety Message/Expanded Safety Message, Safety Plan, Site Safety Plan:</b>		
<ol style="list-style-type: none"> <li>1. Be alert for cold weather injury/illness among team members.</li> <li>2. Be alert for altitude illness among team members.</li> <li>3. Watch out for avalanche hazard in the search area. Use appropriate PPE and avoidance techniques.</li> <li>4. When operating with helicopters follow guidance from crew members and wear appropriate PPE.</li> <li>5. Utilize appropriate clothing items for winter weather operations (NO COTTON).</li> <li>6. Utilize appropriate PPE for any patient contact.</li> </ol>		
<b>4. Site Safety Plan Required?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		
<b>Approved Site Safety Plan(s) Located At:</b>		
<b>5. Prepared by:</b> Name: <u>Shawn Degan</u> Position/Title: <u>SOFR</u> Signature: <u>Shawn Degan</u>		
ICS 208	IAP Page <u>      </u>	Date/Time: <u>02/13/11 2200</u>

Figure 37.10. IAP 208

Air Operations Summary (ICS 220)						
<b>1. Incident Name:</b> STEPHEN SAR		<b>2. Operational Period:</b> Date From: 02/13/11      Date To: 02/13/11 Time From: 0600      Time To: 1800			<b>3. Sunrise:</b> 0702 <b>Sunset:</b> 1842	
<b>4. Remarks</b> (safety notes, hazards, air operations special equipment, etc.): Helicopters should have FLIR and NVG available.		<b>5. Ready Alert Aircraft:</b> Medivac: Guardian Air Transport Angel 4 New Incident:			<b>6. Temporary Flight Restriction Number:</b> 11-23 Altitude: 5000FT AGL Center Point: 35° 14.324' 111° 34.675'	
		<b>8. Frequencies:</b>			<b>9. Fixed-Wing</b> (category/kind/type, make/model, N#, base):	
		Air/Air Fixed-Wing			Air Tactical Group Supervisor Aircraft:	
<b>7. Personnel:</b>	Name:	Phone Number:	Air/Air Rotary-Wing – Flight Following	122.850		
Air Operations Branch Director	KENT PHILLIPS		Air/Ground		154.280	
Air Support Group Supervisor			Command		155.835	Other Fixed-Wing Aircraft:
Air Tactical Group Supervisor			Deck Coordinator			
Helicopter Coordinator			Take-Off & Landing Coordinator			
Helibase Manager			Air Guard			
<b>10. Helicopters</b> (use additional sheets as necessary):						
FAA N#	Category/Kind/Type	Make/Model	Base	Available	Start	Remarks
N123AZ	Type III	BELL 407	FLAGSTAFF	0600	0600	Air Search/Insertion
<b>11. Prepared by:</b> Name: <u>KENT PHILLIPS</u> Position/Title: <u>AOBD</u> Signature: <u>Kent Phillips</u>						
ICS 220, Page 1			Date/Time: 02/12/11 2345			

Figure 37.11. IAP 220 Page 1



## AIR OPERATIONS SUMMARY (ICS 220)

Figure 37.12. IAP 220 Page 2

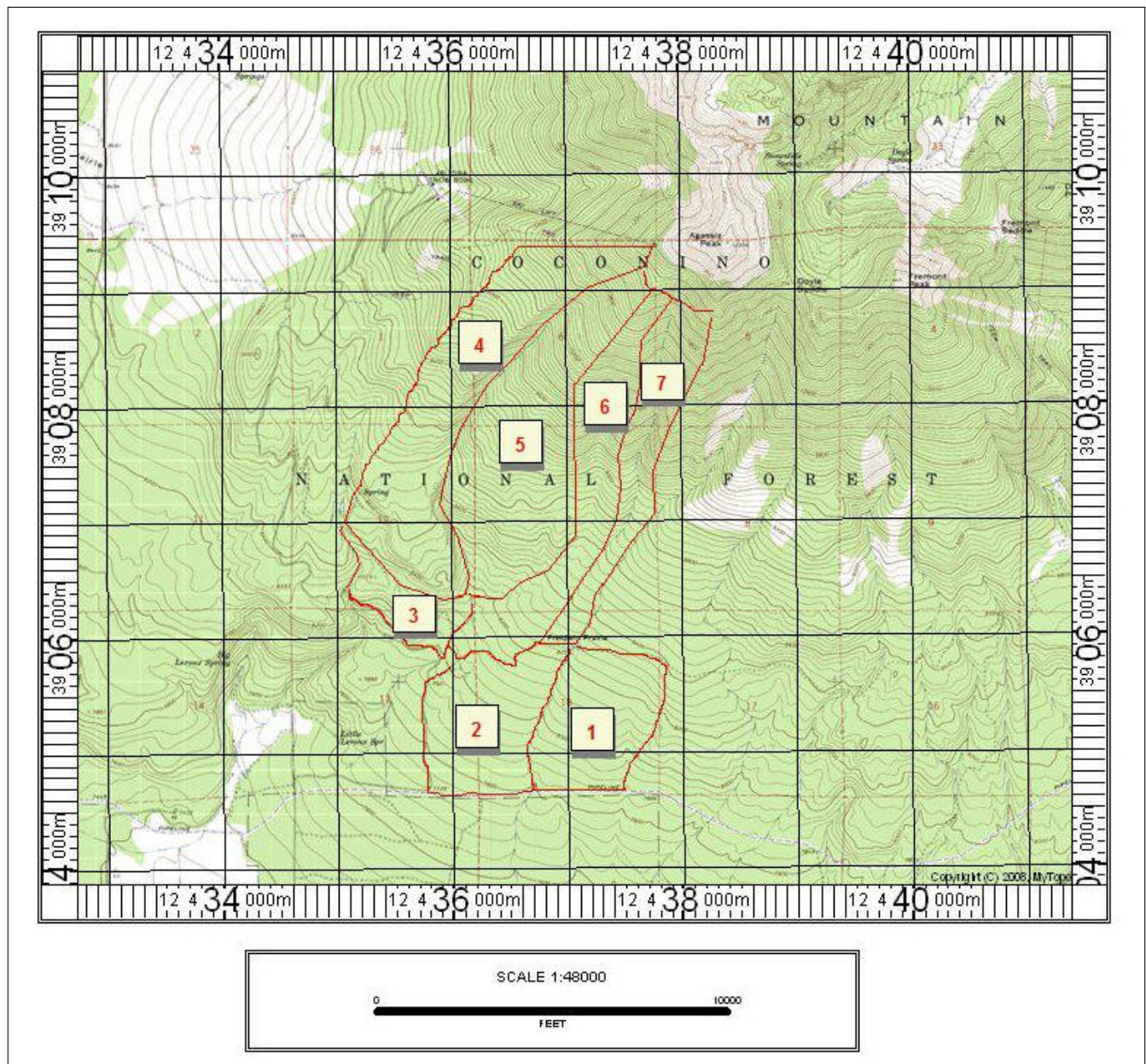


Figure 37.13. Segmented map with segment numbers

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# CHAPTER 38

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## Job Action Sheets

A Job Action Sheet, or JAS, is a tool for defining and performing a specific emergency response functional role. A JAS is designed to clarify responsibilities. While regular planning, training, exercises and evaluation are necessary to ensure that members of the IMT are competent to perform their emergency response roles, having a JAS can help ensure that each responder understands and performs assigned duties according to plan.

JASs based on ICS are common in the handling of medical emergencies. The Job Action Sheets in this text are based in part on the document [http://www.emsa.ca.gov/HICS/files/JAS\\_Plan.doc](http://www.emsa.ca.gov/HICS/files/JAS_Plan.doc) from the California Emergency Medical Services Authority, on the documents <https://homeport.uscg.mil/mycg/portal/ep/contentView.do?contentId=41284&contentType=EDITORIAL> from the U.S. Department of Homeland Security, and on the documents <http://training.fema.gov/EMIWeb/IS/ICSResource/PositionChecklists.htm> from FEMA.

To paraphrase the U.S. Department of Homeland Security

*“These Job Action Sheets do not cover other important traits of an effective PSC, such as:*

- *Good leadership, interpersonal and communications skills, or experience in risk-based decision making.*
- *A solid grasp of political, social, environmental, and economic issues.*
- *Experience in risk-based decision making and in-depth knowledge of substantive aspects of the incident at hand.*

*A good PSC exhibits these traits and many more in addition to properly executing the ICS.”*

Table 38.1. Initial Response Incident Commander Job Action Sheet ©2014

Initial Response Incident Commander (IRIC) Job Action Sheet	
<b>Reports to:</b>	Agency Administrator
<b>Mission:</b>	<ul style="list-style-type: none"> <li>• Responsible for all incident activities during the initial response period including development and implementation of strategic decisions and for ordering and release of all resources.</li> <li>• Ensure welfare and safety of incident personnel.</li> <li>• Supervises all responding resources.</li> <li>• Determine whether incident can be managed with personnel on scene/en route or if higher level incident management is needed.</li> </ul>
<b>Qualifications:</b>	<ul style="list-style-type: none"> <li>• Leadership ability.</li> <li>• Experience in responding to Search incidents as a supervisor of single resources, Task Forces or Strike Teams.</li> <li>• Ability to see “the big picture” and focus on those actions most important to achieving the desired outcomes.</li> <li>• Knowledge of local resources and geography.</li> <li>• Investigative experience.</li> </ul>
<b>Oversees:</b>	<ul style="list-style-type: none"> <li>• All initial response resources, including single resources, Task Forces, Strike Teams.</li> <li>• If appointed, supervises Investigators or Investigative Unit Leader.</li> <li>• If appointed, supervises Command and General Staff.</li> </ul>
<b>Immediate Actions:</b>	<ul style="list-style-type: none"> <li>• Focus on Investigation, Containment, and Search in that order.</li> <li>• Take the initial report, either from the Agency Dispatcher or from the Reporting Party and write it down, either on a Lost Person Questionnaire, the ICS 201, or the WinCASIE III Initial Note. <ul style="list-style-type: none"> <li>◦ Name and contact information of reporting party.</li> <li>◦ How the report was received (telephone, person, etc.).</li> <li>◦ Name of missing person.</li> <li>◦ Thumbnail sketch of missing person.</li> <li>◦ Circumstances of loss.</li> <li>◦ Date and time last seen.</li> <li>◦ Place Last Seen or Last Known Point (as precisely and accurately as possible).</li> <li>◦ What does the reporting party think happened?</li> <li>◦ What does the reporting party want you to do?</li> <li>◦ What Instructions did you give to the reporting party (stay put, call back in an hour, use text messages only to communicate with cell phone, etc.)?</li> </ul> </li> <li>• Check in with Agency Dispatcher, and on ICS 201, page 4.</li> <li>• When appointed as IRIC, communicate this to dispatcher and incident-related personnel.</li> <li>• Read this entire Job Action Sheet.</li> <li>• Mark the Initial Planning Point on your map.</li> <li>• Initiate further investigation using the Lost Person Questionnaire as a guide, and consider delegating these duties to an Investigator.</li> </ul>
Initial Response Incident Commander Job Action Sheet continued on next page ...	

...Initial Response Incident Commander Job Action Sheet continued from previous page

- Assess Current Situation:
  - Determine Search Urgency.
  - Review Lost Person Behavior.
  - Review topography within the area defined by “distance traveled” in LPB and mark on map:
    - ◊ Hazards.
    - ◊ Barriers to travel.
    - ◊ Trails, and other travel aids.
    - ◊ Likely spots that might attract or hold the missing person.
  - Identify those resources immediately available to respond.
  - Conduct and record a scenario analysis. (Use Scenario Analysis worksheet.)
  - Consider the possibility of a criminal act.
  - Identify the potential “risks” to the missing person and to the searchers.
  - Consider history of other missing persons in the same area.
- Designate an Incident Command Post and notify all personnel of the location. Mark location on the map, and make sure you don’t leave it!
- Put on position identification
- Write 3–5 Initial Response Incident Objectives on ICS 201.
  - Continue investigation.
  - Contain the subject.
  - Locate and protect the PLS/IPP.
  - Determine direction of travel.
  - Search likely routes and locations.
  - Provide for responder safety!
- Choose a strategy or strategies to accomplish each objective.
- Define the Tasks to carry out the strategy(ies).
- Determine what kind and how many resources will be required to implement the Tactics.
- Identify any needed reporting locations/staging areas. Mark on the map.
- Order the required resources and begin tracking them on the ICS 201, page 4.
- Confirm dispatch and arrival times of activated resources.
- Brief and assign the initial response search resources.

**Intermediate  
Actions:**

- Keep the agency administrator and agency dispatcher informed of incident and response status regularly.
- Evaluate the initial response plan and track the resources’ progress in achieving the Incident Objectives.
- Review the Investigative Task checklist (see Chapter 34 on page 278) to ensure that all investigative tasks are being accomplished.
- Consider appointing and delegating work as necessary to Command and General Staff positions.
- Debrief the initial response resources as they complete their assignments. Reassign to additional tasks as appropriate.
- If it appears that the initial response resources will not be able to locate the missing person quickly, consider ordering additional resources.
  - Ensure ICS 201 and/or Initial Note is complete and accurate.
  - Set time and location for the Transition Briefing.
  - Conduct the Initial Briefing using the ICS 201 and other pertinent documents:
    - ◊ Lost Person Questionnaire.
    - ◊ Missing Person Flyer.
    - ◊ Clue Log.
    - ◊ Investigative information.

Initial Response Incident Commander Job Action Sheet continued on next page ...

... Initial Response Incident Commander Job Action Sheet continued from previous page	
<b>Demobilization:</b>	<ul style="list-style-type: none"><li>• If needed, develop a Demobilization Plan based upon the needs of the incident.</li><li>• If needed, determine Release Priorities.</li><li>• If needed, implement the Demobilization Plan.</li><li>• Participate in the After Action Review.</li></ul>
<b>Forms Prepared:</b>	ICS 201
<b>Forms Approved:</b>	ICS 201
<b>Meetings:</b>	Initial Incident Briefing, After Action Review.



Table 38.2. Incident Commander Job Action Sheet ©2014

Incident Commander (IC) Job Action Sheet	
<b>Reports to:</b>	Agency Administrator
<b>Mission:</b>	<ul style="list-style-type: none"> <li>• Responsible for all incident activities including development and implementation of strategic decisions and for approving ordering and release of all resources.</li> <li>• Ensure welfare and safety of incident personnel.</li> <li>• Supervise Command and General Staff.</li> </ul>
<b>Qualifications:</b>	<ul style="list-style-type: none"> <li>• Leadership ability.</li> <li>• Experience in managing complex Search incidents.</li> <li>• Ability to see “the big picture” and focus on those actions most important to achieving the desired outcomes.</li> </ul>
<b>Oversees:</b>	<ul style="list-style-type: none"> <li>• Safety Officer.</li> <li>• Information Officer.</li> <li>• Liaison Officer.</li> <li>• Operations Section Chief.</li> <li>• Planning Section Chief.</li> <li>• Logistics Section Chief.</li> <li>• Finance/Administration Section Chief.</li> </ul>
<b>Immediate Actions:</b>	<ul style="list-style-type: none"> <li>• Check in on ICS 211.</li> <li>• Obtain initial briefing from current Incident Commander and agency administrator.</li> <li>• Read this entire Job Action Sheet and review incident management organization chart.</li> <li>• Put on position identification.</li> <li>• Assess Current Situation:             <ul style="list-style-type: none"> <li>◦ Review the current situation status and initial incident objectives. Ensure that all local, State and Federal agencies impacted by the incident have been notified.</li> </ul> </li> <li>• Recognize jurisdictional boundaries.             <ul style="list-style-type: none"> <li>◦ Determine need for, establish, and participate in Unified Command.</li> <li>◦ Co-located command post.</li> <li>◦ Unified and prioritized incident objectives.</li> <li>◦ Coordinated strategy.</li> <li>◦ Single coordinated IAP.</li> <li>◦ One Operations Section Chief (if activated).</li> <li>◦ Communications plan.</li> <li>◦ Resource ordering plan.</li> </ul> </li> <li>• Activate appropriate Command and General Staff positions.</li> <li>• Confirm dispatch and arrival times of activated resources.</li> <li>• Confirm work assignments.</li> <li>• Announce Change of Command to all Incident personnel.</li> <li>• Develop and approve Incident Objectives.</li> <li>• Approve Incident Strategy.</li> </ul>
Incident Commander Job Action Sheet continued on next page ...	

... Incident Commander Job Action Sheet continued from previous page	
	<ul style="list-style-type: none"> <li>• Brief Staff: <ul style="list-style-type: none"> <li>◦ Identify incident objectives and any policy directives for the management of the incident.</li> <li>◦ Provide a summary of current organization.</li> <li>◦ Provide a review of current incident activities.</li> <li>◦ Set time for initial planning meeting.</li> </ul> </li> <li>• Establish level of planning to be accomplished: <ul style="list-style-type: none"> <li>◦ Written IAP.</li> <li>◦ Contingency planning.</li> </ul> </li> </ul>
<b>Intermediate Actions:</b>	<ul style="list-style-type: none"> <li>• Approve and authorize implementation of the IAP: <ul style="list-style-type: none"> <li>◦ Review IAP for completeness and accuracy.</li> <li>◦ Verify that objectives are incorporated and prioritized.</li> <li>◦ Sign ICS Form 202.</li> </ul> </li> <li>• Establish parameters for resource requests and releases.</li> <li>• Review requests for critical resources.</li> <li>• Confirm who has ordering authority within the organization.</li> <li>• Confirm those orders that require Command authorization.</li> <li>• Authorize release of information to the media.</li> <li>• Ensure Planning Meetings are conducted as directed.</li> <li>• Manage by wandering around incident to meet and discuss progress/problems with Command and General Staff.</li> <li>• Coordinate with key team members inside and outside the ICS Organization (Command and General Staff, Agency Administrator, EOC/MAC personnel, etc.) to ensure all aspects of the incident objectives are addressed.</li> </ul>
<b>Extended Actions:</b>	<ul style="list-style-type: none"> <li>• Evaluate progress. <ul style="list-style-type: none"> <li>◦ Evaluate incident complexity.</li> <li>◦ Monitor tactical operations.</li> <li>◦ Compare actual progress to planned tactics.</li> <li>◦ Decide if plan will accomplish incident objectives.</li> </ul> </li> <li>• Monitor safety and condition of all resources assigned to the incident, including the IMT.</li> <li>• Ensure Command and General Staff coordination: <ul style="list-style-type: none"> <li>◦ Periodically check progress on assigned tasks of Command and General Staff personnel.</li> <li>◦ Approve necessary changes to objectives and strategy goals and IAP.</li> <li>◦ Ensure that Liaison Officer is making periodic contact with participating agencies.</li> </ul> </li> <li>• Keep agency administrator informed on incident-related problems and progress.</li> </ul>
<b>Demobilization:</b>	<ul style="list-style-type: none"> <li>• Determine need for, and set time for Demobilization Planning Meeting.</li> <li>• Approve release priorities.</li> <li>• Approve final Demobilization Plan.</li> <li>• Ensure that all Command and General Staff receive performance evaluations.</li> <li>• Ensure that all required incident documentation is complete and accurate, and submitted to the Agency Administrator.</li> <li>• Participate in the After Action Review.</li> </ul>
<b>Forms Prepared:</b> ICS 202, ICS 213, ICS 214	
<b>Forms Approved:</b> ICS 202, ICS 209, Incident Action Plan, Contingency Plans, Demobilization Plan	
<b>Meetings:</b>	Agency Administrator Briefing, Initial Incident Briefing, Initial UC Meeting, Strategy Meeting, Planning Meeting, Operational Period Briefing, Demobilization Planning Meeting, After Action Review.

Table 38.3. Planning Section Chief Job Action Sheet

Planning Section Chief (PSC) Job Action Sheet	
<b>Reports to:</b>	Incident Commander
<b>Mission:</b>	<ul style="list-style-type: none"> <li>• Oversee all incident-related data gathering and analysis regarding incident operations and assigned resources.</li> <li>• Conduct planning meetings.</li> <li>• Prepare the Incident Action Plan (IAP) for each operational period.</li> </ul>
<b>Qualifications:</b>	<ul style="list-style-type: none"> <li>• Ability to write Incident Action Plans.</li> <li>• Management experience.</li> <li>• Organized individual; able to think ahead about what is needed or may be needed during all phases of an incident.</li> </ul>
<b>Oversees:</b>	<ul style="list-style-type: none"> <li>• Resources Unit Leader.</li> <li>• Situation Unit Leader.</li> <li>• Documentation Unit Leader.</li> <li>• Demobilization Unit Leader.</li> </ul>
<b>Immediate Actions:</b>	<ul style="list-style-type: none"> <li>• Check in on ICS 211.</li> <li>• Receive appointment and briefing from the Incident Commander.</li> <li>• Review the current ICS 201 and/or IAP.</li> <li>• Read this entire Job Action Sheet and review incident management team chart (ICS 203/207).</li> <li>• Put on position identification.</li> <li>• Determine need for and appropriately appoint Unit Leaders, distribute corresponding Job Action Sheets and position identification.</li> <li>• Brief Planning Section Unit Leaders on current situation and incident objectives; develop response strategy and, with OSC, develop tactics; designate time for next briefing.</li> <li>• In consultation with the Incident Commander, establish the incident objectives and operational period. Initiate the Incident Objectives Form (ICS 202) and distribute to all activated positions.</li> <li>• Document all key activities, actions, and decisions in an Activity Log (ICS 214) on a continual basis.</li> <li>• Create preferred and alternative strategies.</li> <li>• Establish and maintain communications with Logistics Section Chief and Staging Manager to ensure the accurate tracking of personnel and resources.</li> <li>• Facilitate and conduct incident action planning meetings with Command Staff, Section Chiefs and other key positions to plan for the next operational period. Coordinate preparation and documentation of the Incident Action Plan and distribute copies to the Incident Commander and all Section Chiefs.</li> <li>• Ensure the Situation Unit Leader and staff regularly update and document status reports from all Section Chiefs and Unit Leaders.</li> <li>• Ensure Planning Section personnel comply with safety policies and procedures.</li> <li>• Document all communications (internal and external) on a General Message Form (ICS 213). Provide a copy of the General Message Form to the Documentation Unit.</li> </ul>
<b>Intermediate Actions:</b>	<ul style="list-style-type: none"> <li>• Meet regularly with the Incident Commander to brief on the status of the Planning Section and the Incident Action Plan.</li> <li>• Attend command briefings and meetings.</li> <li>• Continue to conduct regular planning meetings with Planning Section Unit Leaders, Section Chiefs, Command Staff, and the Incident Commander for continued update and development of the Incident Action Plan.</li> <li>• Ensure that the Planning Section is adequately staffed and supplied.</li> </ul>
Planning Section Chief Job Action Sheet continued on next page ...	

... Planning Section Chief Job Action Sheet continued from previous page	
<b>Extended Actions:</b>	<ul style="list-style-type: none"> <li>• Continue to monitor Planning Section personnel's ability to meet workload demands, staff health and safety, resource needs, and documentation practices.</li> <li>• Conduct regular situation briefings with Planning Section.</li> <li>• Continue to receive projected activity reports from Section Chiefs and Planning Section Unit Leaders at designated intervals to prepare status reports and update the Incident Action Plan.</li> <li>• Ensure the Demobilization Unit Leader assesses ability to deactivate positions, as appropriate, in collaboration with Section Chiefs and develops and implements a demobilization plan.</li> <li>• Ensure the Documentation Unit Leader is receiving and organizing all documentation, including Activity Logs (ICS 214) and General Message Forms (ICS 213).</li> <li>• Ensure your physical readiness through proper nutrition, water intake, rest, and stress management techniques.</li> <li>• Observe all staff and volunteers for signs of stress and inappropriate behavior. Provide for staff rest periods and relief.</li> <li>• Upon shift change, brief your replacement on the status of all ongoing operations, issues, and other relevant incident information.</li> </ul>
<b>Demobilization:</b>	<ul style="list-style-type: none"> <li>• As needs decrease, combine or deactivate positions in a phased manner.</li> <li>• Continue to meet with Command Staff, Section Chiefs and Planning Section Unit Leaders to evaluate facility and personnel, review the demobilization plan and update the Incident Action Plan.</li> <li>• Ensure collection of all documentation and Activity Logs from Command and Sections as positions are deactivated and sections demobilized.</li> <li>• Work with Planning and Finance/Administration Sections to complete cost data information.</li> <li>• Begin development of the After Action Review and assign staff to complete portions/sections of the report.</li> <li>• Debrief staff on lessons learned and procedural/equipment changes needed.</li> <li>• Upon deactivation of your position, ensure all documentation and Activity Logs (ICS 214) are submitted to the Documentation Unit.</li> <li>• Upon deactivation, brief the Incident Commander on current problems, outstanding issues, and follow-up requirements.</li> <li>• Submit comments to the Incident Commander for discussion and possible inclusion in an after-action report; topics include: <ul style="list-style-type: none"> <li>◦ Review of pertinent position descriptions and operational checklists.</li> <li>◦ Recommendations for procedure changes.</li> <li>◦ Section accomplishments and issues.</li> </ul> </li> <li>• Participate in stress management and after-action debriefings. Participate in other briefings and meetings as required.</li> </ul>
<b>Forms Prepared:</b> ICS 202, ICS 203, ICS 204, ICS 207, ICS 209, ICS 214, ICS 215	
<b>Forms Approved:</b> ICS 221	
<b>Meetings:</b>	Initial Incident Briefing, Initial UC Meeting, Tactics Meeting, Planning Meeting, Operational Period Briefing, Demobilization Planning Meeting, After Action Review.

Table 38.4. Operations Section Chief Job Action Sheet

Operations Section Chief (OSC) Job Action Sheet	
<b>Reports to:</b>	Incident Commander
<b>Mission:</b>	<ul style="list-style-type: none"> <li>• Responsible for managing all operations directly applicable to the primary mission.</li> <li>• Activates and supervises organizational elements in accordance with the Incident Action Plan, and directs its execution.</li> <li>• Directs preparation of operational plans, requests or releases resources, makes expedient changes to the Incident Action Plan as necessary and reports such to the Incident Commander and Planning Section Chief.</li> </ul>
<b>Qualifications:</b>	<ul style="list-style-type: none"> <li>• Leadership ability.</li> <li>• Experience managing operations on smaller incidents as either IC or OSC.</li> <li>• Working knowledge of the ICS Planning Process.</li> </ul>
<b>Oversees:</b>	<ul style="list-style-type: none"> <li>• All operational resources, including, but not limited to:             <ul style="list-style-type: none"> <li>◦ Branch Directors, Group/Division Supervisors, Task Force and Strike Team Leaders, Field Teams, Air Operations.</li> </ul> </li> </ul>
<b>Immediate Actions:</b>	<ul style="list-style-type: none"> <li>• Check in on ICS 211.</li> <li>• Receive briefing from Incident Commander.</li> <li>• Review the current ICS 201 and/or IAP.</li> <li>• Read this entire Job Action Sheet and review incident management organization chart, ICS 203 and ICS 207.</li> <li>• Put on position identification.</li> <li>• Assess the incident operations</li> <li>• Participate in developing Incident Strategy.</li> <li>• Develop Tactical Plan (ICS 215) for the upcoming Operational Period.</li> <li>• Attend and coordinate the Tactics Meeting.</li> <li>• Assist the Safety Officer in completing the ICS 215A, IAP Safety Analysis.</li> <li>• Adjust operations as needed to most safely, effectively and efficiently accomplish the Incident Objectives.</li> <li>• Participate in the Planning Meeting.</li> <li>• Complete the ICS 220, Air Operations Summary as needed.</li> <li>• Present tactical assignments for all Operations resources at the Operational Period Briefing.</li> <li>• Document all internal communications on an ICS 213, and provide a copy to the Documentation Unit.</li> <li>• Complete the ICS 214 Unit Log.</li> </ul>
<b>Intermediate Actions:</b>	<ul style="list-style-type: none"> <li>• Meet regularly with the IC and PSC to brief on the status of operations, and progress toward meeting the Incident Objectives.</li> <li>• Attend all required meetings and briefings.</li> <li>• Adjust the existing Incident Action Plan as needed, and report changes to the IC and PSC.</li> <li>• Ensure that Operations Section staffing is adequate and appropriate to the needs of the incident.</li> <li>• Ensure that all Operations resources are fully briefing on Safety issues, and are operating safely.</li> <li>• Communicate regularly with the PSC, LSC, FSC, SO, and IC to share current information, resource condition and capability as well as progress in meeting the Incident Objectives. Help solve problems, and provide support.</li> <li>• Ensure that all Operations personnel submit their ICS 214's to the Planning Section, and get properly debriefed before going off duty.</li> </ul>
Operations Section Chief Job Action Sheet continued on next page . . .	

... Operations Section Chief Job Action Sheet continued from previous page	
<b>Extended Actions:</b>	<ul style="list-style-type: none"> <li>• Monitor ongoing Operations to ensure that they are focused directly, and appropriately on meeting the Incident Objectives. Adjust as necessary. If there is a need for revised Incident Objectives or Strategy, immediately notify the Incident Commander.</li> <li>• Continue to monitor Operations Section's ability to safely meet workload demands, maintain acceptable span of control, and adjust as necessary.</li> <li>• Ensure your physical readiness through proper nutrition, water intake, rest, and stress management techniques. Observe all staff and volunteers for signs of stress and inappropriate behavior. Provide for staff rest periods and relief.</li> <li>• Coordinate the development, approval and implementation of transfer of duties when incident escalates/deescalates.</li> </ul>
<b>Demobilization:</b>	<ul style="list-style-type: none"> <li>• Attend and participate in the Incident Demobilization Planning Meeting.</li> <li>• Identify those resources that are no longer needed, and notify the Planning Section of excess resources.</li> <li>• Recommend release of Operations resources as the situation dictates and according to the release priorities approved by the Incident Commander.</li> <li>• Ensure that all Operations Section personnel receive performance evaluations.</li> <li>• Ensure all Operations Section documentation is submitted as required.</li> <li>• Participate in the After Action Review.</li> </ul>
<b>Forms Prepared:</b>	ICS 213, ICS 214, ICS 215, ICS 220
<b>Forms Approved:</b>	None
<b>Meetings:</b>	Agency Administrator Briefing, Initial Incident Briefing, Strategy Meeting, Tactics Meeting, Planning Meeting, Operational Period Briefing, After Action Review.



Table 38.5. Logistics Section Chief Job Action Sheet

Logistics Section Chief (LSC) Job Action Sheet	
<b>Reports to:</b>	Incident Commander
<b>Mission:</b>	<ul style="list-style-type: none"> <li>• Responsible for providing facilities, services, resources, and material in support of the incident.</li> <li>• Participates in development of the Incident Action Plan.</li> <li>• Activates and supervises the branches and sections within the Logistics Section.</li> </ul>
<b>Qualifications:</b>	<ul style="list-style-type: none"> <li>• Experience in providing logistics support as a Unit Leader or Logistics Section Chief on smaller incidents.</li> <li>• Leadership and problem solving ability.</li> <li>• Innovative, with a positive, “can do” attitude.</li> </ul>
<b>Oversees:</b>	<ul style="list-style-type: none"> <li>• Service Branch Director. <ul style="list-style-type: none"> <li>◦ Communications Unit Leader.</li> <li>◦ Medical Unit Leader.</li> <li>◦ Food Unit Leader.</li> </ul> </li> <li>• Support Branch Director. <ul style="list-style-type: none"> <li>◦ Supply Unit Leader.</li> <li>◦ Facilities Unit Leader.</li> <li>◦ Ground Transportation Unit Leader.</li> </ul> </li> </ul>
<b>Immediate Actions:</b>	<ul style="list-style-type: none"> <li>• Check in on ICS 211.</li> <li>• Receive briefing from Incident Commander.</li> <li>• Review the ICS 201 or current IAP.</li> <li>• Read this entire Job Action Sheet and review incident management organization chart, ICS 203 or ICS 207.</li> <li>• Put on position identification.</li> <li>• Order and acquire, brief Logistics Section Unit Leaders on current situation and incident objectives, expected size and scope of the incident.</li> <li>• Collect information on current resources assigned, en route, on order, and local resource status including Initial Response as it relates to the Logistics Section. These information sources may include: <ul style="list-style-type: none"> <li>◦ Agency dispatcher.</li> <li>◦ Initial Response Incident Commander, overhead, resource advisor, etc.</li> </ul> </li> <li>• Obtain information on location, situations; for example, ICP/base locations, medical facilities, road closures, camp locations, etc.</li> <li>• Determine facilities established and operating.</li> <li>• Document all key activities, actions and decisions on an Activity Log, ICS 214.</li> <li>• Participate in preparation of the Incident Action Plan.</li> <li>• Ensure that ICS 205, ICS 206, Traffic Plan are completed.</li> <li>• Coordinate and process requests for additional incident resources.</li> </ul>
<b>Intermediate Actions:</b>	<ul style="list-style-type: none"> <li>• Manage Section personnel and activities for safe, timely service and support to the incident. Ensure the Section is adequately staffed and equipped.</li> <li>• Attend Strategy Meetings, Tactics Meetings, Planning Meetings, and Operational Period Briefings.</li> </ul>
Logistics Section Chief Job Action Sheet continued on next page ...	

... Logistics Section Chief Job Action Sheet continued from previous page	
<b>Extended Actions:</b>	<ul style="list-style-type: none"> <li>● Evaluate and monitor current situation. <ul style="list-style-type: none"> <li>○ Determine if current logistics capabilities will meet incident objectives.</li> <li>○ Identify problems and concerns (evacuation, sheltering, aviation safety, etc.) for which logistics may be part of the solution.</li> <li>○ Advise Incident Commander and other appropriate incident management team personnel.</li> </ul> </li> <li>● Anticipate and identify kind, type, and number of resources required to achieve objectives.</li> <li>● Consider incident type and complexity, kinds and types of resources, resource availability, and safety factors.</li> <li>● Order necessary personnel and equipment.</li> <li>● Discuss long-range and contingency plans and identify potential and future resources' needs.</li> <li>● Ensure all personnel and equipment time records are complete and have been submitted to the Time Unit Leader/Equipment Time Recorder at the end of each operational period.</li> </ul>
<b>Demobilization:</b>	<ul style="list-style-type: none"> <li>● Participate in Demobilization Planning Meeting.</li> <li>● Coordinate with unit leaders and provide Planning Section Chief a list of excess personnel, contract equipment, crews, miscellaneous personnel and other resources. List will include: <ul style="list-style-type: none"> <li>○ Name/type.</li> <li>○ Quantity.</li> <li>○ Time/date of available release.</li> </ul> </li> <li>● Review the list daily for accuracy ensuring that all units are demobilized in a timely and complete manner.</li> </ul>
<b>Forms Prepared:</b>	ICS 205, ICS 206, ICS 214, Resource Orders
<b>Forms Approved:</b>	None
<b>Meetings:</b>	Strategy Meeting, Tactics Meeting, Planning Meeting, Operational Period Briefing, Demobilization Planning Meeting, After Action Review.

Table 38.6. Public Information Officer Job Action Sheet

Public Information Officer (PIO) Job Action Sheet	
<b>Reports to:</b>	Incident Commander
<b>Mission:</b>	<ul style="list-style-type: none"> <li>Responsible for formulating and releasing information about the incident, both internally, to the news media, and to other appropriate agencies and organizations.</li> </ul>
<b>Qualifications:</b>	<ul style="list-style-type: none"> <li>Public Affairs, Public Information experience.</li> <li>Experience in the ICS on smaller incidents.</li> </ul>
<b>Oversees:</b>	<ul style="list-style-type: none"> <li>Assistant Information Officers.</li> </ul>
<b>Immediate Actions:</b>	<ul style="list-style-type: none"> <li>Check in on the ICS 211.</li> <li>Obtain briefing from the Incident Commander.</li> <li>Determine expectations of Incident Commander/Agency Administrator regarding gathering and disseminating of information. <ul style="list-style-type: none"> <li>Participation in interviews.</li> <li>Media access (ground and air).</li> <li>Release of sensitive information.</li> <li>Investigation and cause.</li> <li>Need for, or location of information center.</li> </ul> </li> <li>Review the ICS 201 or current IAP.</li> <li>Read this entire Job Action Sheet and review incident management organization chart, ICS 203 and ICS 207.</li> <li>Put on position identification.</li> <li>Contact the jurisdictional authority to coordinate public information activities. Obtain a media contact list.</li> <li>Establish a single incident information center, if possible.</li> <li>Obtain copies of the current ICS 209s.</li> <li>Prepare an initial information summary as soon as possible after arrival. Interact with the Command and General Staff to obtain and disseminate information.</li> <li>Observe any constraints on information release imposed by the IC.</li> <li>Obtain Incident Commanders's approval for all information releases.</li> <li>Establish system/schedule for obtaining incident information. <ul style="list-style-type: none"> <li>ICS Form 209s.</li> <li>Communication with agency dispatch.</li> <li>Follow-up briefings from Incident Commander.</li> </ul> </li> </ul>
<b>Intermediate Actions:</b>	<ul style="list-style-type: none"> <li>Initiate contact and respond to inquiries from media. <ul style="list-style-type: none"> <li>Call wire services with initial information and updates.</li> <li>Provide phone numbers for media to call for further information.</li> </ul> </li> <li>Release news to the media and post information in the command post and other appropriate information boards.</li> </ul>
Public Information Officer Job Action Sheet continued on next page . . .	

... Public Information Officer Job Action Sheet continued from previous page	
	<ul style="list-style-type: none"> <li>• Develop a Fact Sheet on the incident that describes the nature of the incident and addresses who, what, where, when, and why. <ul style="list-style-type: none"> <li>◦ Size.</li> <li>◦ Location (proximity to well-known locations or communities).</li> <li>◦ Time and date of origin.</li> <li>◦ Cause (if cleared).</li> <li>◦ Costs to date.</li> <li>◦ Current and expected weather conditions.</li> <li>◦ Agencies/jurisdiction.</li> <li>◦ Cooperating agencies.</li> <li>◦ Equipment and resources committed and responding.</li> </ul> </li> <li>• Attend the Planning Meetings and Operational Period Briefings to update the available information.</li> <li>• Arrange for meetings between the media and the incident personnel.</li> <li>• Provide escort service to the media and VIP's/family.</li> <li>• Ensure all media and VIP's/family wear proper protective clothing and equipment.</li> <li>• Respond to special requests for information.</li> <li>• Complete ICS 214 daily.</li> </ul>
<b>Extended Actions:</b>	<ul style="list-style-type: none"> <li>• Support cooperating and participating agencies in contacts with the media and public. Written materials (news releases, fact sheets) should reflect support of other agencies as well.</li> <li>• Obtain updated maps and other visuals to aid Public Information Officers, and other incident personnel in briefing the media on incident status.</li> <li>• Take photographs and video of the incident and related activities.</li> <li>• Obtain community street maps, emergency numbers for local contacts.</li> <li>• Update and post incident fact sheet or newsletter at various locations in community.</li> <li>• Assist with post-incident information strategy and procedure.</li> <li>• Assist in organizing briefing material and documentation materials for jurisdictional agency information staff.</li> <li>• Assist jurisdictional agency with the preparation of a post incident information strategy.</li> </ul>
<b>Demobilization:</b>	<ul style="list-style-type: none"> <li>• Attend Demobilization Planning Meeting.</li> <li>• Complete ICS 221 if required.</li> <li>• Determine with replacement the time of transfer of duties.</li> </ul>
<b>Forms Prepared:</b>	ICS 213, ICS 214, Media Releases
<b>Forms Approved:</b>	None
<b>Meetings:</b>	Agency Administrator Briefing, Initial Incident Briefing, Strategy Meeting, Planning Meeting, Operational Period Briefing, Demobilization Planning Meeting, After Action Review.

Table 38.7. Safety Officer Job Action Sheet

Safety Officer (SO) Job Action Sheet	
<b>Reports to:</b>	Incident Commander
<b>Mission:</b>	<ul style="list-style-type: none"> <li>Responsible for monitoring and assessing hazardous and unsafe situations, and developing measures to ensure personnel safety. Although the SO has the authority to stop or prevent unsafe acts when immediate action is required, usually this is done through the regular line of authority.</li> <li>Includes Safety messages in each IAP.</li> </ul>
<b>Qualifications:</b>	<ul style="list-style-type: none"> <li>Risk Assessment and Risk Management training and experience.</li> <li>Operational field experience on SAR incidents.</li> <li>Working knowledge of ICS and the ICS Planning Process.</li> </ul>
<b>Oversees:</b>	<ul style="list-style-type: none"> <li>Assistant Safety Officers.</li> </ul>
<b>Immediate Actions:</b>	<ul style="list-style-type: none"> <li>Check in on the ICS 211.</li> <li>Obtain briefing from the Incident Commander.</li> <li>Read this entire Job Action Sheet and review incident management organization chart, ICS 203 and ICS 207.</li> <li>Put on position identification.</li> <li>Review the ICS 201 or current IAP and interview Operations Section personnel to identify hazardous situations associated with the incident.</li> <li>Participate in Tactics and Planning Meetings to ensure that safety is a part of the Planning Process.</li> <li>Review all Incident Action Plans for adequate risk identification and mitigation.</li> <li>Review and approve the Medical Plan, ICS 206.</li> <li>Exercise emergency authority to stop or prevent unsafe acts.</li> <li>Ensure that special precautions are taken when extraordinary hazards exist.</li> </ul>
<b>Intermediate Actions:</b>	<ul style="list-style-type: none"> <li>Discuss ICS 215A at operational briefings as appropriate.</li> <li>Prepare and present safety briefing. <ul style="list-style-type: none"> <li>Present a safety briefing at each briefing session.</li> <li>Briefing should contain information to alert incident personnel of potential risk/hazard considered to be most critical.</li> <li>Answer any questions that may arise.</li> </ul> </li> <li>Investigate and complete accident reports on all incident accidents.</li> </ul>
<b>Extended Actions:</b>	<ul style="list-style-type: none"> <li>Prepare narrative or special reports.</li> <li>When requested by the incident agency and/or Incident Commander, prepare narrative report of incident. Include the following items: <ul style="list-style-type: none"> <li>Number of injuries and accidents.</li> <li>General safety situation and problems encountered.</li> <li>Description of significant incidents or unsafe situations.</li> <li>Recommendations for corrective action.</li> </ul> </li> </ul>
Safety Officer Job Action Sheet continued on next page ...	

... Safety Officer Job Action Sheet continued from previous page	
	<ul style="list-style-type: none"> <li>● Distribute accident investigation reports and initiate follow-up action. <ul style="list-style-type: none"> <li>○ Follow up to see that all accident investigation reports are completed and include all required information.</li> <li>○ Distribute copies of the report to the Incident Commander and finance position assigned as appropriate.</li> <li>○ Recommend need for corrective action based on findings of the report to the Incident Commander.</li> </ul> </li> <li>● Initiate immediate corrective action, if necessary.</li> <li>● Distribute information concerning accidents to Incident Commander.</li> <li>● Ensure adequate rest is provided to all unit personnel.</li> </ul>
<b>Demobilization:</b>	<ul style="list-style-type: none"> <li>● Participate in the Demobilization Planning Meeting.</li> <li>● Follow Demobilization Plan instructions for demobilization.</li> <li>● Ensure that all accident and injury reports are complete and submitted to the Finance/Administration Section prior to leaving the incident.</li> </ul>
<b>Forms Prepared:</b> ICS 213, ICS 214, ICS 215A	
<b>Forms Approved:</b> ICS 206	
<b>Meetings:</b>	Strategy Meeting, Tactics Meeting, Planning Meeting, Operational Period Briefing, Demobilization Meeting, After Action Review.



The best leaders...almost without exception and at every level, are master users of stories and symbols.

*Thomas J. Peters*

## CHAPTER 39

### SAR Map Symbols

Figures 39.1 and 39.2 on the next page show the “Incident Command System Map Display Symbolology For Land SAR Missions” (suggested for placement on a base map), which were developed by Mark Pennington, VA DE; revised by Paul Anderson, Jim Stumpf and Steve Foster; and adopted by NASAR.












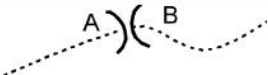
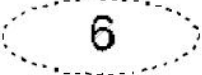
Color used (RED)		<b>PLS, LKP OR IPP</b> (Indicate which and include date and time)
Color used (RED)	● C-1 (4512/3486)	<b>CLUE FOUND</b> (Indicate number and location with UTM coordinates)
Color used (BLUE)		<b>INCIDENT COMMAND POST</b>
Color used (BLUE)		<b>INCIDENT BASE</b>
Color used (BLUE)		<b>STAGING</b>
Color used (BLUE)		<b>CAMPS</b> (Identify by name)
Color used (BLUE)		<b>REPEATER OR MOBILE RADIO RELAY</b> (Identify by number)
Color used (BLUE)		<b>HELIBASE</b>
Color used (BLUE)	● H-1 (216/982)	<b>HELISPOT</b> (Indicate number and location with UTM Coordinates)
Color used (RED)		<b>PLANNED SEARCH AREA BOUNDRY</b>

Figure 39.1. Standard Search and Rescue map symbols, Part 1

Color used (BLUE)		THEORETICAL SEARCH AREA
Color used (BLUE)		STATISTICAL SEARCH AREA WITH POA
Color used (BLACK)		TRAVEL BARRIER
Color used (BLACK)		DIVISION BOUNDARY (Indicate by letter)
Color used (BLACK)		SEGMENT BOUNDARY (Indicate by number)

## SUGGESTED FOR PLACEMENT ON OVERLAYS


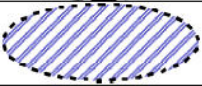
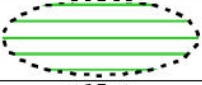


COLOR BASED ON TYPE OF RESOURCE MARKINGS BUILD ON EACH PREVIOUS LAYER		FIRST SEARCH COVERAGE
		SECOND SEARCH COVERAGE
		THIRD SEARCH COVERAGE
		FOURTH SEARCH COVERAGE
Colors used for above searches	DOG - BROWN GROUND CREW - GREEN AIR SEARCHES - BLUE	BOAT - ORANGE
Color used (RED)		CONFINEMENT BOUNDRY OR SEARCH PATROL
Color used (BLACK)	DOG # 2, CREW # 3, TF # 4, ST # 1, PATROL # 5	RESOURCE DESIGNATOR

Figure 39.2. Standard Search and Rescue map symbols, Part 2

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## CHAPTER 40

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### SAR Glossary

<b>AAR</b>	After Action Review. An AAR is a mechanism designed to evaluate an incident in order to improve performance by encouraging strengths and correcting weaknesses.
<b>AIRS</b>	Arizona Interoperable Radio System.
<b>Agency Administrator</b>	Chief executive officer (or designee) of the agency or jurisdiction that has responsibility for the incident. The designee might be the person to whom the IC reports. Usually the Agency Administrator is not on scene.
<b>AOBD</b>	Air Operations Branch Director. In ICS, a position in the Operations branch.
<b>ASGS</b>	Air Support Group Supervisor is primarily responsible for supporting and managing helibase and helispot operations and maintaining liaison with fixed-wing air bases.
<b>Attraction</b>	Either a feature that is likely to attract the subject's attention (Likely Spot), or a tactic used by a search team to help locate the subject, such as calling the subject's name or making loud noises.
<b>AZDEMA</b>	Arizona Department of Emergency and Military Affairs. Their mission is to coordinate emergency services and the efforts of governmental agencies to reduce the impact of disasters on persons and property.
<b>Barrier</b>	A feature that restricts travel in a given direction or brings about a change of direction.
<b>Base</b>	A base is where primary logistics functions are coordinated and administered.
<b>Bogus Search</b>	A search in which, unknown to the searchers, the subject is not missing.
<b>Camp</b>	A camp is where resources are kept.
<b>CAP</b>	Civil Air Patrol is a volunteer organization of aviation-minded members.
<b>CART</b>	Child Abduction Response Team.

<b>CASIE</b>	Computer Aided Search Information Exchange. The name of the DOS program. It has been replaced by Win CASIE III.
<b>CERT</b>	Community Emergency Response Team. CERTs are educated about disaster preparedness for hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations.
<b>Choke Point</b>	A narrow route providing passage from one region to another. Examples include a bridge or a pass. Sometimes called a bottleneck.
<b>COML</b>	Communications Unit Leader is responsible for developing plans for the effective use of incident communications equipment and facilities.
<b>Command Staff</b>	Under ICS, this consists of the PIO, the LNO, and the SO.
<b>Contour Line</b>	A contour line (AKA a contour) is a line on a map that connects points of equal elevation above sea level (or some other fixed reference).
<b>CP</b>	Incident Command Post.
<b>CPOD</b>	Cumulative Probability of Detection. The probability of multiple independent resources detecting the subject in a segment, assuming the subject is in that segment. It is a measure of how well the segment has been searched.
<b>Datum Shift</b>	A datum shift is where a coordinate is given in one datum and then plotted on a map that is in a different datum without correcting it.
<b>Division</b>	Under ICS, a division is a geographical regions established using boundaries.
<b>ELT</b>	Emergency Locator Transmitter. An ELT is a tracking transmitter that aids in the detection and location of aircraft in distress. It is activated on impact.
<b>ESW</b>	Effective Sweep Width. The distance two searchers must be apart, as they search in a grid pattern for an object that results in a <i>POD</i> of approximately 63%.
<b>FLIR</b>	Forward Looking Infrared. A thermal imaging device that can detect heat sources. It provides images of the ground based on temperature differences. Designed to be mounted on a helicopter or fixed-wing aircraft.
<b>GAR</b>	Green-Amber-Red. GAR Risk Assessment Model. An ORM risk assessment model that creates a “Go”-“No Go” decision tool.
<b>General Staff</b>	Under ICS, this consists of the OSC, the PSC, the LSC, and the FSC.
<b>GIS</b>	Geographic Information System. A GIS integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information.
<b>GPS</b>	Global Positioning System. Based upon satellites, this device gives exact locations using latitude and longitude.
<b>GRASS</b>	Geographic Resources Analysis Support System. An open-source GIS program.

<b>Group</b>	Under ICS, a group is a collection of people established by function, that is, what it does.
<b>Hasty Search</b>	A search whose purpose is to cover the most obvious places a subject might be in the least time possible. Usually the first kind of search tactic to be utilized.
<b>Hazard</b>	A place where the missing person could be in danger.
<b>Helibase</b>	The main location for parking, fueling, maintaining, and loading of helicopters operating in support of an incident.
<b>Helispot</b>	A location where a helicopter can safely take off and land.
<b>HRD Dog</b>	Human Remains Detection Dog, AKA Cadaver Dog.
<b>IAP</b>	Incident Action Plan. An oral or written plan containing general objectives reflecting the overall strategy for managing an incident.
<b>IC</b>	Incident Commander. The individual responsible for all incident activities, including the development of strategies and tactics and the ordering and the release of resources.
<b>ICP</b>	Incident Command Post. The field location at which the primary tactical-level, on-scene incident command functions are performed.
<b>ICS</b>	Incident Command System. A standardized on-scene emergency management system. Also, Investigate, Contain, Search—which dictates the order of initial actions.
<b>IMT</b>	Incident Management Team. Under ICS, the IMT consists of the IC, the Command Staff, and the General Staff.
<b>IPP</b>	Initial Planning Point. The first LKP or PLS.
<b>IRIC</b>	Initial Response Incident Commander. The IC during the initial response phase of a search.
<b>Lateral Range</b>	One-half of the Spacing or Track Spacing and is the distance that an observer would need to sweep on either side of the track.
<b>Likely Spot</b>	A feature that is likely to attract the missing person. AKA attraction or magnet.
<b>Limited Continuous Mode</b>	This is the state of an incident where no active searching is done but if clues are discovered they are investigated and, if warranted, active searching resumes.
<b>LKP</b>	Last Known Position. The last known location of the missing subject determined by physical evidence such as a vehicle, a discarded object, or a footprint.
<b>LPB</b>	Lost Person Behavior. An analysis of how lost subjects behave by putting them into different categories.
<b>LPQ</b>	Lost Person Questionnaire. A written document that describes all available physical and mental characteristics of a lost person.
<b>OP</b>	Operational Period.
<b>ORM</b>	Operational Risk Management. A systematic process to continuously assess and manage risks. Developed by the U.S. Coast Guard.
<b>OSC</b>	Operations Section Chief.
<b>PIO</b>	Public Information Officer.

<b>PLB</b>	Personal Locator Beacon. The personal version of the ELT designed to be carried by a person on foot. It is activated manually.
<b>PLS</b>	Place Last Seen. The location where the missing subject was actually seen by another person.
<b>POA</b>	Probability of Area. POA applies to every segment and the ROW. The POA of a segment is the probability that the subject is in that segment taking into account all the searches that have taken place within the search area.
<b>POC</b>	Probability of Containment. POC applies to every segment. The POC of a segment is the probability that the subject is in that segment ignoring all searches that have taken place in every other segment. POC and ROW are incompatible.
<b>POD</b>	Probability of Detection. The probability of a resource detecting the subject in a segment, assuming the subject is in that segment. It is a measure of how well the segment has been searched by that resource.
<b>PPE</b>	Personal Protective Equipment.
<b>PSC</b>	Planning Section Chief.
<b>ROW</b>	Rest of the World. The ROW is the probability that the subject is outside the search area taking into account all searches that have taken place inside the search area.
<b>Scenario</b>	A plausible story that describes what might have happened.
<b>Segment</b>	A uniform region within the search area with well-defined boundaries, recognizable to resources in the field. The size of this region should be searchable by a resource in one Operational Period.
<b>Single Resource</b>	A single resource is an individual piece of equipment, or group of individuals, with an identified supervisor, that can be used in a tactical assignment.
<b>Spacing</b>	Describes the distance between ground searchers as they move in parallel along a constant heading or “track”.
<b>Span of Control</b>	The number of people that a manager can supervise effectively. ICS recommends that the number is between 3 and 7, with 5 suggested as an optimum.
<b>SPE Model</b>	Severity, Probability, Exposure. A risk management model that quantifies risk.
<b>Staging Area</b>	A staging area is where resources are kept while waiting to be assigned.
<b>Strike Team</b>	A strike team consists of resources of the same kind with common communications and a leader.
<b>Strategy</b>	Strategy involves the “big picture”—the overall plan, and how those plans will achieve the goals and objectives.
<b>Tactic</b>	Tactic is an action that leads to the execution of the strategy. For example, a strategy might be to search particular segments. The search technique used to search a particular segment is a tactic.
<b>Task Force</b>	A task force consists of resources of different kinds with common communications and a leader.



<b>Track Spacing</b>	Describes the distance between parallel search tracks conducted by one or more aircraft.
<b>Track Trap</b>	Natural or man-made “traps” that capture evidence of a lost person passing. For example, footprints in sand or clothing caught in thorn bushes.
<b>Travel Aids</b>	These are paths of little resistance to subjects. Travel aids are trails, pathways, roads, game trails, railroad tracks, ridges, valleys, dry washes, drainages, streams, shorelines, clearcuts, power lines, vegetation lines, or any area that provides a sense of direction and a path of little resistance.
<b>TTX</b>	Table Top Exercise.
<b>UC</b>	Unified Command is an element in multi-jurisdictional or multi-agency domestic incident management. It provides guidelines to enable agencies with different legal, geographic, and functional responsibilities to coordinate, plan, and interact effectively.
<b>UTM</b>	Universal Transverse Mercator (UTM) is a geographic coordinate system that uses a grid-based method to specify locations on the surface of the Earth.
<b>YABI</b>	Yet Another Brilliant Idea.

## Appendices

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# APPENDIX A

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## Free Technology Aids

Section A.1

Clue Manager

Clue Manager is a free Windows software program geared towards SAR. It is designed to keep track of the clues found during a search. Clue Manager can be downloaded from <http://www.saraz.org/SARAZNew/>, see Section A.6 on page 363.

Clue Manager starts a new collection of clues for each incident. The program assigns a number to each clue and has fields to record the following information, which is also shown in Figure A.1.

**Edit Clue (Clue Number 001)**

**Details**

Date/Time Located: 08/24/2008 08:55 AM  
Month/day/year

Operational Period: 1 XRef: 1

Team That Located Clue: Hasty Team Person That Located Clue: John Smith

Clue Found: Shoe print Coordinates Of Find: To Be Determined

Detailed Clue Description or Notes: See photo

Photo: Yes Photographer: John Smith Image Filename: ShoePrint.jpg

**Actions**

Instructions To Team: Protect, Mark and Leave

Action Taken:

Clue Resolved: No Authenticity Of Clue: Unknown

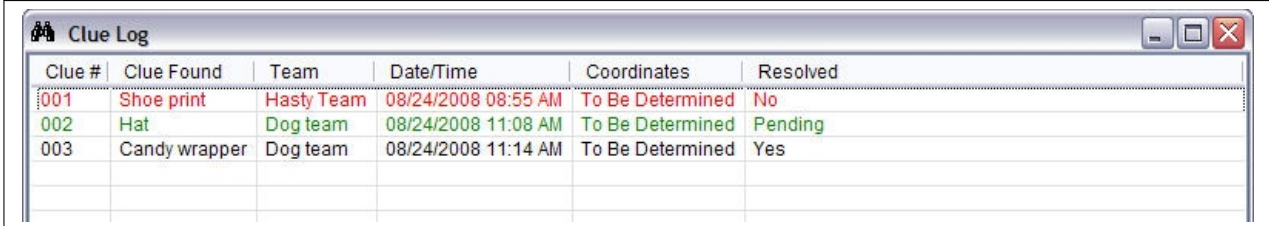
Prepared By: Fiona Armstrong Date/Time Prepared: 08/24/2008 09:55 AM  
Month/day/year

Accept Cancel Help

**Figure A.1.** Adding a new clue in Clue Manager

- Date and Time Located
- Operational Period
- Paperwork Cross Reference
- Team that Located the Clue
- Person that Located the Clue
- The Type of Clue Found
- Clue Location/Coordinates
- Detailed Clue Description
- Photo and Photographer
- Image Location
- Instructions to Team
- Action Taken
- Clue Resolved
- Authenticity of Clue
- Prepared By
- Date and Time Prepared

After clues have been entered, a Clue Log can be generated, where it is easy to see which clues are resolved, which are pending, and which are, as yet, unresolved. In this way, no clues are overlooked. The Clue Log can be printed and so be made a part of the documentation of the incident. It can also be saved as a CSV text file, where the fields are separated by commas. CSV files can be imported into Microsoft® Excel, or its free counterpart, Open Office, where they can be massaged, manipulated, and printed.



Clue #	Clue Found	Team	Date/Time	Coordinates	Resolved
001	Shoe print	Hasty Team	08/24/2008 08:55 AM	To Be Determined	No
002	Hat	Dog team	08/24/2008 11:08 AM	To Be Determined	Pending
003	Candy wrapper	Dog team	08/24/2008 11:14 AM	To Be Determined	Yes

**Figure A.2.** The Clue Log in Clue Manager

Photos can also be manipulated, to enhance details. For example, a photograph of a footprint in snow is better viewed as the negative (“inverting the colors”) of the original photo.

## Section A.2 Comm Manager

Comm Manager is a free Windows software program geared towards SAR. It is designed to keep track of all forms of communications during a search. Comm Manager can be downloaded from <http://www.saraz.org/SARAZNew/>, see Section A.6 on page 363.

Comm Manager starts a new collection of communications for each incident. The program assigns a number to each communication and has fields to record the information shown in Figure A.3 on the next page. The source of the communication can be a document, an email, a letter, a memo, a page, a phone message, a radio message, or verbal.

Comm Log extracts certain data from all the communications and summarizes it in one place, as shown in Figure A.4 on the next page. The Comm Log can be printed and so be made a part of the documentation of the incident. It can also be saved as a CSV text file, where the fields are separated by commas. CSV files can be imported into Microsoft® Excel, or its free counterpart, Open Office, where they can be massaged, manipulated, and printed.

**Figure A.3.** Adding a communication in Comm Manager

Comm #	OP	Sender	Receiver	Date/Time	Message
001	1	SARA Strike Team 1	Communications Center	01/04/2011 07:16	SARA Strike Team 1 out of service at camp.
002	1	SARA Strike Team 1	Communications Center	01/04/2011 07:37	SARA Strike Team 1 advise that one of their members has
003	1	Medical Unit	Communications Center	01/04/2011 08:00	On scene, treating snakebite.

**Figure A.4.** The Comm Log in Comm Manager

### Section A.3 GEOTRANS

GEOTRANS (Geographic Translator) is a free program which allows the user to easily convert geographic coordinates among a wide variety of coordinate systems, map projections, and datums. See Figure A.5 on the next page. GEOTRANS runs under Microsoft Windows, LINUX, and UNIX. It can be downloaded from the National Geospatial-Intelligence Agency's website, <http://earth-info.nga.mil/GandG/geotrans/#Downloading>.

While GEOTRANS was not written with SAR in mind, it is particularly useful during SAR incidents, because it allows the user to convert between the standard datums and coordinate systems used in SAR and discussed in Chapter 15 on page 144. However it is important to realize that, in GEOTRANS,

- NAD83 is NAR-C.
- NAD27 is NAS-C.
- WGS84 is WGE.
- Lat/Long is Geodetic.

### Section A.4 ICS-SAR

ICS-SAR is a free Windows software program geared towards SAR. It can be downloaded from <http://www.saraz.org/SARAZNew/>, see Section A.6 on page 363.

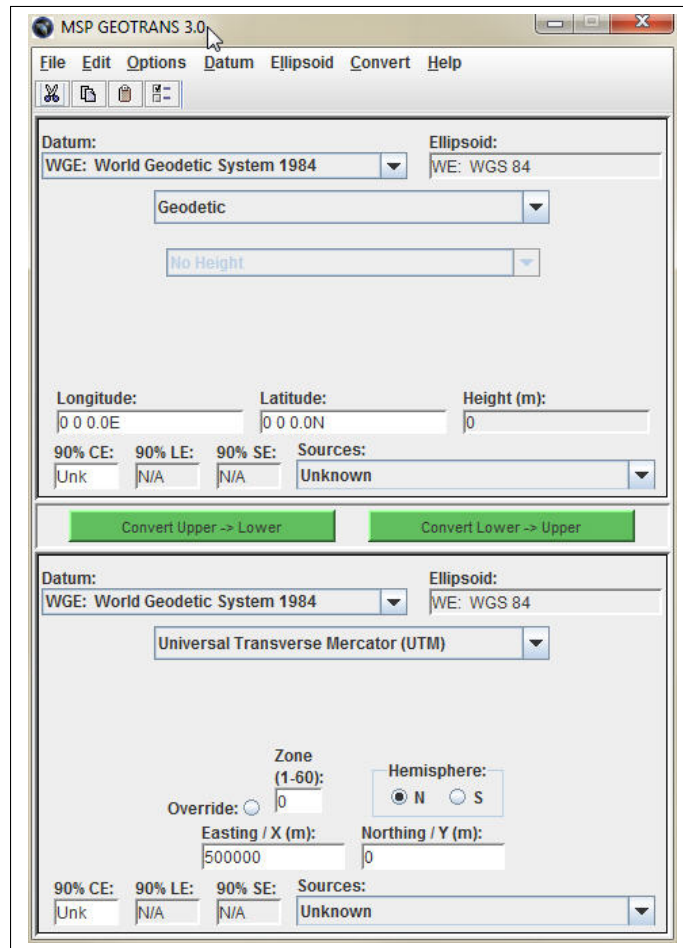


Figure A.5. The GEOTRANS Interface

ICS-SAR is designed to assist in the understanding and implementation of the Incident Command System (ICS) before and during Search and Rescue (SAR) incidents. ICS-SAR gathers in one place a large number of documents relevant to ICS and SAR. See Figure A.6 on the next page.

ICS-SAR can be used in multiple ways, some of which are:

- By an experienced ICS SAR person wanting to print relevant documents during a search.
- By an inexperienced SAR person who has been asked to fill one of the Command or General Staff positions, with which they are unfamiliar. Here the expectations of that position as well as a checklist of things to do can be printed.
- As a quick refresher for those who do not use ICS very often. There are many perishable skills in SAR that need to be constantly refreshed. ICS is one of them.
- By SAR volunteers who want to understand where the SAR functions fit in under ICS.
- As an educational tool, for example, for use in TTXs (Table Top eXercises).

## Section A.5 SAR T-Cards

SAR T-Cards is a free Windows software program geared towards SAR. It can be downloaded from <http://www.saraz.org/SARAZNew/>, see Section A.6 on page 363.



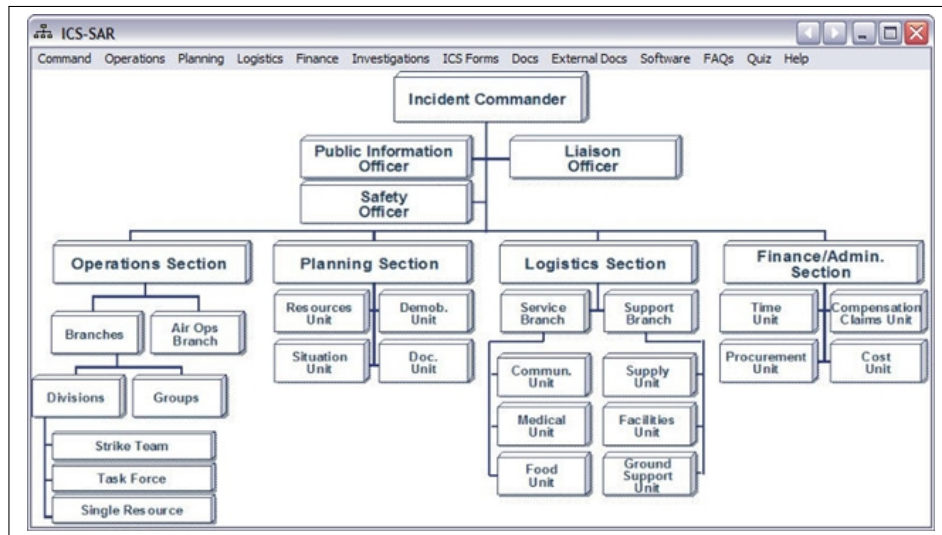


Figure A.6. The ICS-SAR opening screen

SAR T-Cards is designed so that the unit responsible for tracking resources during an incident can do so in an organized and efficient manner. Although SAR T-Cards is aimed at SAR incidents it can be used in any incident, large or small. See Figure A.7.

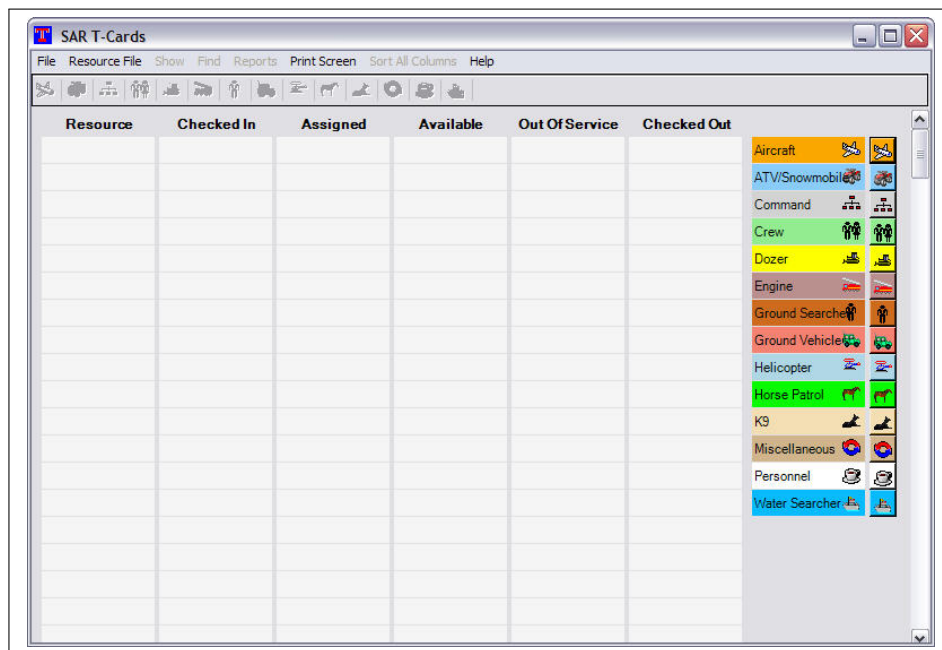


Figure A.7. The SAR T-Cards opening screen

The objects on the right of Figure A.7 represent the different kinds of T-cards that can be created. These contain the seven traditional T-Cards found in the Incident Command System (ICS), supplemented with SAR-specific resources, namely, ATV/Snowmobile, Command, Ground Searcher, Ground Vehicle, Horse Patrol, K9, and Water Searcher.

Ideally, well before an incident is in progress, files are created that contain resources. Then, as the incident unfolds, these resource files are imported into the T-Card Window. Multiple resources files can be created ahead of time and populated with resources that are commonly requested. For example, there could be one for SAR ground volunteers, another for NPS personnel, another for K9 units, and

another for Law Enforcement, etc. Also, resources responding to an out-of-jurisdiction incident, could have their own resource files on a thumb drive to be imported into SAR T-Cards on arrival. This could be part of a pre-plan.

### Section A.6 SARAZ.ORG

The mission of [www.saraz.org](http://www.saraz.org) is to promote land SAR professionalism and education by facilitating the exchange of information among land SAR practitioners. It was created and is maintained by AZ SAR professionals, and is Arizona SAR oriented. The original website was not mobile friendly and is no longer maintained. It has been replaced by mobile friendly version at [www.saraz.org/SARAZNew/](http://www.saraz.org/SARAZNew/).

The website contains the following areas.

- *What Is New?* summarizes the changes in the website.
- *Conferences/Training* brings up a list of conferences and training workshops.
- *Documents* brings up a list of SAR-related documents.
- *Presentations* brings up a list of documents presented at various conferences, such as MRA and NASAR.
- *Free Software* brings up a list of free software, some SAR specific and some of general use.
- *External Links* brings up a list of SAR specific links.
- *Awards* is a list of awards presented to people with an association to Arizona.
- *Contact Us* allows the user to send an email to SARAZ.ORG@gmail.com.

### Section A.7 Win CASIE III

Win CASIE III is a free Windows software program geared towards SAR. It can be downloaded from <http://www.saraz.org/SARAZNew/>, see Section A.6. Win CASIE III is a SAR manager's Swiss army knife.

During the initial response, Win CASIE III can

- Access and print many search management forms, such as ICS forms, Lost Person Questionnaire, Search Urgency Rating Chart, Clue Report, Clue Log, . . . .
- Import other forms and download forms from NIMS.
- Provide summaries of lost person behavior from Chapter 32 on page 264 of this manual.
- Complete an Urgency Rating Chart.
- Keep a complete record of planning decisions and actions using an Initial Note (see an example on the next page). This can include subject details, urgency rating chart, resources used, resources requested, ICS structure, LPB, subject found details, . . . .

During the transition to an Area Search, Win CASIE III can

- Print the Mattson/O'Connor/Proportional Method forms to be filled in by experts.
- Calculate a consensus from the Mattson/O'Connor/Proportional Method forms.
- Keep a complete record of the consensus.

During an Area Search, Win CASIE III can

- Print debriefing forms, team assignment sheets, . . . .
- Do all the *POA*, *ROW*, *POD*, and *CPOD* calculations.
- Split segments.

- Add segments.
- Account for clues.
- Perform “What If?” analysis.
- Give advice on the allocation of resources to optimize the probability of success.
- Keep a complete record (an audit trail) of planning decisions and actions.
- Create a final report of every action taken.

### Example of a Completed Initial Note

In this example individual identities have been changed. The items in red/*italics* are selected from within the Initial Note portion of Win CASIE III—Win CASIE III does not print in red/*italics*. The non-italicized black items are entered by hand by the Incident Commander/CASIE operator.

#### *Initial Note*

##### *Dispatch Call/Initial Report:*

*Date: Saturday, January 05, 2008*

*Time: 2220 hrs*

*Informant: Wendy Smith, the subject’s mother*

*Contact Information: 520-555-5555(H) until 8 am, then 520-111-1111(0) from 8am to 5pm.*

*No cell phone.*

*Details: Her son, Adam, did not return from day hike in Sabino Canyon area.*

*Vehicle (Licence: AZ 123ABC) located at the Sabino Canyon Visitor Center.*

*Date: Saturday, January 05, 2008*

*Time: 2225 hrs*

*Incident Commander: Joe Friday*

*Case Number: 12345678*

##### *Subject Details:*

*Name: Adam H. Smith*

*Age: 18*

*Category: Hikers*

*Lost Person Behavior : Hikers*

*Courtesy of Ken Hill, as quoted in NASAR’s “Managing The Lost Person Incident”.*

*Hikers are trail-oriented and often become lost when their trail is obscured for some reason, or when they encounter a confusing junction of intersecting paths. Because of their reliance on trails, hikers tend to travel farther than other lost person categories, although extreme distances are less frequent than for hunters.*

*They are often less prepared and “woods-wise” than hunters and fishermen.*

*Statistical data: an analysis of 501 cases of lost or overdue hikers (Mitchell, 1985) revealed the following characteristics:*

*Only about 40% were considered to be adequately equipped.*

*92% did not travel after the first 24 hours.*

*Between 30% and 40% traveled at night.*

*About 40% were located by a “hasty search”.*

*An analysis of 24 cases of missing hikers (adults only) by Hill (1996) revealed :*

*29% found their own way back to safety.*

*92% survived.*

*42% of the cases involved two or more subjects.*

*Implications for search planning: containment is a top priority, especially trail blocks. Clue-aware searchers should be tasked to run all likely trails, paths, roads, and similar travel aids.*

*Medical Condition: No known medical condition*

*Experience: Some hiking in lower and upper canyons*

*Equipment:* Unknown

*Description:* Male, 5'10", 150 lbs, blond hair, blue eyes, blue sweater, tan pants, yellow poncho

*PLS/LKP/IPP:* LKP is vehicle (Licence: AZ 123ABC) located at the Sabino Canyon Visitor Center

*Latitude:* N32\* 18.571'

*Longitude:* W110\* 49.354'

*Elevation:* 2726 ft

*Time:* Adam left home at 0700 hrs. Vehicle located by family at 1600 hrs.

*How reported missing:* Family became concerned when Adam failed to return from a hike in Sabino Canyon area. A winter storm had gone through Tucson and the Catalina Mountain area. A significant amount of rain was received in the upper basin causing heavy runoff in the stream crossings.

*Photo:* On its way

*Weather:*

*Current Weather*

*Date:* Saturday, January 05, 2008

*Time:* 2230 hrs

*Temperature:* 55

*Wind (Speed and Direction):* No wind

*Sky (% cover):* 100%

*Cloud Height:* 12,000 ft

*Precipitation and Type:* Light rain

*Weather Forecast:* Expected overnight lows between 40 and 45 degrees.

Winter storm warning above 6000 ft with possible snow accumulation of up to 4 inches.

*Search Urgency: Urgency Rating Chart*

*Age Of Subject : Other (2)*

*Medical Condition Of Subject : Healthy (3)*

*Number Of Subjects : One (1)*

*Subject Experience Profile : Experienced, knows area (3)*

*Weather Profile : Past and/or existing hazardous weather (1)*

*Equipment Profile : Inadequate for environment and weather (1)*

*Terrain/Hazard Profile : Known hazardous terrain or other hazards (1)*

*Urgency Rating (between 7 and 21) = 12*

*Resources (available):* 2 Hasty Teams, Helicopter

*Resources (deployed):*

2145 hrs Investigating officer Ben Romero interviewed the family. No medical problems. In good physical condition. Not very smart but has good common sense. No emotional problems. Sometimes hikes in Blackett's Ridge area. Unknown shoe type.

2200 hrs 2 Hasty Teams airlifted to Blackett's Ridge, intending to split the ridge, searching back to base. Helicopter used search light and FLIR in area. After dropping teams, helicopter refitted and flew the creek to the confluence with Tanque Verde Creek.

2245 hrs No signs reported by any team. Search operations suspended for night.

2250 hrs Traffic deputy to stay with vehicle until SAR returns in morning.

*Resources (requested):* Local volunteer SAR teams, Posse, and helicopter requested for 0700 hrs rendezvous at Sabino Visitor Center.

*CASIE Operator:* Bill Gannon

*Incident Commander:* Joe Friday

*Safety Officer:* Joe Friday

*Information Officer:* Bill Gannon

*Liaison Officer:* Ben Romero

*Planning Chief:* Joe Friday

*Operations Chief:* Joe Friday

*Logistics Chief:* Joe Friday

*Finance/Admin Chief:* Joe Friday

*Date:* Sunday, January 06, 2008

*Current Weather*

*Date:* Sunday, January 06, 2008

*Time:* 0630 hrs  
*Temperature:* 42  
*Wind (Speed and Direction):* No wind  
*Sky (% cover):* 0%  
*Cloud Height:* No clouds  
*Precipitation and Type:* None  
*Weather Forecast:* Expected sunny today, high 65.

0645 hrs SAR examined and drove the upper roadway. No sign of subject.  
0710 hrs Volunteer SAR team in upper Sabino Canyon.  
0715 hrs Posse (2 riders) into Sycamore Canyon.  
0720 hrs Helicopter searching Blackett's Ridge area.  
0815 hrs Volunteer SAR team on Phoneline Trail.

*Found Subject*

*Date:* Sunday, January 06, 2008  
*Time:* 0826 hrs  
*Name:* Adam Smith  
*Condition when found:* Uninjured but cold  
*Location:* Near Sycamore Dam  
*Latitude:* N32° 21.255'  
*Longitude:* W110° 45.144'  
*Elevation:* 4470 ft

*Distance from IPP:*

*Found by:* Posse

*Evacuation details:* Posse supplied warm clothes and found landing zone for helicopter to transport subject to base camp.

*X Ref to paperwork:* 123456

*Debriefing:* (IC) Subject missed trail because of rain but kept going looking for shelter. Found an abandoned camp site near the Dam. He heard helicopter at night but was unable to signal them. Saw helicopter in morning, but still unable to attract attention to himself.

0930 hrs Ground teams out of field.

1000 hrs Posse out of field.

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# APPENDIX B

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## Contour Lines

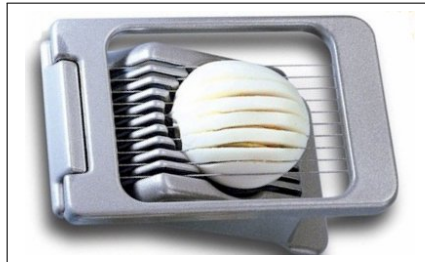
Understanding and interpreting contour lines on a topo map are essential skills for all involved in a search. This section contains a brief overview of these topics.<sup>1</sup>

Contour lines are a means of trying to characterize a three-dimensional object (the surface of the earth) when projected onto a two-dimensional piece of paper (a topo map).

A contour line (AKA a contour) is a line on a map that connects points of equal elevation above sea level (or some other fixed reference). So someone who follows a contour line neither loses nor gains altitude, and eventually arrives back at their starting point.

The direction perpendicular to a contour line at any point is the direction of steepest or shallowest slope of the terrain at that point.

A common way of demonstrating contour lines is by means of an egg slicer, which slices hard-boiled eggs into slices of equal thickness. See Figure B.1. Imagine a hard-boiled egg placed on a countertop in an upright position sitting on one end, and then sliced horizontally, without separating the slices. Viewed from above, the edge of each individual cut is the same height above the counter and so is a contour line. In fact, stepping from the top down, a sequence of contours that are circles emerges, gradually increasing in size, until halfway. Typically a contour would have a number associated with it, indicating its elevation above the countertop. So to rebuild the egg from the contours, circles are drawn at the associated elevation creating a wire grid skeleton, which is completed by adding skin, thereby approximating the original egg's surface. Notice that contour lines representing different elevations cannot touch, otherwise the point of contact would have two different elevations.



**Figure B.1.** Egg slicer

Now imagine a hill sliced horizontally with a giant egg slicer. The edges of the individual cuts are the contours. Although they are no longer circles, the contours are closed loops that are deformed circles. In the same way as for the egg, if a sequence of contours are deformed circles that increase in size as the

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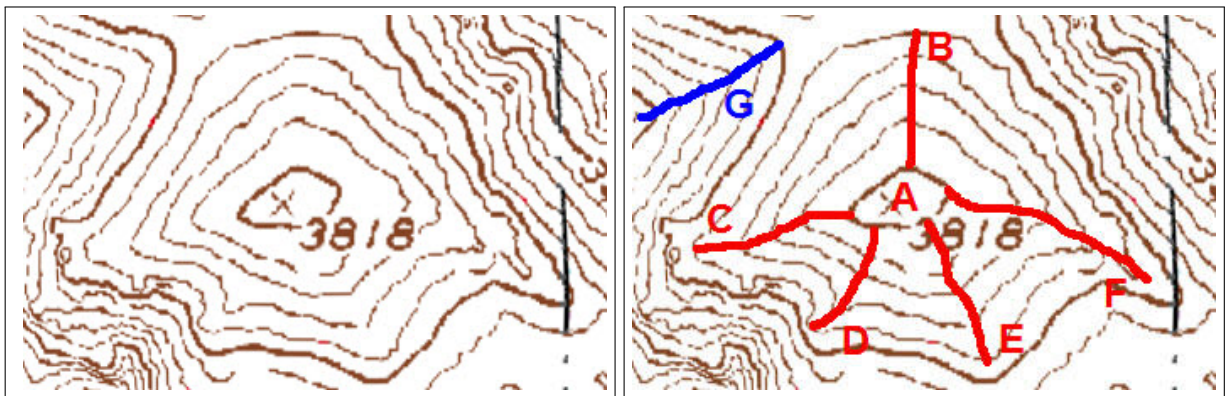
<sup>1</sup> For general information on Basic Land Navigation see Reference [PMS].



elevation decreases, then the contours represent a hill.<sup>2</sup> The top of the hill is contained in the smallest contour.

*If a sequence of contours are deformed circles that increase in size as the elevation decreases, then the contours represent a hill. The top of the hill is contained in the smallest contour.*

Refer to Figure B.2, which is a portion of a topo map. Look at the left-hand figure and the top of the hill contained within the contour cut by the number 3. This is identified by the letter A in the right-hand figure. On the top of this hill is a Benchmark (the small × symbol).<sup>3</sup> In this case the benchmark is 3818 feet above sea-level. (The units, namely feet, are identified by the map's legend, which is not shown on this portion of the map.)



**Figure B.2.** Contour Lines of a hill

Now compare a person heading due south-west from the benchmark to one heading due north, each crossing 5 contours, so they both end up at the same elevation. The one heading south-west covers less ground than the one heading north, for the same drop in elevation. This means that the terrain to the south-west is steeper than the terrain to the north. This is characterized by the closeness of the contours. The closer the contour lines the steeper the terrain. The wider the contours the flatter the terrain. No contours indicates flat terrain. Contours that are extremely close together represent steep cliffs.

*The closer the contour lines the steeper the terrain. The wider the contours the flatter the terrain. No contours indicates flat terrain. Contours that are extremely close together represent steep cliffs.*

Notice that, if both people look back, they see the same thing, namely a hill. This is true for anyone looking towards the benchmark. They each see a hill, although they may not see the summit.

Widely spaced contours at the top of a hill indicate a flat hilltop, whereas closely spaced contours at the top of a hill indicate a pointed hilltop. So the top of the hill containing the benchmark is relatively flat.

<sup>2</sup> A mountain is a large hill.

<sup>3</sup> Benchmarks are usually metal disks set into concrete or rock in the ground. They are placed by national surveying or mapping organizations, such as the United States Geological Survey, and indicate the elevation at the benchmark.

*Widely spaced contours at the top of a hill indicate a flat hilltop. Closely spaced contours at the top of a hill indicate a pointed hilltop.*

Unlike the egg, the contours on this hill are not circles but more like diamonds, with the corners pointing in different directions. Concentrate on those parts of the contours that point north, and imagine a person standing on one of the contours at its northern corner. The terrain to the immediate left and right of the person is lower than the person's elevation, because the elevation of the region between contours is between the elevation of the two contours bounding it, and the person is standing on the higher elevation contour. Thus, if the person follows the direction of the corners from one contour to the next always heading perpendicular to the contour at that point, the person follows a ridge, and the ridge line can be estimated by joining the corners of these successive contours. This is shown in the right-hand figure with the letter B. These corners can be approximated in shape by a U that points downhill.

Notice that there are four other ridges emanating from the summit of the hill. Counting counter-clockwise they are

1. A ridge slightly south of west of the summit. This is shown in the right-hand figure with the letter C.
2. A ridge slightly west of south of the summit. This is shown in the right-hand figure with the letter D.
3. A ridge slightly east of south of the summit. This is shown in the right-hand figure with the letter E.
4. A ridge slightly south of east of the summit. This is shown in the right-hand figure with the letter F.

The first three are very similar to the original ridge heading north, but the fourth one is characterized by a pattern of Vs pointing downhill rather than Us. This means that the falloff from this ridge is much steeper than the other ridges, so it is much sharper.

*Contour lines that appear in a pattern shaped like a U or a V pointing in a **downhill** direction indicate a ridge. A U shape indicates a gentle ridge, a V shape a sharp ridge.*

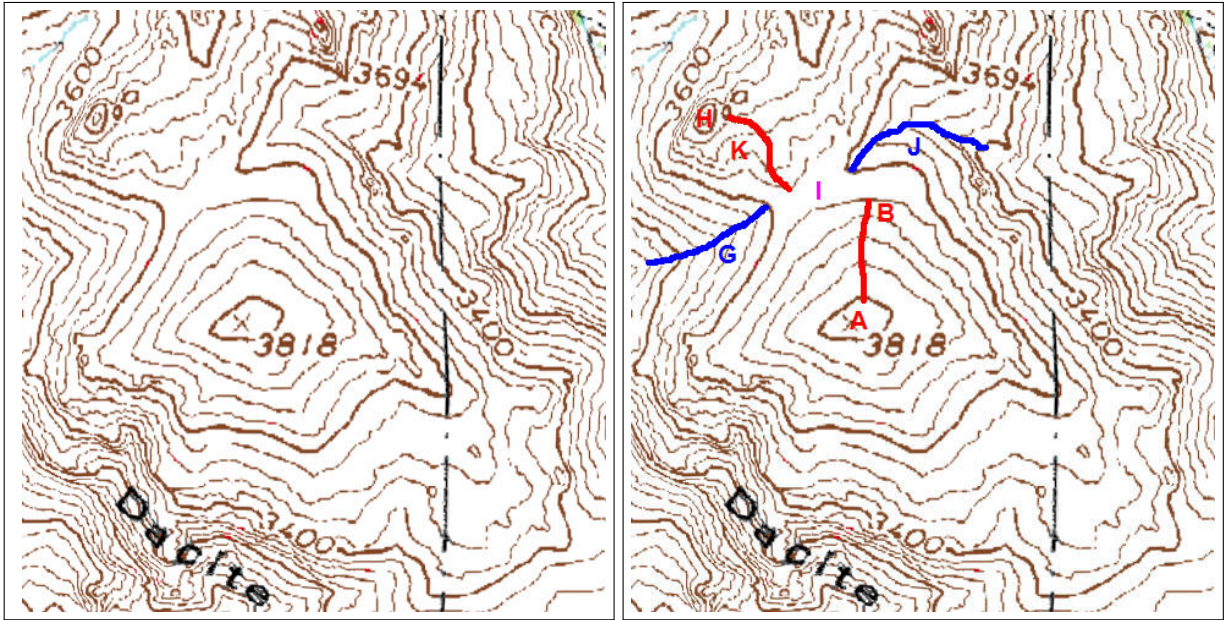
There are more U and V shapes in Figure B.2 on the previous page.

1. Between the two ridges heading southwest (ridges C and D) is a series of contours shaped like a U, but these are pointing uphill, not downhill, so they do not represent a ridge.
2. There are a series of V shaped contours coming in from the west near the top of the figure, heading north-east, identified by G in the right-hand figure. These too are pointing uphill, not down.

In contrast to ridges, someone standing on a contour line at one of these U or V shapes will be at a lower elevation than the terrain immediately to their left and right. This is characteristic of a valley or gully. The Us indicate a wide gully or rounded valley. In the case of the gully identified in Item 1, it is a steep but wide gully. Wide gulleys are often called gentle gulleys. The gully identified by the letter G is a sharp, steep valley or gully.

*Contour lines that appear in a pattern shaped like a U or a V pointing in an **uphill** direction indicate a valley or gully. A U shape indicates a gentle valley or gully, a V shape a steep valley or gully.*

Valleys and gullies are natural places for water to flow. Water follows steepest slopes, so it flows perpendicular to the contours.



**Figure B.3.** A wider view near the hill

Figure B.3 shows a wider view of Figure B.2 on page 368. The contour lines are colored brown, which is typical of topo maps. Usually the contours are separated by equal elevations. Some brown contours are darker than others. This does not make them more important, but is an aid to identifying the elevation of contours. The darker contour that starts near the top left-hand side has the numbers 3600 through it. This means that contour is 3600 feet above sea level. Following it around shows that it exits at the middle top portion of the map just after the numbers 3694. (In fact, it eventually rejoins the original contour.) The number 3600 is called a contour index.

Notice at the lower end of the 3600 foot contour, that this is the sixth contour from the benchmark. Immediately south of this is another darker contour at elevation 3400 feet. So there is a 200 foot elevation change between successive dark contours. What about the lighter contours? Well there are 4 lighter contours between adjacent dark contours, which means there are 5 segments that must contribute 200 feet, each one being  $200/5 = 40$  feet different in elevation. They would represent elevations of 3440, 3480, 3520, and 3560 feet. This difference is called the contour interval, and it can also be found on the map's legend.

*The contour interval is the change in elevation between successive contour lines.*

Looking at the top of the hill shows another dark contour, which must be 200 feet higher than 3600 feet, namely at 3800 feet. This is consistent with the benchmark of 3818 feet. Presumably the figures 3800 are not on this contour because it would add confusion to the map.

Notice to the south of the numbers 3400 near the bottom of the map, that there is another dark contour, which must be 200 feet lower than 3400 feet, namely 3200 feet. In this part of the map the contour lines are very close together, indicating a steep cliff.

There is a second hill just below the number 3600 in the top left part of the map, identified by the letter H in the right-hand figure. This hill is higher than the benchmark hill A because it not only has a dark contour, but also a lighter one inside it, so this hill is at least 3820 feet in elevation. The contour lines near the top are close together, so the top is more pointed than the benchmark hill. To its west is a very steep cliff.

Imagine walking north down the ridge B from the benchmark hill A. After 5 contours there is a large open area with elevation between 3560 and 3600 feet, denoted by the letter I in the right-hand

figure. In the south westerly direction is the gulley identified earlier by the letter G. In the north easterly direction there is another gulley denoted by the letter J, so following either of these decreases the elevation. However, ahead is the hill H and walking up the ridge K increases elevation. Thus, this large open area I is indicative of a saddle. How is a saddle easily identified from contour lines? Look at the 3600 contour line again. It is the contour that contains the saddle, and the saddle occurs where the 3600 contour line pinches in on itself, looking like an hour-glass. In fact there is an elevation that, if a contour line were drawn through it, would look like a figure 8. So, in theory, contour lines can touch, but they represent the same elevation.<sup>4</sup>

*A saddle occurs between two hills where a contour line has an hour-glass shape.*

Note that two hills need not be separated by a saddle—they could be separated by a gulley. Also, depending on their location, a person may see only one hill (for example, if they were south-east of the benchmark hill) or both hills (for example, if they were west of the benchmark hill).

Caution needs to be exercised when extrapolating the nature of the terrain between contour lines. In the case where contours represent elevations every 40 feet, it could happen that between any two contours there is a steep cliff 39 feet high, which circles the entire hill, and the topo map would not show it.

A final type of contour that may appear on a topo map is a line representing a closed depression, such as a crater at the top of a volcano. These contours have small tic marks perpendicular to the contour line, with the tic marks pointing downhill.<sup>5</sup>

*Depressions are represented by closed contour lines that have tick marks pointing downhill.*

In Figure B.4 there are two craters, although it may be difficult to see the tic marks on the left-hand one.



**Figure B.4.** Two craters

<sup>4</sup> Sometimes, on a topo map, contour lines that represent different elevations appear to touch. This indicates a steep, near vertical, cliff face.

<sup>5</sup> These tic marks are called hachures.



## Summary

- If a sequence of contours are deformed circles that increase in size as the elevation decreases, then the contours represent a hill. The top of the hill is contained in the smallest contour. Contours that are extremely close together represent steep cliffs.
- The closer the contour lines the steeper the terrain. The wider the contours the flatter the terrain. No contours indicates flat terrain.
- Widely spaced contours at the top of a hill indicate a flat hilltop. Closely spaced contours at the top of a hill indicate a pointed hilltop.
- Contour lines that appear in a pattern shaped like a U or a V pointing in a **downhill** direction indicate a ridge. A U shape indicates a gentle ridge, a V shape a sharp ridge.
- Contour lines that appear in a pattern shaped like a U or a V pointing in an **uphill** direction indicate a valley or gully. A U shape indicates a gentle valley or gully, a V shape a steep valley or gully.
- A saddle occurs between two hills where a contour line has an hour-glass shape.
- Depressions are represented by closed contour lines that have tic marks pointing downhill.

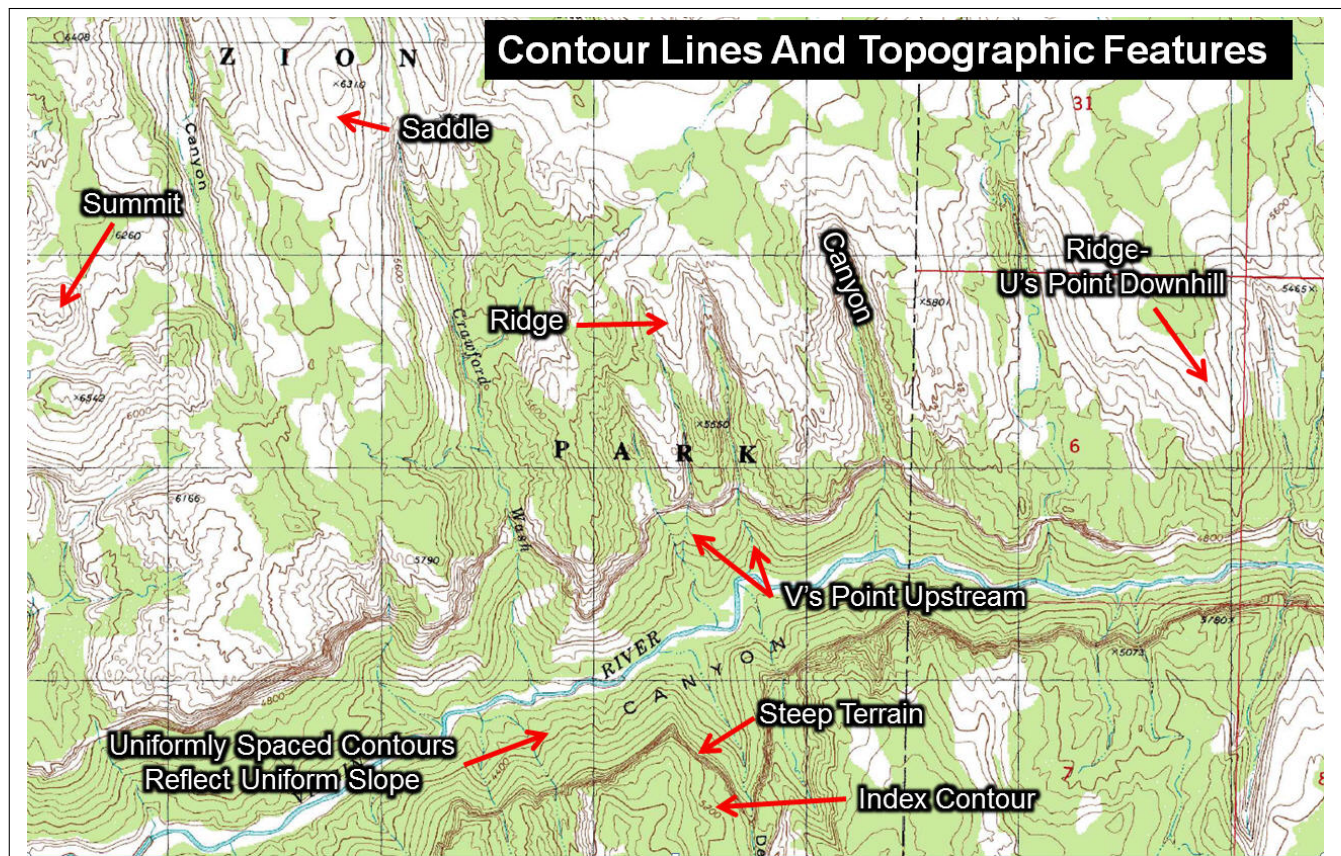


Figure B.5. Summary

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# APPENDIX C

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## Probability

We often speak of events and their chance, or probability, of occurring. Chance, or probability, is often used when the outcome of an event is not known exactly in advance. Probability is a part of our lives. Everyday we make judgements based on probability.

- There is a 90% chance that the Wildcats will win their game tomorrow.
- There is very little chance of winning the lottery.
- There is a 20% probability of rain today.
- There is a 90% probability the subject is in the search area.
- If the subject is in my assigned search area, then I had a 60% chance of finding him.

Probability is a measure of how likely it is for an event to happen. Mathematically probabilities apply to events and are numbers between 0 and 1. However, for everyday purposes, probabilities are often converted to percentages, so  $0 = 0\%$  and  $1 = 100\%$ . In spite of what people say (“I am 110% sure it will happen”), probabilities cannot exceed 100%.

If the probability of an event happening is 0%, then that event is guaranteed not to happen. For example, the probability that a person will be younger tomorrow than today is 0%, or the probability that the sun will not rise tomorrow is 0%.

If the probability of an event happening is 100%, then that event is guaranteed to happen. The probability that the sun will rise tomorrow is 100%.

Table C.1 shows verbal cues for other probabilities.

**Table C.1.** Probabilities by Verbal Cues

Probability	Meaning
100%	Guaranteed to happen. A certainty.
90%	Likely to happen
80%	
70%	
60%	
50%	Even chance of happening
40%	Unlikely to happen
30%	
20%	
10%	
0%	Guaranteed not to happen. An impossibility.



The chances of winning the Arizona Lottery is 1 in 195,249,054, which is a probability of about 0.0000005%. So that event is very, very, very, unlikely to happen, but not an impossibility, because the probability is not 0%. After all, people do win the lottery.

Notice that the statements in the first paragraph of this chapter could also be written.

- There is a 10% chance that the Wildcats will not win their game tomorrow.
- There is very high chance of not winning the lottery.
- There is an 80% probability of no rain today.
- There is a 10% probability the subject is not in the search area.
- If the subject was in my assigned search area, then I had a 40% chance of not finding him.

So if  $P$ , as a percentage, is the probability of an event occurring, then  $100 - P$  is the percentage probability of that event not occurring.

*A potential SAR manager was a candidate to take the final 1-hour SAR Coordinators' exam, but he had not studied for it. He was relieved to find that the exam was a multiple-choice test with all answers to the questions being true or false. To pass he had to score 50%. He had taken a basic statistics course and remembered his instructor once performing a coin-flipping experiment. He decided to flip a coin he had in his pocket to get the answers for each question (with heads being true and tails being false) without looking at the questions. The instructor watched the candidate the entire hour as he was... flipping the coin... writing the answer on the answer sheet... flipping the coin... writing the answer on the answer sheet..., on and on. At the end of the hour, everyone else had left the room except for this candidate. The instructor walked up to his desk and interrupted the candidate, saying: "Listen, it is obvious that you did not study for this exam since you didn't even look at the questions. If you are just flipping a coin for your answer, why is it taking you so long?"*

*The stunned candidate looked up at the instructor and replied (as he was still flipping the coin): "Shhh! I am checking my answers!"*

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# APPENDIX D

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## Useful Formulas Used in SAR

This Appendix is for those readers who are curious about the formulas used in SAR. It is not for the math-phobic, and can be avoided completely by using Win CASIE III.

### Updated $POA$ 's—Bayes' Theorem

The updated  $POA$  of Segment  $x$  after it has been searched with a probability of detection  $POD(x)$  is

$$POA_{new}(x) = \frac{(1 - POD(x))POA_{old}(x)}{1 - POD(x)POA_{old}(x)}, \quad (1)$$

while the updated  $POA$ 's of the segments,  $s$ , that have not been searched are

$$POA_{new}(s) = \frac{POA_{old}(s)}{1 - POD(x)POA_{old}(x)}, \quad (2)$$

while

$$ROW_{new} = \frac{ROW_{old}}{1 - POD(x)POA_{old}(x)}. \quad (3)$$

### Demonstration—Updating $POA$ 's

*An initial consensus is shown in Table D.1.*

Table D.1. Initial $POA$ 's		
$POA(1)$	$POA(2)$	$ROW$
50%	40%	10%

*Segment 1 is searched with a  $POD$  of 60%. What are the updated  $POA$ 's?*

#### Answer

To find the updated  $POA$  for Segment 1, use equation (1), because Segment 1 is the segment that is searched. In this case

$$POA_{new}(1) = \frac{(1 - POD(1))POA_{old}(1)}{1 - POD(1)POA_{old}(x)},$$

where  $POA_{old}(1) = 0.5$  and  $POD(1) = 0.6$ . Thus,

$$POA_{new}(1) = \frac{(1 - 0.6)0.5}{1 - (0.6)0.5} = 0.2857 = 28.57\%.$$

To find the updated  $POA$  for Segment 2, use equation (2), because Segment 2 is a segment that is not searched.

$$POA_{new}(2) = \frac{POA_{old}(2)}{1 - POD(1)POA_{old}(1)},$$

where  $POA_{old}(2) = 0.4$  and  $POD(1) = 0.6$ . Thus,

$$POA_{new}(2) = \frac{0.4}{1 - (0.6)0.5} = 0.5714 = 57.14\%.$$

Finally, from equation (3),

$$ROW_{new} = \frac{ROW_{old}}{1 - POD(x)POA_{old}(x)} = \frac{0.1}{1 - (0.6)0.5} = 0.1429 = 14.29\%.$$

## Cumulative POD

If  $n$  resources with probabilities of detection  $D_1, D_2, \dots, D_n$ , independently search the same segment, their Cumulative POD,  $CPOD$ , is

$$CPOD = 1 - (1 - D_1)(1 - D_2) \cdots (1 - D_n). \quad (4)$$

For the case of  $n = 2$ , it is possible to construct Table D.2, whose use is shown in the following demonstration.

**Table D.2.** Table for Estimating  $CPOD$

POD	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%
5%	10	15	19	24	29	34	38	43	48	53	57	62	67	72	76	81	86	91	95
10%	15	19	24	28	33	37	42	46	51	55	60	64	69	73	78	82	87	91	96
15%	19	24	28	32	36	41	45	49	53	58	62	66	70	75	79	83	87	92	96
20%	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84	88	92	96
25%	29	33	36	40	44	48	51	55	59	63	66	70	74	78	81	85	89	93	96
30%	34	37	41	44	48	51	55	58	62	65	69	72	76	79	83	86	90	93	97
35%	38	42	45	48	51	55	58	61	64	68	71	74	77	81	84	87	90	94	97
40%	43	46	49	52	55	58	61	64	67	70	73	76	79	82	85	88	91	94	97
45%	48	51	53	56	59	62	64	67	70	73	75	78	81	84	86	89	92	95	97
50%	53	55	58	60	63	65	68	70	73	75	78	80	83	85	88	90	93	95	98
55%	57	60	62	64	66	69	71	73	75	78	80	82	84	87	89	91	93	96	98
60%	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98
65%	67	69	70	72	74	76	77	79	81	83	84	86	88	90	91	93	95	97	98
70%	72	73	75	76	78	79	81	82	84	85	87	88	90	91	93	94	96	97	99
75%	76	78	79	80	81	83	84	85	86	88	89	90	91	93	94	95	96	98	99
80%	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
85%	86	87	87	88	89	90	90	91	92	93	93	94	95	96	96	97	98	99	99
90%	91	91	92	92	93	93	94	94	95	95	96	96	97	97	98	98	99	99	99.5
95%	95	96	96	96	96	97	97	97	97	98	98	98	98	99	99	99	99	99.5	99.8

### Demonstration—Calculating $CPOD$

*A helicopter searches a segment with a POD of 40% and a grid-search team searches it with a POD of 60%. What is the CPOD for the segment after these two searches?*

#### Answer

There are many equivalent ways to answer this question. Here are three.

1. Use equation (4) with  $D_1 = 40\% = 0.4$  and  $D_2 = 60\% = 0.6$ . From the formula

$$CPOD = 1 - (1 - D_1)(1 - D_2) = 1 - (1 - 0.4)(1 - 0.6) = 0.76 = 76\%.$$

The *CPOD* is 76%.

2. Use Table D.2 on the previous page. On the left-hand side, locate 40% and follow the row until it meets the column under 60%. The intersection contains the *CPOD*, 76%.
3. Use Figure 29.3 on page 244. On the vertical axis locate 40% and read off its Coverage, about 0.52. Do the same for 60%, obtaining a Coverage of about 0.92. Add the Coverages ( $0.52 + 0.92 = 1.44$ ), giving a Cumulative Coverage of 1.44. On the horizontal axis locate the Coverage of 1.44 and read off the corresponding *POD* from the vertical axis, about 77%.

If there are more than two *POD*'s recorded for the same segment, the *CPOD* is computed by combining two them to obtain an intermediate *CPOD*, and then treating that as a *POD*, to combine with the next *POD*, and so on. (Alternatively, use Win CASIE III Figure 29.6 on page 248, including all the *POD*'s.)

#### Demonstration—Calculating *CPOD*—Continued

*A helicopter searches a segment with a POD of 40%, a grid-search team searches it with a POD of 60%, and a Horse Team with a POD of 50%. What is the CPOD for the segment after these three searches?*

#### Answer

Any of the previous techniques to calculate *CPOD*'s can be used. Here is one, using the formula

$$CPOD = 1 - (1 - D_1)(1 - D_2),$$

with  $D_1 = 40\% = 0.4$  and  $D_2 = 60\% = 0.6$ , giving

$$CPOD = 1 - (1 - D_1)(1 - D_2) = 1 - (1 - 0.4)(1 - 0.6) = 0.76 = 76\%.$$

The intermediate *CPOD* is 76%. Now reuse the formula with  $D_1 = 76\% = 0.76$  and  $D_2 = 50\% = 0.5$ :

$$CPOD = 1 - (1 - D_1)(1 - D_2) = 1 - (1 - 0.76)(1 - 0.5) = 0.88 = 88\%.$$

The *CPOD* for all three searches is 88%.

## POD and Coverage

If *POD* is expressed as a percentage then *POD* and Coverage are related by

$$POD = 100(1 - e^{-Coverage})$$

and

$$Coverage = -\ln(1 - POD/100).$$

These relationships can be represented graphically (see Figure 29.3 on page 244) or in tables (see Tables D.3 and D.4).

**Table D.3.** *POD* as a function of Coverage

Coverage	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.70	1.80	1.90	2.00
<i>POD</i>	10%	18%	26%	33%	39%	45%	50%	55%	59%	63%	67%	70%	73%	75%	78%	80%	82%	83%	85%	86%

**Table D.4.** Coverage as a function of *POD*

<i>POD</i>	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%
Coverage	0.05	0.11	0.16	0.22	0.29	0.36	0.43	0.51	0.60	0.69	0.80	0.92	1.05	1.20	1.39	1.61	1.90	2.30	3.00

If *POD* is expressed as a decimal then *POD* and Coverage are related by

$$POD = 1 - e^{-Coverage}$$

and

$$Coverage = -\ln(1 - POD).$$

### Demonstration—Converting Coverage to *POD*

Estimate the team's *POD* if they reported a Coverage of 0.67.

#### Answer

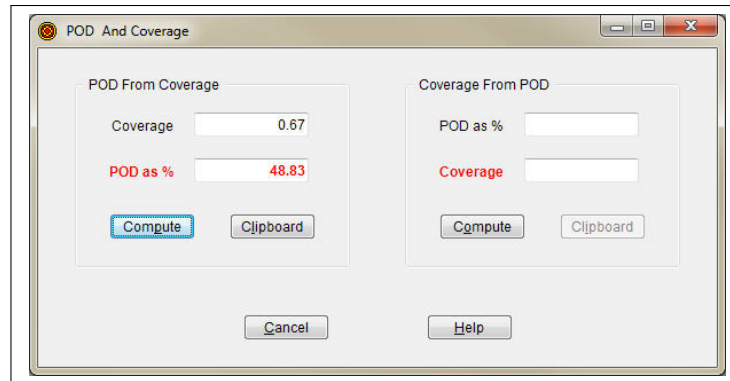
There are three different, but equivalent, ways to estimate the *POD* from this information.

1. Use a formula with Coverage = 0.67. From the formula (and a scientific calculator)

$$POD = 100(1 - e^{-Coverage}) = 100(1 - e^{-0.67}) = 100(1 - 0.51) = 48.83.$$

A Coverage of 0.67 gives a *POD* of about 49%.

2. Use a graph. From Figure 29.3 on page 244, a Coverage of 0.67 gives a *POD* of about 48%. This is obtained by locating 0.67 on the horizontal axis (Coverage)—about half-way between 0.6 and 0.8—then drawing a vertical line until it meets the curve, and finally drawing a horizontal line, crossing the vertical axis (*POD*) between 40 and 50.
3. Use Win CASIE III, which has this capability built in. With Win CASIE III running, select the menu items “What If?”, “POD And Coverage”, enter 0.67 for the “Coverage”, and finally click the “Accept” button. See Figure D.1.

**Figure D.1.** Coverage/*POD* from Coverage

## Effective Sweep Width (ESW) and Critical Separation (CS)

There is no exact formula relating Effective Sweep Width (ESW) and Critical Separation (CS) although it is believed that

$$ESW \approx a \times CS,$$

where

$$0.5 \leq a \leq 0.7.$$

## Coverage, Spacing, and ESW

The relationship between Coverage, Spacing, and ESW is,

$$Spacing = \frac{ESW}{Coverage}.$$

$$Coverage = \frac{ESW}{Spacing}.$$

### Demonstration—Estimating *POD*

From on site trials, a grid search team estimates its *CS* as 20 feet for their segment. Estimate the team's *POD* if they use purposeful wandering and are actually separated by 30 feet.

#### Answer

Because of purposeful wandering, here  $ESW \approx 1 \text{ CS} = 20$  feet, while  $Spacing = 30$  feet. There are two different, but equivalent, ways to estimate the *POD* from this information.

1. Use formulas and graphs. From the formula

$$Coverage = \frac{ESW}{Spacing} = \frac{1 \text{ CS}}{Spacing} = \frac{20}{30} = 0.67.$$

From Figure 29.3 on page 244, a Coverage of 0.66 gives a *POD* of about 48%.

2. Use Win CASIE III, which has this capability built in. With Win CASIE III running, select the menu items “What If?”, “Coverage/POD And Spacing”, and “Coverage/POD From Spacing”, make sure the “Effective Sweep Width” radio button is selected, and enter 30 for the “Spacing” and 20 for “ESW”, and finally click the “Accept” button. See Figure D.2.

The screenshot shows a software window titled "Coverage/POD From Spacing". It has two main sections: "Input" and "Options". In the "Input" section, there are two text boxes: "Spacing(ft)" with the value 30 and "ESW (ft)" with the value 20. The "Options" section contains three radio buttons: "Metric" (unchecked), "Effective Sweep Width" (checked), "Critical Separation" (unchecked), and "Average Maximum Detection Range" (unchecked). Below these is an "Output (Estimates)" section with two rows of data: "Coverage" with the value 0.6667 and "POD %" with the value 48.66. At the bottom of the window are four buttons: "Accept", "Cancel", "Clipboard", and "Help".

Figure D.2. Coverage/POD from Spacing

## Area, Time, Number of Searchers, Spacing, and Speed

The five quantities

1. The *Area* of the segment to be searched.
2. The number of *Hours* the resource searches.
3. The *Number of Searchers* in the resource.
4. The *Spacing* between the searchers.
5. The *Speed* of the resource.



are related by the formulas

$$\text{Area (sq. mi)} = \frac{\text{Spacing (feet)} \times \text{Hours} \times \text{Number of Searchers} \times \text{Speed (mph)}}{5,280}.$$

$$\text{Speed (mph)} = \frac{5,280 \times \text{Area (sq. mi)}}{\text{Spacing (feet)} \times \text{Hours} \times \text{Number of Searchers}}.$$

$$\text{Spacing (feet)} = \frac{5,280 \times \text{Area (sq. mi)}}{\text{Hours} \times \text{Number of Searchers} \times \text{Speed (mph)}}.$$

$$\text{Hours} = \frac{5,280 \times \text{Area (sq. mi)}}{\text{Spacing (feet)} \times \text{Number of Searchers} \times \text{Speed (mph)}}.$$

$$\text{Number of Searchers} = \frac{5,280 \times \text{Area (sq. mi)}}{\text{Spacing (feet)} \times \text{Hours} \times \text{Speed (mph)}}.$$

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# APPENDIX E

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## Memo From Director, USAF Element, National SAR School

*There is no federal legislation that puts a County Sheriff or any other local agency in charge of searches. In the United States, civil SAR is normally performed at the local level, with assistance from the federal government/military/Coast Guard only if needed and requested through a Rescue Coordination Center (RCC). This construct is specific for day-to-day civil SAR, not larger scale events which fall under the National Response Framework and ESF9 (for managing incidents that range from the serious but purely local, to large-scale terrorist attacks or catastrophic natural disasters. For those larger events, especially where there is a presidential declaration of an emergency or disaster area, NRF comes into play and you will see a larger scale response from the federal level with assistance coming from FEMA, DoD, etc).*

*Within the National SAR Plan, paragraph 9 identifies the states as having complete jurisdictional sovereignty for SAR within their state boundaries if they choose to accept it. All states within the United States HAVE decided to retain responsibility for local SAR. Paragraph 29 of the National SAR Plan states that “State and local authorities are responsible for land based SAR and designate a person to be ‘SAR Coordinator’ within their respective jurisdictions”. The bottom line is each state gets to determine the construct of a SAR system within their borders; i.e. what agencies are responsible for each type of SAR incident. In many states (but not all) the responsibility for missing person searches is delegated to law enforcement, be it State Police, DPS, County Sheriff, Park Police, or some other agency. This may be because there is typically going to be some type of investigation on-going during any search for a missing person. Other types of incidents may have a different agency responsible; overdue aircraft searches may be law enforcement, Dept. of Aeronautics, Emergency Management, CAP, or whatever the state has decided.*

*For those wondering about NIMS/ICS/NRF: In any given civil SAR incident, there should be a state or local agency with overall responsibility, as discussed above. The responsible agency will be the one to designate an IC or Incident Commander with overall responsibility for the incident/event. Depending on the size and complexity of the incident, the IC may or may not be from the agency responsible for Search and Rescue (ESF9); if SAR is only to be a part of an incident it is unlikely an agency with SAR responsibilities would be IC. If SAR is the only event, IC is likely to be from SAR responsible agency. Remember ICS is supposed to be a scalable structure, using only as much of the structure as needed to respond to an incident. So you may have a small incident with IC handling all the ICS duties, or a larger multi day area type search with people assigned to fill roles.*

*Hope this answers a couple of the questions that came up in the discussion.*

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757-856-2273  
William.l.Clarke@uscg.mil

## Readings, Answers, References, and Index

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# Additional Readings

## Educational

- **Deal, Tim et al.** “Beyond Initial Response”, 2<sup>nd</sup> Edition. Author House, Bloomington, Indiana. 2010.
- **Dougher, Hugh.** “Search Management Systems”. ERI International, Inc., Olympia, Washington. 2008.
- **Gilmartin, Kevin M.** “Emotional Survival For Law Enforcement”. E-S Press, Tucson, Arizona. 2002.
- **Kelley, Dennis.** “Mountain Search for the Lost Victim”. Published privately. 1969.
- **O’Connor, Dan,** editor. “Managing the Lost Person Incident”, 2<sup>nd</sup> Edition. National Association for Search and Rescue. 2007.
- **Perkins, Dave.** “Probability of Detection (POD) Research, And Other Concepts For Search Management”. Emergency Response Institute, Olympia, Washington. 1989.
- **Perkins, Dave and Roberts, Pete.** “Searching for a Missing Person. Managing the Initial Response. A practical handbook”. The Centre for Search Research, Northumberland, UK.
- **Setnicka, Tim J.** “Wilderness Search and Rescue”. Appalachian Mountain Club, Boston, Massachusetts. 1980.
- **Shimanski, Charley.** “Working with the Media in Search and Rescue”. Mountain Rescue Association. 2008. Downloadable from [http://www.mra.org/drupal2/sites/default/files/documents/training/Media\\_rev08.pdf](http://www.mra.org/drupal2/sites/default/files/documents/training/Media_rev08.pdf). Accessed January 27, 2011.
- **Syrotuck, William G.** “Analysis of Lost Person Behavior”. Barkleigh Publications, Mechanicsburg, Pennsylvania. 2000.
- **Syrotuck, William G.** “An Introduction to Land Search—Probabilities and Calculations”. Barkleigh Publications, Mechanicsburg, Pennsylvania. 2000.
- **Syrotuck, William G.** “Some Grid Search Techniques for Lost Individuals in Wilderness Areas”. Barkleigh Publications, Mechanicsburg, Pennsylvania. 2001.
- **United States Department of Defense.** US Army Survival Manual: FM 21-76. 1970. [www.ar15.com/content/manuals/FM21-76\\_SurvivalManual.pdf](http://www.ar15.com/content/manuals/FM21-76_SurvivalManual.pdf).

## Narrative

- **Blehm, Eric.** “The Last Season”. Harper Perennial, New York. 2006.

- **Butler, Elias and Myers, Tom.** “Grand Obsession: Harvey Butchart and the Exploration of Grand Canyon”. Puma Press, Flagstaff, Arizona. 2007.
- **Bytnar, Bruce W.** “A Park Ranger’s Life”. Wheatmark, Tucson, Arizona. 2010.
- **Farabee, Charles R. “Butch”.** “Death, Daring and Disaster—Search and Rescue in the National Parks”. Roberts Rinehart Publishers, Boulder, Colorado. 2005.
- **Ghiglieri, Michael P. and Myers, Thomas M.** “Over the Edge: Death in Grand Canyon”. Puma Press, Flagstaff, Arizona. 2001.
- **Hufault, Cathy.** “Death Clouds on Mt Baldy”. Arizona Mountain Publications, Vail, Arizona. 2011.

### Mathematical

- **Koopman, Bernard O.** “Search and Screening”. Military Operations Research Society, Alexandria, Virginia. 1980.
- **Stone, Lawrence D.** “Theory of Optimal Search”. INFORMS, Linthicum, Maryland. 1989.
- **Washburn, Alan R.** “Search and Detection”, 4<sup>th</sup> Edition. INFORMS, Linthicum, Maryland. 2002.



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# Answers To Exercises/Quizzes

**1.1** Trailing Dogs and Air Scent Dogs

**1.13** (b) False

**1.14** (c) Immobile and responsive

**1.15** (c) May not understand that they are the subject of a search

**1.16** (b) Route and Location Searches

**1.17** (b) Immobile

**1.18** (a) Either an Extended or Area Search

**1.19** (b) False

**1.20** (d) All of the above

**1.21** (b) False

**1.22** (d) Incident Command System

**1.23** (a) Strike teams and task forces

**1.24** (b) 3

**2.3** (b) County Sheriff

**2.4** (d) AZDEMA

**2.5** (a) True

**2.6** (d) 60

**2.7** (b) False

**2.8** (b) False

**2.9** (c) Is notified by telephone followed by a written report

**3.2** Ensure responder safety. Control size and complexity of incident. Resolve incident as quickly as possible.

**3.3** (d) Investigate, Contain, Search

**3.4** (d) 97%

**3.5** (c) Initial Planning Point

**3.6** (b) False

**3.7** (b) Of the first LKP or PLS

**3.8** (d) LPQ

**3.9** (b) False

**3.10** (b) False

**3.11** (c) Incident Action Plan

**3.12** (a) ICS-SAR

**4.3** (d) The investigation starts immediately and continues until the search concludes

**4.4** (d) All of the above

**4.5** (b) A lower number indicates a higher priority

**4.6** (b) False

**4.7** (b) False

**4.8** (a) True

**4.9** (b) False

**4.10** (a) True

**4.11** (e) 214

**4.12** (c) Place Last Seen

**4.13** (d) Both of these programs

**5.5**

(a) 40 feet

(b) South of the 6004 foot benchmark

(c) 6960 feet—due north of the second S

(d) 6453 and 6366 feet

**5.7** (a) Deciding where to search

**5.8** (b) False

**5.9** (a) True

**5.10** (a) True

**5.11** (e) All of the above

**6.8** Where road meets circle on right.

**6.10** (a) Initial or hasty search

**6.11** (c) Both determining the direction of travel and detecting movement

**6.12** (a) True

**6.13** (c) Attract the subject's attention

**6.14** (c) Virtual

**6.15** (a) Mobile

**6.16** (c) Responsive

**6.17** (a) True

**6.18** (b) Smoke

**6.19** (a) Lookout

**6.20** (b) Virtual containment

**6.21** (b) False

**7.2** (b) False

**7.3** (a) True

**7.4** (d) All of the above

**7.5** (c) Wait for additional information

**7.6** (d) All of the above

**7.7** (a) True

**7.8** (b) False

**7.9** (b) False

**7.10** (b) False

**7.11** (b) False

**7.12** (b) False

**7.13** (b) False

**7.14** (b) False

**7.15** (a) True

**7.16** (a) Operational Period 1

**7.17** (b) False

**8.3** (b) False

**8.4** (a) True

**8.5** (b) False

**8.6** (a) True

- 8.7** (a) True
- 8.8** (a) True
- 8.9** (f) All of the above
- 8.10** (a) True
- 8.11** (e) All of the above
- 8.12** (a) To ensure their team has all necessary equipment
- 8.13** (b) False
- 9.4** (a) True
- 9.5** (b) Record details of unit activity
- 9.6** (b) False
- 9.7** (b) False
- 9.8** (a) True
- 9.9** (a) True
- 9.10** (a) True
- 9.11** (a) True
- 9.12** (b) If no debrief takes place, the planning of future search efforts could be problematic
- 9.13** (d) All of the above
- 9.14** (e) All of the above
- 10.5** (b) False
- 10.6** (b) False
- 10.7** (b) False
- 10.8** (d) All of the above
- 10.9** (b) False
- 10.10** (b) The Agency Administrator
- 10.11** (c) Limited Continuous Mode
- 10.12** (a) The family
- 10.13** (d) Find out what did not work well
- 10.14** (a) True
- 10.15** (b) False
- 10.16** (a) True
- 11.4** In the Initial Note, you should have used at least the following.
- (a) “Details” under the “Insert” menu items, which generates a Details template that can be partially completed.
- (b) “Subject Category”. (Use the Tab key to place the cursor at the end of the word “Category:” in the previously generated Details template, and then click on Initial Note menu item “Subject Category” and select “Children (4 to 6 years)”.)
- Aside: In a more realistic setting, you might also have used the following at this stage.
- “Dispatch Call/Initial Report” under the “Insert” menu items, which generates a template that can be partially completed.
  - “ICS”.
- 11.5**
- (a) Use the Tab key to place the cursor at the end of the words “Search Urgency: ” in the previously generated Details template. Then, in the main window, select the menu item “Initial Resources”, “Urgency Rating Chart”. After checking the appropriate radio buttons, click on “Clipboard” and then paste the clipboard’s contents in the Initial Note.
- (b) In the main window, select the menu item “Initial Resources”, “Lost Person Behavior Distance Traveled”, finding 0.06 and 1.65 miles.
- (c) In the main window, select the menu item “Initial Resources”, “Circular Search Areas”, and enter 0.06 and 1.65 miles as the Inner and Outer Radii. After clicking “Accept”, you get 8.542 square miles. Click “Clipboard”, place the cursor at the end of the Initial Note, and paste the result.
- 11.6**
- (a) Place the cursor at the end of the Initial Note and select the menu item “Team Status”. Complete the template for each team.
- (b) Place the cursor at the end of the Initial Note and select “Found Subject”. Complete the template.
- 11.7** (b) In an accordion file
- 11.8** (b) False
- 11.9** (b) False
- 11.10** (a) True
- 11.11** (a) True
- 11.12** (b) False
- 11.13** (b) False
- 11.14** (b) False
- 11.15** (d) “IPP-PLS” or “IPP-LKP”
- 11.16** (a) The IPP
- 12.8** (b) Unity of Command
- 12.9** (c) All the Section Chiefs
- 12.10** (b) Planning
- 12.11** (c) Leader
- 12.12** (a) Resource Unit
- 12.13** (d) All of the above
- 12.14** (a) Operations
- 12.15** (b) 3 to 7 subordinates
- 12.16** (d) The number of individuals or resources that one supervisor can manage effectively
- 12.17** (a) The SO, PIO, and LOFR
- 12.18** (c) Public Information Officer
- 12.19** (d) Incident Command Post
- 12.20** (b) The IC, Command Staff, and General Staff
- 12.21** (d) Base Camp is not used in ICS
- 12.22** (d) Rendezvous is not used in ICS
- 12.23** (a) Operations Section Chief
- 12.24** (b) Kind describes what the resource is. Type describes its capability.
- 12.25** (c) Logistics
- 12.26** (b) Planning
- 12.27** (c) Chain of Command
- 12.28** (a) Standard or common terminology
- 12.29** (a) For incident command from one Incident Commander to another
- 12.30** (b) When a more qualified person assumes command
- 12.31** (c) How do we communicate with each other?
- 12.32** (b) The Incident Commander
- 13.3** (c) Incident Action Plan
- 13.4** (a) True
- 13.5** (b) False
- 13.6** (b) False

- 13.7** (a) True  
**13.8** (a) IC/UC Meeting  
**13.9** (a) True  
**13.10** (b) False  
**13.11** (a) True  
**13.12** (a) True  
**13.13** (a) True  
**13.14** (a) True  
**14.5** (b) False  
**14.6** (a) True  
**14.7** (a) True  
**14.8** (d) The team should do all of these  
**14.9** (a) True  
**14.10** (d) All of the above  
**14.11** (a) True  
**14.12** (b) False  
**14.13** (c) Use Clue Manager  
**14.14** (d) All the above  
**14.15** (b) False  
**15.8** (a) True  
**15.9** (b) False  
**15.10** (b) False  
**15.11** (b) False  
**15.12** (a) True  
**15.13** (d) USNG  
**15.14** (b) False  
**15.15** (e) Answers (a), (b), and (c)  
**16.3** (a) Decimal degrees  
**16.4** (d) None of the above  
**16.5** (b) False  
**16.6** (a) True  
**16.7** (c) Civil Air Patrol  
**16.8** (d) Both (b) and (c)  
**16.9** (a) True  
**17.2** (b) False  
**17.3** (b) Simplex  
**17.4** (a) True  
**17.5** (b) Arizona Interoperable Radio System  
**17.6** (b) False

- 17.7** (a) A Communications Plan is an essential tool for any Search and Rescue operation and should be tested to assure functionality  
**18.7** (d) Fatigue  
**19.3** (b) False  
**19.4** (b) False  
**19.5** (a) True  
**19.6** (a) True  
**19.7** (a) True  
**19.8** (a) True  
**19.9** (e) Answers (a), (c), and (d)  
**19.10** (e) Answers (c) and (d)  
**20.3** (b) False  
**20.4** (a) True  
**20.5** (a) True  
**20.6** (a) True  
**21.2** (d) All of the above  
**21.3** (a) True  
**21.4** (a) True  
**21.5** (d) All of the above  
**21.6** (a) True  
**24.1** Radius:  $6 \text{ hrs} \times 2 \text{ mph} = 12 \text{ mi}$ .  
Area:  $\pi \times 12^2 = 452 \text{ square miles}$ .  
**24.3** (a) True  
**24.4** (a) True  
**24.5** (c) Theoretical, Statistical, Subjective, Deductive Reasoning  
**24.6** (c) Subjective Method  
**24.7** (a) Theoretical Method  
**24.8** (d) Deductive Reasoning Method  
**24.9** (b) Statistical Method  
**25.9** (b) False  
**25.10** (b) False  
**25.11** (d) Terrain, vegetation, and resource used  
**25.12** (b) 1 mile  
**25.13** (b) False  
**25.14** (b) False  
**25.15** (b) False  
**25.16** (a) True  
**25.17** (b) False

- 25.18** (b) False  
**25.19** (a) True

**26.1** No. Expert 1's total 110%. Should total 100%. Expert 2's *ROW* must be a numerical (percentage) value. Expert 3's letters must be between A and I. Expert 4's *ROW* must be positive, as must every segment. Expert 5 is using the Proportional Method, but the *ROW* must be a percentage.

**26.3** Segment 1, because every expert rates it the highest priority.

Segment Consensus	
ROW	15.00%
1	41.21%
2	28.03%
3	15.76%
Total	100.00%

**26.4** One, of many solutions, is  $POA(1) = 45\%$ ,  $POA(2) = 10\%$ ,  $POA(3) = 9\%$ ,  $POA(4) = 8\%$ ,  $POA(5) = 7\%$ ,  $POA(6) = 6\%$ ,  $POA(7) = 5\%$ ,  $POA(8) = 4\%$ ,  $POA(9) = 3\%$ ,  $POA(10) = 2\%$ ,  $ROW = 1\%$ .

**26.7** To print the consensus forms, use "Access Forms", "Consensus Form". A natural Incident Name would be "Weiser Search #09271722".

**26.8** Use "Start New Incident" under the "File" menu, or "Start New" on the Toolbar. A natural Incident Name would be "Weiser Search #09271722".

You should have imported the Initial Note when asked.

The table shows the Initial Consensus.

Segment Consensus	
ROW	20.00%
1	37.46%
2	28.73%
3	13.81%

- 26.9** (b) False  
**26.10** (a) True  
**26.11** (b) O'Connor Method  
**26.12** (a) True  
**26.13** (e) 0.02  
**26.14** (a) 200%  
**26.15** (a) True  
**26.16** (b) False

**26.17** (b) No

**26.18** (e) At most once

**28.2** The *CPOD* is a measure of how well a segment has been searched. The ROW is never searched, so its *CPOD* = 0.

**28.3** For Segment 2,  $D_1 = 60\% = 0.6$  and  $D_2 = 30\% = 0.3$ , so  $CPOD = 1 - (1 - D_1)(1 - D_2) = 1 - (1 - 0.6)(1 - 0.3) = 0.72 = 72\%$ .

**28.11** (b) False

**28.12** (b) False

**28.13** (b) False

**28.14** (a) True

**28.15** (b) False

**28.16** (a) True

**28.17** (b) False

**28.18** (b) False

**28.19** (a) *POA*

**28.20** (a) True

**28.21** (b) False

**28.22** (b) False

**28.23** (b) False

**28.24** (b) Split the segment and apply the *POD* to the region searched

**28.25** (d) Split the segment and apply the *POD*'s to the appropriate new segments

**28.26** (a) 30%

**28.27** (b) 70%

**28.28** (c) Not enough information

**29.2** *POD* and Coverage both measure the efficiency of a resource in different units.

**29.3** 85.97%

**29.4** A *POD* of 1.00% is the same as a *POD* of  $1/100 = 0.01$ . The difference is  $1.00 - 0.01 = 0.99$  or 99%.

**29.5** *POD*  $70\% \approx 1.2$  Coverage Coverage  $1.2/2 = 0.6 \approx 45.0\%$  *POD*

**29.6** 0.7576, 53.12%; 659.98 ft, 329.99 ft

**29.7** ESW between 35 and 49 ft

**29.8**

(a) Between 50 and 70 ft

(b) Between 100 and 140 ft

(c) Between 0.61 and 0.85 sq mi

**29.9** 144 ft

**29.10**

Coverage <i>POD</i> (%)	
0.00	0.00%
0.25	22.12%
0.50	39.35%
0.75	52.76%
1.00	63.21%
2.00	86.47%

**29.11**

<i>POD</i> (%)	Coverage
0%	0.0
20%	0.22
40%	0.51
60%	0.92
80%	1.61

**29.12**

Spacing (ft)	Coverage
40	2.00
60	1.33
80	1.00
100	0.80
120	0.67
140	0.57
160	0.50

**29.13**

Coverage	Spacing (ft)
0.25	320.00
0.50	160.00
0.75	106.67
1.00	80.00
2.00	40.00

**29.14** Both terms mean the same thing, but are used in different contexts. "Spacing" is the distance between ground searchers as they move in parallel along a constant heading. "Track Spacing" is the distance between parallel search tracks conducted by one or more aircraft.

**29.15** One-half of the Track Spacing; the distance an observer needs to sweep on either side of the track.

**29.16** To print the consensus forms, use "Access Forms", "Debriefing Form".

(Aside: If the debriefing forms are not identified in any way, then you should write your own cross-reference on them, such as "DB1", "DB2", ..., then use this reference under "X Reference to paperwork".)

When entering the Helicopter's *POD*'s in Segments 1 and 2, you can save typing by checking the box "Reuse this information".

The table shows the updated *POA*'s and *CPOD*'s at the end of OP 2.

Segment	<i>POA</i>	<i>CPOD</i>
ROW	42.57%	0.00%
1	21.93%	72.50%
2	13.45%	78.00%
3	22.05%	25.00%

**29.17**

(a) To see the latest *POA*'s, sorted from highest to lowest, click on the heading "POA" in the Incident Status panel. The "hottest" segment is the ROW. The "hottest" segment in the search area is Segment 3 followed closely by Segment 1.

(b) To see the search effort click on the "History" radio button. To sort by segment, click on the heading "Segment".

**29.18**

(a) Add the find under "Update Search", "Create Note", "Found Subject".

(b) The report is created under "Update Search", "Report", "Complete".

**29.19** 88%

**29.20** 66.67%

**29.21** (b) Makes the ROW artificially high

**29.22** (b) False

**29.23** (a) True

**29.24** (a) True

**29.25** (b) 86%

**29.26** (d) 88%

**29.27** (b) False

**29.28** (a) True

**29.29** (b) 40%

**29.30** (c) Not enough information.

**29.31** (a) If the subject is in that search segment, then there is a 30% chance of finding the subject

**29.32** (b) The chances of the subject being in that segment is 30%

**30.1** 66 searchers

**30.2** 1.32 hrs = 1 hr 19 min

**30.3** 660 feet

**30.4** 0.8441 sq mi

- |   |   |                          |
|---|---|--------------------------|
| <b>30.5</b> (a) True                    | while they continue with their assignment | <b>30.12</b> (c) 90 feet |
| <b>30.6</b> (b) False                   | <b>30.9</b> (a) True                      | <b>31.1</b> (a) True     |
| <b>30.7</b> (a) True                    | <b>30.10</b> (a) True                     | <b>31.2</b> (a) True     |
| <b>30.8</b> (c) Request a Tracking Team | <b>30.11</b> (b) 44                       | <b>31.3</b> (b) False    |

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# SAR Investigations Websites

The following is a list of potentially useful websites for SAR investigations in Arizona.

## Climatology

### Fire

- NIFC Fire Weather Center. National fire weather information. <https://www.predictiveservices.nifc.gov/weather/weather.htm>.

### Forecasts

- Intellicast. <http://www.intellicast.com/>.
- Intellicast. National Park Forecasts. <http://www.intellicast.com/National/Outdoors/>.
- NOAA National Weather Service. <http://www.nws.noaa.gov/>.
- NOAA Weather Radio. County by county coverage NOAA weather radio. <http://www.nws.noaa.gov/nwr/indexnw.htm>.
- Weather Channel. Weather maps, forecasts, and current weather conditions. Search for weather information by City or Zip Code. <http://www.weather.com/>.
- Weather Channel. National Park Forecasts. <http://www.weather.com/activities/recreation/outdoors/>

### Hurricane

- NOAA National Hurricane Center. <http://www.nhc.noaa.gov/>.
- Tropical Weather. Atlantic & Pacific Oceans. <http://weather.hawaii.edu/tropical/>.
- WeatherOnline!. Tropical Weather. <http://www.weatheronline.com/tropical/>.

### Natural Disasters

- National Geophysical Data Center. The website archives and assimilates tsunami, earthquake, and volcano data to support research, planning, response, and mitigation. Long-term data, including photographs, can be used to establish the history of natural hazard occurrences and help mitigate against future events. <http://www.ngdc.noaa.gov/hazard/>.
- Natural Hazards Center at the University of Colorado at Boulder. Disaster information database and links to additional disaster resources/sites. <http://www.colorado.edu/hazards/>.
- USGS. National Earthquake Information Center. <https://earthquake.usgs.gov/contactus/golden/>.

### Sunrise/Sunset

- U.S. Naval Observatory Naval Oceanography Portal. Sunrise/sunset and moonrise/moonset information, phases of the moon, altitude and azimuth of sun and moon by date. <http://www.usno.navy.mil/USNO/astromical-applications/data-services>.



### Water/River Flow Data

- USGS Real Time Water Data. Real-time hydrologic data for water resources of the United States. <http://waterdata.usgs.gov/nwis/rt>.
- NWS Hydrologic Information Center. National Weather Service. <http://www.nws.noaa.gov/oh/hic/>.

### Wind Chill Chart

- NOAA Wind Chill chart. [http://www.nws.noaa.gov/om/cold/wind\\_chill.shtml](http://www.nws.noaa.gov/om/cold/wind_chill.shtml).
- USA Today. Revised Wind Chill Table. <http://www.usatoday.com/weather/resources/basics/wind-chill-char.htm>.

## Incident Command

### ICS Forms Online

- ICS Forms. National Wildfire Coordinating Group (NWCG). [www.nwcg.gov/pms/forms/ics.htm](http://www.nwcg.gov/pms/forms/ics.htm).
- ICS Forms. Office of Response and Restoration, NOAA. <http://response.restoration.noaa.gov/oilands/ICS/intro.html>.
- ICS Forms. San Francisco Bay Area Search And Rescue Council. <http://www.basarc.org/downloads/SARForms.zip>
- ICS Forms. US Coast Guard. <https://www.uscg.mil/forms/ics.asp?files=0>

## Mass Casualty

### Critical Incident Stress Management (CISM)

- International Critical Incident Stress Foundation, Inc. 24 Emergency Hotline. Assistance in locating local CISM support. Provision of immediate stress consultation to emergency service organizations. Tips for dealing with CIS. 3290 Pine Orchard Lane, Suite 106, Ellicott City, MD 21042. Phone:(410) 750-9600 (410) 313-2473 [Emergency]. <http://www.icisf.org/>.

## References

### General References

- Acronyms Finder. Acronym is a searchable dictionary of almost 60,000 acronyms. <http://www.acronymfinder.com/>.
- Ask.com. Ask a question. <http://www.ask.com/>.
- Britannica Encyclopedia. <http://www.britanica.com/>.
- Encyclopedia.com. <http://www.encyclopedia.com/>.
- Library of Congress. Online Catalog. Database of approximately 12 million records representing books, serials, computer files, manuscripts, cartographic materials, music, sound recordings, and visual materials in the Library of Congress collections. <http://catalog.loc.gov/>.
- Merriam-Webster Online Dictionary. <http://www.merriam-webster.com/>.
- Old Farmer's Almanac. Weather forecasts, tide references, and lunar phases. <http://www.almanac.com/>.
- One Look Dictionaries. The Fast Finder. <http://www.onelook.com/>.

- Purdue University Libraries Quick Reference. The virtual reference desk with links to reference works including; Dictionaries, Thesauri, Acronyms and Encyclopedias, Information Technology, Maps and Travel Information, Phone Books and Email Directories, Science Data, Selected United States Federal Government Documents, Time and Date, and Zip Codes. <http://www.lib.purdue.edu/eresources/readyref/>.
- Refdesk.com Facts Subject Index. Databases, dictionaries, encyclopedias, government, internet resources, law, phone book, population, postal, time & date, weights & measures and fast facts. <http://www.refdesk.com/facts.html>.

### Hazardous Materials

- CHEMTREC (Chemical Transportation Emergency Center). Information resource and solutions provider for hazardous materials and dangerous goods response. <http://www.chemtrec.org/>.
- Emergency Response Guidebook (ERG2008). <http://phmsa.dot.gov/hazmat/library/erg>.
- National MSDS (Material Safety Data Sheet) Repository. MSDS search linked to manufacturer databases. Excellent MSDS dictionary tool. <http://www.msdsearch.com/>.

### Medical Information

- Indiana Prevention Resource Center street drug slang dictionary. Search by drug street name. Links to additional drug slang sites. <http://www.drugs.indiana.edu/slang>.
- Merck manuals. Medical libraries for healthcare professionals, patients and caregivers, chemists, pet owners, and veterinarians. <http://www.merckmanuals.com/>.
- RxList. An Internet drug index for prescription drugs, medications and pill identifier. <http://www.rxlist.com/>.
- WebMD. Health information, tools for managing your health, and support to those who seek information. <http://www.webmd.com/>.

### Rescue References

- Desert Rescue Research. Creators of the Technical Rescue Field Operations Guide. <http://www.desertrescue.com/>.

### SAR Technology References

- SARINFO. SAR Technology Files. References on the use of technology in SAR including; PLB, NVG, ground penetrating radar, effectiveness of FLIR and aerial imaging and sonar use for locating submerged cadavers. <http://www.sarinfo.bc.ca/Library/Technology/LibTechnology.html>.

## Regulations

### Regulations

- Code of Federal Regulations (CFR). National Archives & Records Administration. <http://www.gpoaccess.gov/cfr/index.html>.
- US Code Search. US House of Representatives. <http://uscode.house.gov/search/criteria.shtml>.

## Search & Rescue Standards

- American Society for Testing & Material. Committee F32 on Search & Rescue. <http://www.astm.org/COMMIT/COMMITTEE/F32.htm>.
- National Fire Protection Association (NFPA). NFPA SAR Related Guidelines (online publication sales): NFPA 1006: Standard for Rescue Technician Professional Qualifications. NFPA 1670: Standard on Operations and Training for Technical Rescue Incidents. NFPA 1983: Standard on Fire Service Life Safety Rope and System Components. <http://www.nfpa.org/>.

## Search Engines & Directories

### Government SAR Agencies and Information

- COSPAS-SARSAT. International Satellite System For Search & Rescue. 406 MHz alerting beacon information. Comparison of 121.5 MHz & 406 MHz beacons, ground receiving station (LUT) information and satellite configuration. Maritime Mobile Access & Retrieval System (MARS) Database specified by International Telecommunication Union includes; International Call Signs, Maritime Identification Digits and Coast Station Identification Numbers used in maritime radio communication. <http://www.cospas-sarsat.org/>.
- NASA Search and Rescue Mission Office. Information on beaconless search, laser scanning. <http://searchandrescue.gsfc.nasa.gov/>.
- National Business Center Aviation Management Directorate. Aircraft & Vendor Pilot Source List, Safecom, Departmental Manual- Aviation Management Policy, Information bulletins. <http://amd.nbc.gov/>.
- National Disaster Medical System (NDMS). USPHS Office Of Emergency PreparednessThe National Disaster Medical System (NDMS), provides assistance to state and local authorities in dealing with the medical and health effects of major peacetime disasters. <http://www.phe.gov/Preparedness/responders/ndms/>.
- National Search & Rescue Committee (NSARC) [formerly ICSAR]. NSARC, Suite 3106, 2100 2nd St., Washington, DC 20593-0001 (202) 372-2090. Download copies of US SAR Committee Agreement, US National SAR Plan, current National SAR Manual and National Search & Rescue Supplement. <http://www.uscg.mil/hq/cg5/cg534/NSARC.asp>.
- SARSAT (Search & Rescue Satellite Aided Tracking). NOAA. Information on SARSAT system and emergency beacons. <http://www.sarsat.noaa.gov/>.
- U.S. Coast Guard- Vessel & Aircraft Datasheets. Fact sheets featuring size, cruising speeds, range, capabilities and deployment locations of U.S. Coast Guard SAR vessels and aircraft. <http://www.uscg.mil/datasheet/>.

### Government, Federal

- Embassy/Consulate Directory. Worldwide embassy information. [http://dir.yahoo.com/government/embassies\\_and\\_consulates/](http://dir.yahoo.com/government/embassies_and_consulates/).
- Federal Citizen Information Center. National Contact Center. Federal telephone directories, Yellow Pages, Foreign & International, State & Local. <http://www.info.gov/>.
- Federal Gateway. Federal agency information. <http://www.fedgate.org/>.
- Government Printing Office (GPO) Access. Federal Government Information. Official federal government information “at your fingertips”. <http://www.gpoaccess.gov/>.
- Infomine, Government Information. Libraries Of The University Of California. <http://infomine.ucr.edu/cgi-bin/search?govpub>.

- Recreation.gov. Recreation On Federal Lands. Quick access to information and links on all federal recreation lands administered by NPS, US Army Corps of Engineers, BLM, TVA, USFS, US Fish & Wildlife Service, Bureau of Reclamation and Federal Highway Administration. <http://www.recreation.gov/>.
- Government Resources. Robert C. Byrd National Technology Transfer Center. <http://www.nttc.edu/resources/governmentWebsites.asp>.
- Small Business Administration (SBA). Business Resource Hot Links. Links to media, internet search engines, federal government www servers, legal-regulatory, phone-directories and more. <http://app1.sba.gov/hotlist/>.
- USA.gov. Puts the government at your fingertips through an official U.S. Government portal that accesses millions of local-and-federal Web pages. <http://www.usa.gov/>.

### Government, State & Local

- Library Of Congress Internet Resource Page. State and Local Government Information. Meta-indexes, links to individual state information, state statutes. <http://www.loc.gov/rr/news/stategov/stategov.html>.

### Law Enforcement

- CopNet. International Law Enforcement Resources. Law enforcement agencies, law enforcement resources and internet search resources. <http://www.copnet.org/>.
- i2 Group. Investigative Analysis Software. The Analyst's Notebook is the world's leading visual investigative analysis software, used in 1200 organizations world-wide. It assists investigators by uncovering, interpreting, and displaying complex information in easily-understood chart form. <http://www.i2group.com/>.
- JUSTNET. Justice Technology Information Network. National Institute Of Justice. Provides criminal justice professionals with information on technology, guidelines and standards for these technologies, objective testing data, and science and engineering advice and support. Product database, forensics support and links to internet resources. <http://www.justnet.org/>.
- Officer.com. Police news, forums, links. <http://www.officer.com/>.
- TLO.com. A subscription database for investigating people and vehicle sightings. <https://tlo.com/>.

### People Locators

- A1 Trace International. Conduct investigative profiles of individuals. <http://www.a1trace.com/>.
- Dex Knows. Find a business or a person. <http://www.dexknows.com/>.
- IAF.NET. Internet Address Finder (IAF), listed as the "Internet's fastest and most convenient white pages service". Search by name and address for internet address or search by e-mail for conventional name and address. <http://www.iaf.net/>.
- Infospace. People locator through public records, Yellow pages, White pages, comprehensive government website directory (local, state and federal) and embassy information. <http://www.infospace.com/>.
- Investigative Professionals LLC. Conducts thorough background investigations on individuals and businesses for a wide range of clients. <http://www.investigativeprofessionals.com/>.
- KnowX.com. Provides access to billions of public records. <http://www.knowx.com/>.
- US SEARCH. Accesses U.S. public record databases to locate people. Instant people searches, first name searches, search deceased records, court record searches, civil judgement searches and national bankruptcy searches. <http://www.ussearch.com/>.
- Yahoo! People Search. Telephone or e-mail search features. <http://people.yahoo.com/>.

## People Locators, Children

- KlaasKids. Polly Klaas Foundation. “What To Do If Your Child Disappears”. Checklist For Parents. Associated links relating to Megan’s Law. <http://www.klaaskids.org/>.
- National Center for Missing and Exploited Children. Free consulting service to investigating agencies of expert, retired LE officer, skilled in child sexual abuse and abduction. Cybertipline- receives leads that are provided to LE agencies. Information databases utilized by NCMEC are available for assisting LE agencies including: Infotek, Autotrack, and LexisNexis. <http://www.ncmec.org/>.
- National Center for The Child Alert Network. <http://www.nccan.net>.

## SAR Agencies

- Mountain Rescue Association (MRA). MRA team emergency phone list, SAR Tools, and links. <http://www.mra.org/>.
- National Association for Search And Rescue. <http://www.nasar.org/nasar>.
- National Cave Rescue Commission (NCRC). Directory of NCRC Regional Cave Rescue Coordinators. <http://www.caves.org/commission/ncrc/national/>.
- National Emergency Management Association. <http://www.nemaweb.org/>.

## Search Engines

- About.com. <http://www.about.com/>.
- Altavista. Special features include; Search Assistant that allows custom search by date and geographic location. <http://www.altavista.com/>.
- AOL.com Netscape. <http://netscape.aol.com/>.
- Bing. <http://www.bing.com/>.
- Excite. <http://www.excite.com/>.
- Google. Special features include Web Page Translation, Phonebook, Street Maps. Google searches non-HTML file types including PDF documents, Microsoft Office, PostScript, Corel WordPerfect, Lotus 1-2-3, and others. The “I’m Feeling Lucky” button takes you directly to the first web page Google returned for your query. Image based search feature available directly from the home page. Search for a person by typing in their name, city and state. <http://www.google.com/>.
- HotBot. <http://www.hotbot.com/>.
- Go.com. <http://www.go.com/>.
- InfoUSA. Business Database. Business databases, consumer listings/databases, physicians & surgeons listings, and new businesses. <http://www.infousa.com/>.
- ixquick. A metasearch engine that does not record your IP address or other personal information. <http://www.ixquick.com/>.
- Lycos. <http://www.lycos.com/>.
- MLibrary. University of Michigan. <http://www.lib.umich.edu/>.
- Network Solutions WHOIS query. Search a domain name to find who owns the site. <http://www.networksolutions.com/whois/>.
- Search.com. CNET Inc. Internet metasearch engine. <http://www.search.com/>.
- SearchSystems.net. Public Records Directory. Collection of free public record databases on the internet organized by state or country. Access to everything from marriage licenses to records of shipwrecks. <http://publicrecords.searchsystems.net/>.
- Starting Page! A search engine that uses ixquick privacy protection technology with results generated by Google. <http://www.startingpage.com/>.
- YAHOO! <http://www.yahoo.com/>.

### Search Engines, Images

- Google Images. <http://images.google.com/>.
- Yahoo! Image Search. <http://images.search.yahoo.com/>.

### Telephone Directories

- 555-1212.com. Metasearch engine for telephone directory searches. Directory listings include; area codes, international directories, white pages, Yellow Page businesses by category, businesses by name, fax numbers, toll-free numbers and government. <http://www.555-1212.com>.
- AT&T AnyWho. Yellow pages, white pages, reverse lookup, area/zip code lookup, maps, and directions. <http://www.anywho.com>.
- Australia. <http://www.whitepages.com.au/>.
- Canada. <http://www.canada411.ca/>.
- Google. Phonebook Feature—US street address and phone number lookup to the information we provide through our search box. Publicly listed phone numbers and addresses at the top of results pages for searches that contain specific kinds of keywords. <http://www.google.com/>.
- Lookup USA. <http://www.lookupusa.com/>.
- Dex Knows. <http://www.dexknows.com/>.
- Reverse Phone Directory. Reverse phone number lookup using PC411, Anywho or Infospace. <http://www.reversephonedirectory.com/>.
- Superpages.com. <http://www.superpages.com/>.
- The Ultimate Directory. Infospace.com. White pages, Yellow pages, classified, shopping sites, finance information, government data. <http://www.infospace.com>.
- Yellowpages.com. <http://www.yellowpages.com/>.

### Telephone Directory, Government

- USA.gov. Puts the government at your fingertips through an official U.S. Government portal that accesses millions of local-and-federal Web pages. US government telephone and e-mail directories. <http://www.usa.gov/>.

## Specialized Rescue Resources

### Alpine/Avalanche Rescue

- Arizona. Kachina Peaks Avalanche Center, Inc. <http://www.kachinapeaks.org/>.
- Colorado. Colorado Avalanche Information Center (CAIC). <http://avalanche.state.co.us/>.
- Montana. Gallatin National Forest Avalanche Center (GNFAC). <http://www.mtavalanche.com/>. West Central Montana Avalanche Advisory. <http://www.missoulaavalanche.org/>.
- Utah. Utah Avalanche Information Center (USDA- Forest Service). <http://www.utahavalanchecenter.org/>.
- American Alpine Institute. <http://www.aai.cc/>.
- American Avalanche Association. <http://americanavalancheassociation.org/>.
- Backcountry Access. Manufacturer of avalanche, and provider of avalanche education. <http://backcountryaccess.com/>.
- Canadian Avalanche Centre. <http://www.avalanche.ca/>.
- Cyberspace Snow and Avalanche Center (CSAC). <http://www.avalanche-center.org/>.
- National Snow and Ice Data Center. Avalanches. <http://nsidc.org/snow/avalanche>.
- National Ski Patrol. <http://www.nsp.org/>.
- Ski Patrol Web. <http://www.skipatrol.org/>.



## Aviation

- Jane's Online. Jane's Information Group. Includes online access to All The World's Aircraft, Military Aircraft Image Library, Terrorism Watch Reports, US Chemical-Biological Handbook, Merchant Ships, Major Warships. <http://www.janes.com/>.
- Landings. Virtually every aviation related link. Most comprehensive aviation site. Search databases; aircraft registration ('N' tail number search), certificated pilots, airport information, FAA regulations, NTSB accident reports, related online calculators, organizations, companies, weather, FBO's (Fixed Base Operators), supplies, manufacturers and airlines. <http://www.landings.com/>.

## Cave

- National Cave Rescue Commission (NCRC). <http://www.caves.org/commission/ncrc/national/>.
- WinKarst. Cave Mapping software. Creates 3D visualization and modeling of cave passages. The model can be spun on the computer screen in real time. Links to several other cave mapping programs. <http://www.resurgentsoftware.com/WinKarst.html>.

## Diving

- Divers Alert Network. Telephone contact information regarding Diving Emergency Hotline and for non-emergency medical questions DAN Medical Information Hotline. DIVING EMERGENCIES: 919-684-9111 (accepts collect calls). DAN America Info Line: 800-446-2671 or 919-684-2948, Mon-Fri, 8:30am-5pm (ET). Non-Emergency Medical Questions: 800-446-2671 or 919-684-2948. Divers Alert Network, 6 West Colony Place, Durham, NC 27705. <http://www.diversalertnetwork.org/>.

## Marine

- National Data Buoy Center (NDBC). NOAA. Weather and water information for NOAA moored data buoys and C-MAN locations. Some buoys report wave directions. All C-MAN stations report the winds, air temperature, and pressure; some also report wave information, water temperature, visibility, and dew point. <http://www.ndbc.noaa.gov/>.
- Tide and Current Predictor. <http://tbone.biol.sc.edu/tide/>.
- Center for Operational Oceanographic Products and Services (CO-OPS). NOAA. Historical and real-time observations and predictions of tides, water levels, coastal currents and other meteorological and oceanographic data. <http://co-ops.nos.noaa.gov/>.

## Mine

- Mine Safety & Health Administration (MSHA), Department Of Labor. An Agency whose mission is to prevent death, disease, and injury from mining and to promote safe and healthful workplaces for the Nation's miners. <http://www.msha.gov/>.

## Tools

### Clocks

- Internet Clocks, Counter and Countdowns. <http://www.panaga.com/clocks/clocks.htm>.
- Official U.S. Time, National Institute of Standards and Technology. Atomic Clock. NIST- Boulder, CO. <http://nist.time.gov/>.
- Timeticker. Exact local time by worldwide time zones. <http://www.timeticker.com/>.
- Timeanddate.com. The World Clock. Current local times around the world U.S. Naval Observatory, Washington, DC. Time Service Department. USNO <http://www.timeanddate.com/worldclock/>.
- Master Clock Time. <http://tycho.usno.navy.mil/time.html>.

### Conversion Tools

- Onlineconversions.com. Online conversion calculator. <http://www.onlineconversions.com/>.
- Convert-me.com: Interactive Units Converter. Instant on-line conversion calculators for weight, capacity & volume, length, area, speed, pressure, temperature, circular measure, and time. <http://www.convert-me.com/>.

### Credit Reporting/Business Information

- Dun & Bradstreet. <http://www.dnb.com/>.
- U.S. Securities and Exchange Commission. EDGAR (Electronic Data Gathering, Analysis & Retrieval). Database of forms filed by publicly held corporations. <http://www.sec.gov/edgar.shtml>.
- Equifax. Credit Reporting Agency. <http://www.equifax.com/>.
- Experian. Credit Reporting Agency. <http://www.experian.com/>.
- TransUnion. Credit Reporting Agency. Trans Union LLC is a leading provider of Information and Services serving both consumers and the business world by providing accurate credit and fraud-prevention data, and information-based solutions. <http://www.transunion.com/>.

### Footwear Impression

- Bootprint image gallery. Very limited collection of hiking/mountaineering boot impressions. <http://www.sarinfo.bc.ca/bootprints.htm>.

### Geographic Names

- Geographic Names Information Service. USGS. USGS database of place names throughout the U.S. <http://geonames.usgs.gov/>.

### Land Navigation

- Avenza.com. This website explains Avenza maps and leads you to the download app for either iOS or Android so that you can use geo-referenced PDF maps on phone or tablet. <http://www.avenza.com/avenza-maps/>
- "Finding your way with map and compass". USGS fact sheet. <http://egsc.usgs.gov/isb/pubs/factsheets/fs03501.pdf>.
- GPS Resource Library. Numerous GPS related links; internet mapping programs, information on converting Lat/Long to UTM, satellite maps of the world, government GPS sites, manufacturers, image editing tools and GIS mapping programs. <http://www.gpsy.com/gpsinfo/>.
- Keith Conover's Search & Rescue/Outdoor Page. Map & compass, ASRC Grid, etc. <http://www.pitt.edu/~kconover/sar-outdoor.htm>.
- NOAA Magnetic Declination Calculator. Calculates current magnetic declination and other geomagnetic properties. Links to information on geomagnetism. <http://www.ngdc.noaa.gov/geomagmodels/Declination.jsp>.
- SARTopo.com. A robust SAR mapping tool that allows for easy collaboration between units and the generation of geo-referenced PDF maps for printing. <https://sartopo.com>.
- US Forest Service GPS Page. Lists of GPS Community Base Stations and GPS related links. <http://www.fs.fed.us/database/gps/>.

## Language Translation

- Google translate. Translations between various languages. <http://translate.google.com/>.
- Systan Software Homepage. A supplier of language translation software. <http://www.systransoft.com/>.
- Travlang. Your Travel & Language Supersite. Free translating dictionaries; Afrikaans, Czech, Danish, Dutch, Esperanto, Finnish, French, Friesian, German, Hungarian, Italian, Latin, Norwegian, Portuguese, Spanish and Swedish. Currency exchange. <http://www.travlang.com/>.

## Maps

- Arizona Regional Image Archive. <http://aria.arizona.edu/>.
- Atlapedia Online. Contains full color physical and political maps as well as key facts and statistics on countries of the world. <http://www.atlapedia.com/>.
- BackCountry Navigator. Mobile map software for outdoor recreation. <http://www.backcountrynavigator.com/>.
- Bing maps. Find local businesses, view maps and get driving directions. <http://www.bing.com/maps/>.
- Color Landform Atlas of The United States. Shaded relief, county and other statewide maps. <http://fermi.jhuapl.edu/states/states.html>.
- DigitalGlobe Inc. High-resolution earth imaging satellites and a comprehensive geo-information product store. <http://www.digitalglobe.com/>.
- FEMA (Federal Emergency Management Agency). GIS/Mapping Products. Disaster mapping, flood hazard mapping and on-line interactive hazard maps. <http://www.fema.gov/hazard/map/index.shtm>.
- Google maps. Find local businesses, view maps and get driving directions. <http://maps.google.com/>.
- GPS File Depot. Custom maps, points of interest, ximage hosting, tutorials, articles for GPS. <http://www.gpsfiledepot.com/>.
- GPS Waypoint Database & Registry. Worldwide database of GPS coordinates, distance and bearing calculator and GPS satellite information. Links to mapping related sites. <http://www.waypoint.org/>.
- Igage Mapping Corporation. Provides digital mapping and GIS/GPS solutions. <http://www.igage.com/>.
- Mapquest. Street maps, driving directions, city guides, aerial photos. <http://www.mapquest.com/>.
- Maptech, Inc. Publishes digitized USGS maps in software and paper formats. <http://www.maptech.com/>.
- Memory-Map, Inc. Mobile digital mapping software for maps and charts on PC and Windows Mobile. <http://www.memory-map.com/>.
- National Park Maps. <http://www.nps.gov/carto/>.
- National Park Maps. University of Texas at Austin. Downloadable JPG and PDF files of maps of National Parks and Monuments. [http://www.lib.utexas.edu/maps/national\\_parks.html](http://www.lib.utexas.edu/maps/national_parks.html)
- Terraserver. Online imagery. <http://www.terraserver.com>.
- Trails.com. Downloadable topographic maps with a database that contains USGS topographic maps for the entire United States. <http://www.trails.com/maps.aspx>.
- WinKarst. Cave Mapping software. Creates 3D visualization and modeling of cave passages. The model can be spun on the computer screen in real time. Links to several other cave mapping programs. <http://www.resurgentsoftware.com/WinKarst.html>.
- US Forest Service Geodata Clearinghouse. <http://fsgeodata.fs.fed.us/>.

- USGS. Finding and Ordering USGS Topographic Maps. Directory of map dealers, GLIS (Global Land Information System) Map Finder and online ordering. [http://topomaps.usgs.gov/ordering\\_maps.html](http://topomaps.usgs.gov/ordering_maps.html)
- USGS National Mapping Information. Mapping products and services, online systems, downloadable mapping data and mapping library. <http://www.nationalmap.gov/>.
- USGS National Aerial Photography Program. National Aerial Photography Program products are used to revise maps. These photos are taken on roughly a 5-year cycle and produced to rigorous specifications, covering the entire lower 48 states. The photos are shot from airplanes flying at 20,000 feet. Each 9-by 9-inch photo (without enlargement) covers an area a bit more than 5 miles on a side. <http://eros.usgs.gov/#/Guides/napp>.
- National Atlas Of The United States. Department of Interior. Digital version of map-like views of America's natural and sociocultural landscapes. <http://www.nationalatlas.gov/>.

### SAR Software

- CASIE3 (Computer Aided Search Information Exchange) Home Page. Download latest version of CASIE search software and other SAR related programs such as ICS-SAR, Comm Manager, and Clue Manager Lost person behavior files, form files and articles. Search effectiveness of helicopters research test results. <http://www.saraz.org/SARAZNew/>.
- Incident Commander Pro Software- SAR Technology Inc. Software application for complete management of a search incident. <http://www.sartechnology.ca/>.
- Faces software by Faces ID, Inc. Software for producing composite pictures of a subject in near photo-like quality. Uses a 10-digit alphanumeric "intercode" for over 4,000 facial features, which permits easy exchange of a picture's data by phone, e-mail or fax. <http://www.facesid.com/>.

### Search Planning Tools

- SARBC. Lost Person Behavior Characteristics. Search & Rescue Society of British Columbia provides statistics for search planning based upon subject behavior. <http://www.sarbc.org/sarbc/behchar.html>.
- SARINFO. Purchase Search Manager software. Links to vendors, weather, avalanche, navigation and mapping sites. Tech-tips for SAR techniques. <http://www.sarinfo.bc.ca/>.
- SARINFO. Computer File Library. Downloadable Files. Library of downloadable executable, database and software files including: Search Manager, Lat/Long-UTM conversion, wind chill & humidity index and many more. <http://www.sarinfo.bc.ca/Library/Computers/LibComputers.html>.
- SARINFO. Search Planning Library. Extensive downloadable files relating to SAR planning and search theory. <http://www.sarinfo.bc.ca/Library/Planning/LibPlanning.html>.

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# References

- [Adolph] Adolph, E.F. "Physiology of Man in the Desert". Interscience Publishers, New York, 1947.
- [Anderson 1] Anderson, Paul. "Initial Response Checklist". Reproduced in Win CASIE III.
- [Anderson 2] Anderson, Paul; Dick, Aaron; Johnson, Eric; Lovelock, David; Martin, Richard and Ramirez, Jeremy. "Managing Spontaneous Volunteers in Search and Rescue". Accessed from <http://www.saraz.org/documents/SV.zip> on October 20, 2018.
- [Anon] Anonymous. "Planning P". Accessed from <http://training.fema.gov/EmiWeb/IS/ICSResource/assets/PlanningP.pdf> on July 9, 2011.
- [ARCHER] "Airborne Real-time Cueing Hyperspectral Enhanced Reconnaissance". Accessed from [http://en.wikipedia.org/wiki/Airborne\\_Real-time\\_Cueing\\_Hyperspectral\\_Enhanced\\_Reconnaissance](http://en.wikipedia.org/wiki/Airborne_Real-time_Cueing_Hyperspectral_Enhanced_Reconnaissance) on May 19, 2010.
- [ASRC] Appalachian Search and Rescue Conference, Inc. "ASRC Operations Manual" Version 3.1, April, 1999. Copyright 1999. P.O. Box 440, Newcomb Hall Station, Charlottesville, VA 22904
- [Blehm] Blehm, Eric. "The Last Season". Harper Perrenial, New York, 2006.
- [Bownds 1] Bownds, J.M., Lovelock D., McHugh C.P., and Wright A.L. "Desert Searches: Effectiveness of Helicopters". Pima County Sheriff's Department, Tucson, Arizona, 1981.
- [Bownds 2] Bownds, J.M., Harlan, A., Lovelock D., and McHugh C.P. "Mountain Searches: Effectiveness of Helicopters". NASAR, 1991.
- [Caldwell] Caldwell, John A et al. "Fatigue Countermeasures in Aviation." Aviation, Space, and Environmental Medicine. Aerospace Medical Association, Alexandria, VA. Volume 80, No. 1. January 2009 <http://www.asma.org/pdf/compendium/2009/fatigue-counters.pdf>
- [Clark] Clark, Daniel W. "Basic Critical Incident Stress Management". Accessed from [http://www.criticalconcepts.org/Pre\\_IncidentEducation\\_V.ppt](http://www.criticalconcepts.org/Pre_IncidentEducation_V.ppt) on January 22, 2011.
- [Deal] Deal, T., de Bettencourt, M., Deal, V., Merrick, G., and Mills, Chuck. "Beyond Initial Response", 2<sup>nd</sup> Edition. Author House, Bloomington, IN. 2010.
- [Dixon] Dixon, William. "Lisa Kern Hannon - January 11, 1970—May 3, 1994". ASRC 2005. [http://www.asrc.net/asrc/uploads/in\\_memoriam/LisaHannon\\_LongObit.pdf](http://www.asrc.net/asrc/uploads/in_memoriam/LisaHannon_LongObit.pdf).
- [Dupont] Dupont, Gordon. "Human Factors: Avoid The Dirty Dozen With Safety Nets". Airbeat Magazine. January-February 2009.
- [Farabee] Farabee, Charles R. "Butch". "Death, Daring and Disaster—Search and Rescue in the National Parks". Roberts Rinehart Publishers, Boulder, CO. 2005
- [FLIR] "Forward looking infrared". Accessed from [http://en.wikipedia.org/wiki/Forward\\_looking\\_infrared](http://en.wikipedia.org/wiki/Forward_looking_infrared) on May 19, 2010.
- [Fossett] "Steve Fossett". Accessed from [http://en.wikipedia.org/wiki/Steve\\_Fossett](http://en.wikipedia.org/wiki/Steve_Fossett) on November 25, 2010.
- [Geis] "Complacency Risk Management Model". Accessed from <http://www.cti-home.com/images/stories/pdfs/general-human/%20factors/Complacency.pdf> on February 26, 2012.
- [Gerstein] Gerstein, Marc. "Flirting With Disaster—Why Accidents Are Rarely Accidental". Sterling Publishing Co., NY. 2008 Book Website: [http://www.flirtingwithdisaster.net/index.php?page\\_id=278](http://www.flirtingwithdisaster.net/index.php?page_id=278).
- [Graham] Graham, Hatch. "Probability of Detection for Search Dogs or How Long is Your Shadow?" [http://www.forpitsake.org/images/SAR-DOG\\_PoD.pdf](http://www.forpitsake.org/images/SAR-DOG_PoD.pdf) accessed on October 19, 2010.
- [Hill 1] Hill, K.A. "An Introduction to Ground Search Management for the Police Authority" [http://husky1.stmarys.ca/~khill/Police\\_Authority.pdf](http://husky1.stmarys.ca/~khill/Police_Authority.pdf) accessed on February 20, 2011.
- [Hill 2] Hill, K.A. "The Psychology of Lost" <http://husky1.stmarys.ca/~khill/psychologyoflost.pdf> accessed on February 20, 2011.
- [Hill 3] Hill, K.A. "Analyzing scenarios in land search." Response: The Journal of Search, Rescue and Emergency Response, 11, 23–34. 1992.
- [Kelley] Kelley, Dennis. "Mountain Search for the Lost Victim". Published privately. 1969.
- [Kim] "After Action Review/Kim family search. December 8, 2006. Conducted by Charlie Phenix and Lang Johnson" in "Jo Co After Action Review.pdf". Accessed from <http://www.co.klamath.or.us/sheriff.html> on March 15, 2010.

- [KSL] KSL.com. "Authorities: No Evidence to Suggest Foul Play in Turney Death" November 24th, 2006. KSL News. Salt Lake City, UT. Deseret Media Company <http://www.ksl.com/?nid=148&sid=670545>
- [Ledwidge] Ledwidge, Marc and Phillips, Ken. "2009 Air Rescue Report—International Commission for Alpine Rescue (IKAR-CISA)". IKAR. 2009  
<http://www.mra.org/drupal2/sites/default/files/documents/ikar/2009IKARAirRescueReport.pdf>.
- [Lehman] Lehman, Jeff. "Tragedy Strikes San Geronio SAR". SB Tracker, Monthly Newsletter of the Inland Empire Search and Rescue Council. San Bernardino, CA. July 2004
- [Lovelock 1] Lovelock, David. "Some Thoughts on Multiple-Subject Searches" <http://www.saraz.org/documents/MultipleSubjects.pdf> accessed on February 25, 2011.  
ip; This PDF file, written by David Lovelock, attempts to clarify the meaning and use of the terms Objectives, Strategies, and Tactics, with examples from Search and Rescue.
- [Moore] Moore, Stacy. "Home Builder Dies Suddenly on Search". Hi-Desert Star Newspaper, Yucca Valley, CA. May 1, 2010. <http://www.hidesertstar.com/articles/2010/05/01/news/doc4bdbd0ae7d9c6531026166.txt>.
- [Morgan] Morgan M.J., Adam A., and Mollon J.D. "Dichromats detect colour-camouflaged objects that are not detected by trichromats." *Proc Biol Sci.* 1992 Jun 22. 248 (1323):291-5. <http://www.ncbi.nlm.nih.gov/pubmed/1354367> accessed on October 19, 2010.
- [NIOSH] National Institute for Occupational Safety and Health (NIOSH). "Work Related Crashes- Prevention Strategies for Employers". Center for Disease Control- NIOSH, Washington, DC. Publication 2004-136. March 2004  
<http://www.cdc.gov/niosh/docs/2004-136>.
- [NIFC-IHOG] National Interagency Fire Center (NIFC). "Interagency Helicopter Operations Guide (IHOG)". National Interagency Fire Center, Boise, ID. 2013. NFES # 001885. <http://gacc.nifc.gov/sacc/logistics/aircraft/IHOG.pdf>.
- [NIFC-IIBMH] National Interagency Fire Center (NIFC). "Interagency Incident Business Management Handbook". Boise, ID. Chapter 10 - Personnel. Revised 05-2009
- [NIFC-IRPG] National Interagency Fire Center (NIFC). "Incident Response Pocket Guide". A publication of the National Wildfire Coordinating Group Sponsored by NWCG Operations and Workforce Development Committee. National Interagency Fire Center, Boise, ID. January 2010. PMS 46. NFES # 1077. <http://www.nwcg.gov/pms/pubs/nfes1077/nfes1077.pdf>. National Wildland Coordinating Group.
- [NTSB] National Transportation Safety Board (NTSB). "Factual Report Aviation—Jensen, Utah; Incident ID SEA07LA021". NTSB, Washington, DC. Accident Date 11-21-2006.
- [NTSB 1] National Transportation Safety Board (NTSB). "Crash During Approach to Landing of Maryland State Police". Incident Report NTSB/AAR-09/07 (PB2009-910407). NTSB, Washington, DC. Accident Date 9-27-2008.  
<http://www.nts.gov/publictn/2009/AAR0907.pdf>
- [PMS] National Wildfire Coordinating Group. "PMS 475 — Basic Land Navigation". <http://www.nwcg.gov/pms/pubs/large.html>
- [Ohlfs] Ohlfs, Jeff. Personal Interview. Incident Commander, NPS. Death Valley National Park, CA. June 1, 2010.
- [Perkins 1] Perkins, Dave. "Probability of Detection (POD) Research, And Other Concepts For Search Management". Emergency Response Institute, Olympia, Washington. 1989.
- [Perkins 2] Perkins, Dave and Roberts, Pete. "Searching for a Missing Person. Managing the Initial Response. A practical handbook". The Centre for Search Research, Northumberland, UK.
- [Perkins 3] Perkins, Dave and Roberts, Pete. "The Use of Scenarios in Incident Management". The Centre for Search Research, Northumberland, UK.
- [SAR] "Search and Rescue Training" website, <http://www.searchandrescuetraining.com/images/popups/1.jpg>. Accessed on March 23, 2010.
- [Scharper] Scharper, Matt. "OES/ACS, ARES and Navy Personnel Injured In SAR Helicopter Crash" 5-1-2 Bulletin. California Office of Emergency Services- Auxiliary Communications Services. Issue No. 62. July 10, 2001  
<http://www.emcomm.org/svares/archives/number062.htm>.
- [Setnicka] Setnicka, Tim J. "Wilderness Search and Rescue". Appalachian Mountain Club, Boston. 1980.
- [Shimanski 1] Shimanski, Charley. "Accidents In Mountain Rescue Operations". Mountain Rescue Association. 2008.  
[http://www.mra.org/drupal2/sites/default/files/documents/training/AMRO\\_rev08.pdf](http://www.mra.org/drupal2/sites/default/files/documents/training/AMRO_rev08.pdf).
- [Shimanski 2] Shimanski, Charley. "Working with the Media in Search and Rescue". Mountain Rescue Association. 2008.  
[http://www.mra.org/drupal2/sites/default/files/documents/training/Media\\_rev08.pdf](http://www.mra.org/drupal2/sites/default/files/documents/training/Media_rev08.pdf).
- [Sobel] Sobel, Dava and Andrewes, William J.H. "The Illustrated Longitude". Walker and Company, New York, USA. 1998.
- [Syrotuck] Syrotuck, William G. "Analysis of Lost Person Behavior". Arner Publications, USA. 1976, 1977. Reprinted by Barkleigh Publications, USA. 2000.
- [UAV1] "Unmanned aerial vehicle". Accessed from [http://en.wikipedia.org/wiki/Unmanned\\_aerial\\_vehicle](http://en.wikipedia.org/wiki/Unmanned_aerial_vehicle) on May 18, 2010.
- [UAV2] "Wikmedia Commons" website, <http://commons.wikimedia.org/wiki/File:Globalhawk.750pix.jpg>. Accessed on June 1, 2010. Quoting from the website: this "image or file is in the public domain".
- [USCG-ORM] United States Coast Guard. "Operational Risk Management". Commandant Instruction 3500.3. Department of Transportation. Washington, DC. Nov 23, 1999. [http://www.uscg.mil/directives/ci/3000-3999/Ci\\_3500\\_3.pdf](http://www.uscg.mil/directives/ci/3000-3999/Ci_3500_3.pdf).



- [USDA] USDA—Forest Service. “Fatigue Awareness”. Powerpoint presentation prepared by Missoula Technology & Development Center, Missoula, MT. 2007 <http://www.fs.fed.us/fire/training/fatigue/fatigue.ppt>.
- [Vicente] Vicente, Kim. “The Human Factor—Revolutionizing The Way People Live With Technology”. Routledge, New York, NY. 2003.
- [Wenner] Wenner, Gretchen. “Search and rescue volunteer dies at Oceano Dunes”. Bakersifeld.com. May 25, 2009. <http://www.bakersfield.com/news/x251646638/Search-and-rescue-volunteer-dies-at-Oceano-Dunes>.
- [Weick] Weick, K.E. “South Canyon revisited: Lessons from high reliability organizations”. Wildfire, 4(4), 54–68. 1995. <http://www.fs.fed.us/t-d/pubs/htmlpubs/htm95512855/page15.htm>.
- [Wiegmann] Wiegmann, Douglas A. and Shappell, Scott A. “Human Error Analysis Of Commercial Aviation Accidents Using The Human Factors Analysis And Classification System (HFACs)”. U.S. Department of Transportation—Federal Aviation Administration. Office of Aviation Medicine. Report Number DOT/FAA/AM-01/3. Washington, D.C. 20591. February 2001
- [Young] Young, Christopher S. and Wehbring, John. “Urban Search”. dbS Productions, Charlottesville, VA. 2007.

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