

Section 5: Maintaining Readiness

Topic 21

Operations and Logistics

Objectives

Welcome to Topic 21.

This topic will introduce you to operating and logistical issues that arise during emergency communication operations.

Student Preparation required:

None.

Choosing Phone Net Frequencies

Unlike commercial and public safety radio users, Amateur Radio operators have a vast amount of radio spectrum to use in meeting the needs of an emergency. Most local and regional emergency communications communication takes place on 2-meter or 70-centimeter FM, or on 40-, 60-, or 80-meter SSB/CW. The choice made is based on the locations to be covered, the availability of repeaters, distance, terrain, and band conditions.

VHF and UHF FM are preferred for most local operations because the equipment is common, portable, and has a clear voice quality, and the coverage is extended by repeater stations. VHF and UHF communication range is determined by terrain, antenna height, and the availability of repeaters.

For larger areas or in areas without repeaters, HF SSB/CW/Digital may be needed. Most local emergency communications operations are on the 40- or 80-meter bands using Near Vertical Incidence Skywave (NVIS) propagation. For long-haul communication needs and international operations, 15- or 20-meter nets may be the best option. Many emergency communications groups will have preselected a number of frequencies for specific purposes. The complete list of these frequencies should be in your go kit and preprogrammed into your radios. Keep in mind that on weekends the bands may be quite crowded, so you may consider using 12, 17, 30, or 60 meters.

Know Your Resources in Advance

Become familiar with the coverage and features of each permanent repeater and digital message system in your area, and preprogram your radios with the frequencies, offsets, and Continuous Tone Coded Squelch System (CTCSS) tones. Ask your EC or AEC which repeaters are used for emergency communication in your area. Will they be available for exclusive emergency communications use, or must they be shared with other users? Information to find out includes:

- How the repeater or system identifies itself
- Whether there are any “dead spots” in critical areas
- How much power is required to reach the repeater with a clear, quiet signal from key locations
- Whether the repeater has a courtesy tone, and if it does, what it sounds like, and whether the tones change depending on the repeater’s mode
- How long the “time-out timer” is
- Whether it is part of a linked system of repeaters or it is connected to EchoLink/IRLP
- What features it has, and which touch-tone commands or CTCSS tones activate them

For net frequencies that support digital communication systems, such as packet radio bulletin board messaging systems, PACTOR, PSK31, and RTTY:

- Which software they use
- Whether the digital systems have mailboxes or digipeater functions
- Which other nodes they can connect to
- Whether can traffic be passed over an internet link automatically or manually
- How many connections they can support at once

Network Coverage Concerns

Most emergency communications managers rely on simplex operation for backup when planning their VHF or UHF FM nets for one reason — repeaters often do not survive disasters or are overwhelmed with the amount of traffic. Repeaters that do survive and are usable are considered a bonus. Since simplex range is limited by terrain, output power, and antenna gain and height, operation over a wide area can be a challenge. Almost any structure or hills can block signals to some degree. Don’t overlook SSB on our VHF or UHF bands; it can support communication over surprising distances and over rough terrain.

To avoid last-minute surprises, your group should pretest all known fixed locations in your area for coverage. For instance, if you are serving the American Red Cross (ARC), test simplex coverage from each official shelter to the Red Cross office and the city's EOC or other key locations, and mobile coverage in the same areas. Don't forget to test coverage to key home-based stations. If needed, there are several ways to improve simplex range:

- Use an antenna with greater gain
- Move the antenna away from obstructions
- Use a directional antenna
- Increase antenna height
- Increase transmitter output power as a last resort
- In a fast-moving situation with poor simplex coverage and no repeater, it can be helpful to place a mobile station on a hilltop or office building where operators can communicate with, and relay for, any station in the net. A mobile relay station can also allow communications to follow a moving event, such a wildfire or flash flood. That station becomes, in effect, a "human repeater"

Although an expedient "workaround," this slow and cumbersome process can reduce net efficiency by more than half. A modern aid to this kind of operation is the "simplex repeater." This device automatically records a transmission and immediately retransmits it on the same frequency. Remember that FCC rules do not allow unattended operation of simplex repeaters and that you must manually identify it.



A better solution is a portable duplex repeater that can be quickly deployed at a high point in the desired coverage area. The coverage of this repeater does not have to be as good as a permanent repeater — it just must be accessible to the stations in your net. Portable repeaters have been used successfully from the back seat of a car, using a mobile antenna, and parked on a ridge or even the top floor of a parking garage. Portable masts and trailer-mounted towers have also been used successfully. Check with your local frequency-coordinating body if your plans include portable repeaters.

If all stations in the net have dual-band radios or scanners, a strategically located mobile radio may be operated in “cross-band repeater” mode. If you use your dual-band mobile in this manner for an extended period, use the low or medium power setting to avoid overheating and damaging your radio. Consider using a fan to further reduce the likelihood that your radio will be damaged from overheating.

For a permanent repeater to be useful in a disaster, it must have emergency power and be in a location and of such construction that it can survive the disaster. Agreements with repeater owners should be in place to allow emergency operations to the exclusion of regular users.

Frequency and Net Resource Management

While we may have a large amount of frequency resources, in actual practice our choices are limited to the available operators and their equipment. Net managers may occasionally need to “shift” resources to meet changing needs. In the early stages of an emergency, the tactical nets may require more operators, but in later stages, the health and welfare traffic might increase.

In addition to the main net frequency, each net should have several alternate frequencies available. These should include one or more “backup” frequencies for use in the event of interference, and one or two frequencies to be used to pass traffic “off net.”

Message Relays

When one station cannot hear another, a third station may have to relay the messages. Although this is a slow and cumbersome process, it is often the only way to reach certain stations. If relays must be used, net control should move the stations involved off the main net frequency to avoid tying up the channel for an extended period.

Radio Room Security

To protect your equipment and the messages you handle, and prevent unnecessary distractions, it is best to allow only the operators who are on duty to be in the room. Avoid leaving the radio room and equipment unattended and accessible. It is never a good idea to allow members of the press to be in the room without specific permission from the partners.

Record-Keeping

Most served agencies will expect you to keep records of your operations. These records will certainly include original copies of any messages sent, station logs, memos, and official correspondence. Some may even require you to keep “scratch” notes and informal logs. Depending on the partner’s policy, you may be required to keep these records in your own possession for a time, or to turn some or all records over to the partner at the end of operations. In some agencies, your station records are permanent and important legal documents and must be treated as such. It is important to know your partner’s policy on record-keeping in advance so that you can comply from the very beginning of operations.

Your station operating logs should probably contain the following information:

- Your arrival and departure times
- Times you check in and out of specific nets
- Each message, by number, sender, addressee, and other handling stations
- Critical events — damage, power loss, injuries, earth tremors, other emergencies
- Staff changes — both emergency communications and site management, if known
- Equipment problems and issues
- Completed ICS forms

Every individual message or note should be labeled with a time and date. In the case of scratch notes, place dates and times next to each note on a sheet, so that information can be used later to determine a course of events.

If you expect to operate from the location for more than a day or two, establish a message filing system so that you can retrieve the messages as needed. A “portable office” type file box, expanding file, or any other suitable container can be used to organize and file the messages. This is also an efficient way to allow another operator to pick up where you left off, even if they arrive after you leave. Effective record-keeping allows them to come up to speed quickly.

Dealing with Stress and Egos

Any unusual situation can create personal stress — disasters create incredible amounts of it. Most people are not used to working under extreme stress for long periods and do not know how to handle it. They can become disoriented, confused, unable to make good decisions or any decisions at all, lose their tempers, and behave in ways they never would any other time. Nervous breakdowns are common among those who get overwhelmed and have not learned to manage stress and stress-causing situations.

Especially in the early hours of a disaster, the tendency is to regard every situation or need as an “emergency,” requiring an immediate response. You might get a barrage of requests for action. You might not have the extra seconds required to fully consider the options and to prioritize your actions. The result is an overload of responsibility, which can lead to unmanageable levels of stress. While you cannot eliminate disaster-related stress, you can certainly take steps to reduce or control it.

Tips to help manage stressful situations:

- Delegate some of your responsibilities to others
- Take on only those tasks that you can handle
- Prioritize your actions — the most important and time-sensitive ones come first
- Do not take comments personally — mentally translate “personal attacks” into “constructive criticism” and a signal that there may be an important need that is being overlooked
- Take a few deep breaths and relax. Do this often, especially if you feel stress increasing. Gather your thoughts and move on
- Watch out for your own needs — food, rest, water, and medical attention
- Do not insist on working more than your assigned shift if others can take over
- Get rest when you can so that you will be ready to handle your job more effectively later on
- Take a moment to think before responding to a stress-causing challenge — if possible, tell them you will be back to them in a few minutes
- If you are losing control of a situation, bring someone else in to assist or notify a superior
- Do not let a problem get out of hand before asking for help
- Keep an eye on other team members, and help them reduce stress when possible

Some personnel within the emergency response community have “big egos,” and still others have a need to be in full control at all times. Both personality types can be problematic anytime but are far worse under stress. Take time now to consider how you will respond to the challenges they present. If your automatic response to certain behaviors is anger, make a conscious decision to come up with a different and more positive response strategy. Depending on the official position of the “problem” person, you might:

- Do your job as best you can, and deal with it after the emergency is over
- Politely decline and state your reasons
- Refer the issue to a superior
- Choose in advance to volunteer in another capacity and avoid that person altogether, if

possible

Long-Term Operations

As soon as it becomes clear that the situation is not going to return to normal for a while, you and your group should make plans for extended emergency communications operations. A defined mission will help set necessary limits during extended operations. Be aware of “mission creep,” as it can burn out volunteers and put them in difficult situations they may not be prepared to handle. Hopefully, your emergency communications group and partners have prepared contingency plans for this, and all you will have to do is put them into action. If not, here are some potential needs to consider:

- Additional operators to allow for regular shift changes, and those who go home
- Replacement equipment, as operators leave with their own gear or gear fails
- Food and water
- A suitable place to sleep or rest
- Generator fuel
- Fresh batteries, sanitation facilities (bring your own toilet tissue), shelter
- Message handling supplies, forms
- Alternate NCS operators, backups
- Additional net resources to handle message traffic

Accepting Specialized Assignments

In the world of modern emergency communications, you may be asked to handle other assignments for the partners that may or may not include communicating. At one time, most emergency communications groups had strict policies against doing other tasks, and this is still true of some. In the days when radios were difficult to operate under field conditions and required constant attention, this was important. The other common reason given is that you have volunteered to be a communicator, not a “bedpan changer.” It is true that some partners’ staff will abuse the situation when they are short of help, but if both the partner’s staff and emergency communications group are clear about any limits beforehand, the problem should not arise.

Today, most emergency communications groups will permit their members to be cross-trained for, and perform, a variety of served-partner skills that also include communicating. Examples are SKYWARN weather spotting, Red Cross damage assessment, and many logistics jobs. If your group still has a “communication only” policy, are you really meeting your partner’s needs? Is it necessary to have a damage assessment person and a communicator to do that job? What would happen to your partner if each driver also had to bring along a dedicated radio operator? Can one person do both jobs?

Look for opportunities to cross-train to other functions such as shelter staff, feeding, or muckout. Learning new disaster response skills will give you a broader view of the response and recovery process and possibly allow you to add Amateur Radio capability to an area that may not have it.

Reference Links

For information about ARRL Public Service Communications, see the Public Service Communications Manual

<http://www.arrl.org/files/file/Public%20Service/ARES/ARESmanual2015.pdf>

For specific information on ARES, see The ARES Field Resources Manual

<http://www.arrl.org/files/file/Public%20Service/ARES/ARESFieldResourcesManual-2019.pdf>

Disaster Responder Self-Care Guidance from the Centers for Disease Control

<https://emergency.cdc.gov/coping/responders.asp>

Review

Simplex operation is often preferred over repeaters because repeaters may fail in a disaster situation. Frequencies and operators are a resource that should be managed for maximum efficiency and effectiveness. Record-keeping is essential to an effective emergency communications operation. It allows messages to be tracked and preserves continuity when personnel change. Demanding situations like disasters can breed disagreements, especially when strong egos and short-fused tempers are introduced. Take steps to reduce the level of stress on yourself, and do not respond in kind to an angry person. When an operation looks like it will be an extended one, begin immediately to prepare for the additional people and resources necessary to sustain the operation. Arrange to charge batteries as needed. Use generators and power distribution equipment safely. Whether to leave your equipment behind is a choice only you can make. Think about this well in advance to be sure other arrangements are made before you leave with all your equipment. Modern emergency communications groups often accept other partner tasks beyond just communications.

Section 5: Maintaining Readiness

Topic 22

Health and Safety

Objectives

Welcome to Topic 22.

This topic will help you make informed decisions that will protect your own health and safety and that of your family in a disaster environment.

Student Preparation required:

None.

Introduction

Safety begins with a proper attitude. Make it a habit to plan your work carefully and always consider the safety aspects of your ham radio activities. It is also important to learn as much as possible about what *could* go wrong so we can avoid factors that might result in accidents. Amateur Radio activities are not inherently hazardous, but as with many things in modern life, it pays to be informed. Stated another way, while we long to be creative and innovative, there is a need to act responsibly. A good attitude toward safety also requires us to be knowledgeable about common safety guidelines and follow them faithfully.

While the following web pages may offer some important safety guidelines, you should not consider them to be a comprehensive discussion on this topic. Guidelines can't possibly cover all situations you might encounter, but if you approach a task with a measure of common sense, you should be able to work safely.

Be sure to review the information found on the following web pages:

www.arrl.org/electrical-safety

www.arrl.org/grounding

www.arrl.org/lightning-protection

www.arrl.org/rf-exposure

www.arrl.org/grounding-and-bonding-for-the-amateur

There are additional texts and ARRL publications that provide information on safety guidelines and practices. Learning about safety should be an ongoing process. *Always remember: There is no substitute for common sense.*

Safety Begins at Home

Disaster relief volunteers sometimes become so involved with helping others that they forget to take care of their own families and themselves. The needs of disaster survivors seem so large when compared with their own that volunteers can feel guilty taking even a moment for their own basic personal needs. However, if you are going to continue to assist others, you need to keep yourself in good condition. If you do not, you risk becoming part of the problem. If your family is not safe and all their needs are not taken care of, worrying about them may prevent you from concentrating on your job.

Home and Family First

Before leaving on an assignment, be sure you have made all necessary arrangements for the security, safety, and general well-being of your home and family. Family members and perhaps friends or neighbors should know where you are going, when you plan to return, and a way to get a message to you in an emergency. If you live in the disaster area or in the potential path of a storm, consider moving your family to a safe location before beginning your volunteer duties. Take whatever steps you can to protect your own property from damage or looting and let some neighbor or even local police know where you are going, when you plan to return, and how to reach you or your family members in an emergency. Also refer to FEMA's guidance on developing a family emergency communications plan.

In addition to your emergency communications deployment checklists, you might want to create a home and family checklist. FEMA has many resources on building a basic disaster kit for the home and family.

Whether You Should Leave

First and foremost, follow the directions of local officials regarding evacuation or sheltering. There are times when your family may need you as much or more than your emergency communications group does. Obviously, this is a decision that only you and your family can make. If a family member is ill, your spouse is unsure of their ability to cope without you, if evacuation will be difficult, or any similar concern arises, staying with them may be a better choice. *If there is ever any doubt, your decision must be to stay with your family.* This is also something you should discuss and come to an agreement about with your spouse well before any disaster, in order to avoid any last-minute problems.

You First — The Mission Second

Once you are working with your emergency communications group, you will need to continue to take care of yourself. If you become overtired, ill, or weak, you cannot do your job properly. If you do not take care of personal cleanliness, you may be unpleasant to be around. Whenever possible, each station should have at least two operators on duty so that one can take a break for sleep, food, and personal hygiene. If that is not possible, work out a schedule with the emergency communications managers or your NCS to take periodic “off-duty” breaks.

Food

Most people need at least 2,000 calories a day to function well. In a stressful situation, or one with a great deal of physical activity, you may need even more. Experienced emergency communications managers and partner personnel will usually be aware of this issue and take steps to see that their volunteers’ needs are met. If you are at a regular shelter, at least some of your food needs may be taken care of. In other situations, you may be on your own, at least for a while. High-calorie and high-protein snacks will help keep you going, but you will also need food that is more substantial.

Water

Safe water supplies can be difficult to find during and after many disasters. You will probably use three to five gallons of water each day just for drinking, cooking, and sanitation. In extremely hot or cold conditions, or with increased physical activity, your needs will increase significantly. Most disaster preparedness checklists suggest at least one gallon per person, per day.

Many camping supply stores offer a range of water filters and purification tablets that can help make local water supplies safer. However, they all have limitations you should be aware of.

Filters may or may not remove all potentially harmful organisms or discoloration, depending on the type. Those with smaller filter pores (.3 microns is a very tight filter) will remove more foreign matter but will also clog more quickly. Iodine-saturated filters will kill or remove most harmful germs and bacteria but are more expensive and impart a faint taste of iodine to the water. Most filters will remove Giardia cysts. All water filters require care in their use to avoid cross-contamination of purified water with dirty water.

Purification tablets have a limited shelf life that varies with the type and gives the water an unpleasant taste. The tablets will do nothing for particulate (dirt) or discoloration in the water. Be sure to read and understand the information that comes with any water purification device or tablet before purchasing or using it.

The CDC says you can use unscented household chlorine bleach. After filtering out any particulates by pouring the water through several layers of densely woven cloth, put 1/8 teaspoon of bleach in a gallon of water, mix well, and allow it to sit for 30 minutes. If it still smells

slightly of bleach, you can still use it.

If you have no other means, boiling for at least five minutes will kill any bacteria and other organisms, but will not remove any particulate matter or discoloration. Boiling will leave water with a “flat” taste that can be improved by pouring it back and forth between two containers several times to reintroduce some oxygen.

Sleep and Personal Hygiene

Try to get at least six continuous hours of sleep in every 24-hour period, or four continuous hours and several shorter naps. Bring fresh soft foam earplugs and a black eye mask to ensure that light and noise around you are not a problem. An appropriate sleeping bag, closed-cell foam pad, or air mattress, and your own pillow will help give you the best chance of getting adequate rest. If caffeine keeps you awake, try to stop drinking coffee, tea, or other beverages containing caffeine at least four hours before going to bed. Allowing yourself to become overtired can also make falling asleep difficult. This is a good subject to learn from the Amateur Radio contest community. DX contests can run up to 48 hours, and the top operators must master sleep strategies to be competitive.

If you pack only a few personal items, be sure they include toothpaste and toothbrush, a comb, and deodorant. If possible, bring a bar of soap or waterless hand cleaner, a small towel and washcloth, and a few extra shirts. Waterless shampoo is available from many camping stores. After 2 or 3 days without bathing, you can become rather unpleasant to be around, so think of others and make an attempt to stay as clean and well-groomed as you can under the circumstances.

Safety in an Unsafe Situation

Many disaster assignments are in unsafe places. Natural disasters can bring flying or falling debris, high or fast-moving water, fire, explosions, building collapse, polluted water, disease, toxic chemicals, and a variety of other dangers. While you may focus on the job assigned you, never lose “situational awareness.” You should always be aware of your surroundings and the dangers they hold. Never place yourself in a position where you might be trapped, injured, or killed. Try to anticipate what might happen and plan ahead. Always have an escape plan ready in the event that conditions suddenly become dangerous. Do not allow yourself to become “cornered” — always have *more than one* escape route from buildings and hazardous areas.

Wear appropriate clothing. Depending on the weather, your gear might include a hard hat, rain gear, warm non-cotton layers, work gloves, and waterproof boots. In sunny climates, include a shade hat, long-sleeved shirt, long pants, and sunscreen. Always bring several pairs of non-cotton socks and change them often to keep your feet clean and dry. Create seasonal clothing lists suitable for your climate and the types of disasters you might encounter. As a volunteer communicator, you will not generally be expected to enter environments that require specialized protective clothing or equipment. Do not worry about purchasing these items unless required by your partners.

Be prepared to help others find or rescue you should you become trapped or isolated. Carry a police or signal whistle and a chemical light stick or small flashlight in your pocket. Let others know where you are going if you must travel anywhere, even within a “safe” building. Try not to travel alone in dangerous conditions — bring a “buddy.”



Shelter

In most cases, you will not need your own shelter for operating or sleeping. You may be able to stay or work in the emergency operations center, evacuation shelter, or even your own vehicle. However, in some cases a tent, camp trailer, motorhome, or other suitable shelter may be necessary. Your choice will depend on your needs, resources, and what is allowed at your work location.

Tents should be rated for high winds and should be designed to be waterproof in heavy weather. Most inexpensive family camping tents will not survive difficult conditions. Dome tents will shed wind well but look for published “wind survival” ratings since not all dome designs are equal. Your tent should have a full-coverage rain fly rather than a single waterproof fabric. The tent’s bottom should be waterproof, extending up the sidewalls at least six inches in a “bathtub” design, but bring an extra sheet of plastic to line the inside just in case. (Placing a plastic ground cloth under a tent will allow rain to quickly run under and through a leaky tent floor.) Bring extra nylon cord and long ground stakes to help secure the tent in windy conditions. If you are not an experienced foul-weather camper, consider consulting a reputable local outfitter or camping club for advice on selecting and using a tent.

Medical Considerations

If you have a medical condition that could potentially interfere with your ability to do your job, it

is a good idea to discuss this with your physician ahead of time. For instance, if you are a diabetic, you will need to avoid going for long periods without proper food or medication, and stress may affect your blood sugar level. Those with heart problems may need to avoid stressful situations. Even if your doctor says you can participate safely, be sure you have an adequate supply of appropriate medications on hand and a copy of any prescriptions. Let your emergency communications manager and any work partners know of your condition so that they can take appropriate actions if something goes wrong. Wear any medical ID jewelry you have. Keep a copy of any special medical information and emergency phone numbers in your wallet at all times. We know you want to help, but your EC needs to know and can make an appropriate assignment. Bring an electronic copy stored on your phone or a USB drive as a backup to the paper documents.

Protect Your Eyes and Sight

If you wear eyeglasses, be sure to bring a spare pair or enough contact lenses to last through the deployment. If you use disposable contact lenses, bring more than enough changes to avoid running out. Some contact lens wearers may want to switch to glasses to avoid having to deal with lens removal and cleaning under field conditions. If you have any doubts, consult your eye doctor ahead of time. Bringing a copy of your lens prescription along may also be a good idea, especially if you are likely to be some distance from home for a while.

Sunglasses may be a necessity in some situations and should always be carried in sunny climates. Working without them in bright sun can cause fatigue, and possibly eye damage. If you are in an area with large expanses of snow or white sand, prolonged periods of exposure can cause the retina to be burned, a very painful condition commonly known as “snow blindness.” Since no painkiller will help with retinal burns, it is best to use good-quality UV blocking sunglasses at all times and avoid prolonged exposure. If you do not normally wear eyeglasses, consider a pair of industrial safety glasses or goggles to protect your eyes from smoke and ash, wind-blown water, dust, and debris. Keep all spare eyeglasses or safety glasses/goggles in a felt-lined, hard-shell storage case to prevent scratching and breakage.

Sample Personal Survival and Comfort Needs Checklist

Modify according to your own situation.

- ✓ Suitable size backpack or duffel bag for clothing and personal gear
- ✓ Plastic storage tub for food, cooking gear
- ✓ Toilet kit — soap, comb, deodorant, shampoo, toothbrush, toothpaste
- ✓ Toilet tissue in zipper-lock freezer bag
- ✓ Small towel and washcloth
- ✓ Lip balm
- ✓ Facial tissues
- ✓ Sunscreen
- ✓ Insect repellent
- ✓ Prescription medications (1-week supply)

- ✓ Copies of medication and eyeglass/contact lenses
- ✓ Prescriptions
- ✓ Spare eyeglasses or contact lenses and supplies
- ✓ Hand lotion for dry skin
- ✓ Small first aid kit
- ✓ Non-prescription medications, including painkiller, antacids, anti-diarrheal, etc.
- ✓ Extra basic clothing — shirts, socks, underwear
- ✓ Gloves for protection or warmth
- ✓ Pocket flashlight
- ✓ Folding pocketknife
- ✓ Sleeping bag, closed-cell foam pad or air mattress, pillow
- ✓ Earplugs (soft foam-type in sealed package)
- ✓ Opaque eye mask
- ✓ Outer clothing for season and conditions (rain gear, parka, hat, face mask, etc.)
- ✓ Hardhat
- ✓ Reflective vest, hat
- ✓ Travel alarm clock
- ✓ Chemical light sticks
- ✓ Police or signal whistle
- ✓ Dust masks
- ✓ Phone/e-mail/address list for family, friends, neighbors, physician, pharmacy
- ✓ Emergency contact/medical information card in your wallet
- ✓ Spare car and house keys
- ✓ High-energy or high-protein snacks
- ✓ Food — freeze-dried or MREs
- ✓ Coffee, tea, drink mixes
- ✓ Plate or bowl, knife, fork and spoon, insulated mug
- ✓ Camp stove, small pot, fuel and matches
- ✓ Battery or other lantern
- ✓ Water in heavy plastic jugs
- ✓ Water purification filter or tablets
- ✓ Magnetic compass, maps
- ✓ Duct tape, parachute cord

Pack individual items or kits in zipper-lock freezer bags to keep dry, clean, and neat.

Reference Links

American Red Cross – Disaster Safety

www.redcross.org/get-help/prepare-for-emergencies/types-of-emergencies

Center for Disease Control and Prevention

www.cdc.gov/

CDC Guidance on Water Purification

https://www.cdc.gov/healthywater/drinking/travel/emergency_disinfection.html

Communications Tower Best Practices Guide

http://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db0601/DOC-345150A1.pdf

FEMA Build a Kit

<https://www.ready.gov/build-a-kit>

FEMA Disaster Preparedness for Kids

<https://www.ready.gov/kids>

FEMA Disaster Safety and Preparedness Information

<https://www.ready.gov/>

FEMA Family Emergency Communication Plan

<https://www.fema.gov/media-library/assets/documents/108887>

FEMA Protecting Family & Property

<https://www.ready.gov/make-a-plan>

Food

https://www.fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/get-answers/food-safety-fact-sheets/safe-food-handling/basics-for-handling-food-safely/ct_index

NOAA Flood Safety

www.floodsafety.noaa.gov/

Safety

www.arrl.org/safety

Sleep Strategies for DX Contests from K5ZD

<http://k5zd.com/articles/a-sleep-strategy-for-dx-contesting/>

Water

www.ready.gov/managing-water

Review

As important as a mission might seem, you must first take steps to protect your own home, family, and health. Plan well ahead and include other members of your family in your planning. Let others know where you will be and how to reach you. To avoid becoming part of the problem, bring along the items you will need to be comfortable, clean, and safe. Take time to meet your own needs during your deployment so that you do not become part of the problem.

Section 5: Maintaining Readiness

Topic 23

ARES PIO: The Right Stuff

Objectives

Welcome to Topic 23.

After reading this topic, you will acquire the basic understanding of the role of a Public Information Officer (PIO) when attached to a deployed Amateur Radio Emergency Service (ARES) unit. The topic is meant to encourage further training in this specific activity area.

Student Preparation required:

None.

Introduction

More and more Sections are appointing ARES-specific PIOs. These PIOs are specialists in covering media relations when ARES units are deployed in an emergency or community service operation. While general PIOs may also do this work, the entire emergency field is becoming increasingly complex, and special training is not only advisable but strongly encouraged.

The goal of a PIO in an emergency is:

“Providing the Right information to the Right people at the Right time so they can make the Right decisions.” — FEMA Advanced PIO Course

In addition to the regular PIO duties and tasks of establishing media relationships, informing the public and attracting new members, the ARES PIO has the opportunity to become an integral part of the Incident Command System (ICS).

The public needs to know the scope of the emergency or disaster, how big the emergency is, what is being done about it, and what they may need to do themselves. Silence and/or errors on any of these topics breeds rumors. The ICS has standardized ways to coordinate this information in a unified voice. Short-circuiting that process will only make you unwelcome at best.

As the gravity of a situation unfolds and more responders and agencies become involved, a Unified Command is activated. The Unified Command comprises a group of trained and

qualified individuals that work together to lead and orchestrate the effort. One component of forming the Unified Command is that of a group of PIOs representing the various responders, agencies, and disciplines will come together to form a Joint Information Center (JIC). It is the duty of the JIC to establish a unified message and become the voice of the event, provide consistent and unified information, and dispel rumors, as well as to provide a central location for media to receive information and ask questions. A trained ARES PIO may be invited to represent Amateur Radio within the JIC.

As an ARES PIO, your job is to be the “expert” on Amateur Radio efforts involved (the number of ARES personnel involved, locations of ARES stations, etc.). You may be assigned multiple additional duties within the JIC to assist the Lead PIO. You will be expected to perform these additional duties as well as your ARES PIO duties simultaneously. Should the media inquire about ARES or Amateur Radio involvement, the Lead PIO may call on you to provide accurate information regarding Amateur Radio and ARES.

The ARES PIO will also be the person who guides reporters to meet and talk with other ARES members. For example, if a TV reporter wants to interview an ARES operator, the PIO will set it up, stay close to make sure it goes well, aid the operator if the interview gets “sticky,” and frame it in the best possible way. The PIO is also responsible for seeing that the operator makes a good impression with appropriate clothing and appearance — not a stained, dirty T-shirt with inappropriate logos on it! (This has happened.)

Under no circumstances should you ever speculate to the media regarding the outcome of the situation, nor should you provide any information about the names of victims, condition of individuals, or gravity of the situation.



This is the job of others, not an ARES operator nor an ARES PIO. The PIO may be asked to speak to the media about Amateur Radio involvement, number of ARES personnel involved, and the kinds of communications being supported by ARES, but even the PIO can only talk about ARES' own work and must refer other topics to more appropriate personnel.

And, always remember, especially during an emergency situation that involves risk to life and property, *there is no such thing as "off the record."* Anything you say directly or within earshot of the media, even in jest, can lead to disastrous results that could jeopardize the entire operation, cause your dismissal, and risk exclusion of Amateur Radio from future incidents.

An ECs Is Not a PIO

Each role, if being performed correctly, is a full-time job. The best media relations are done by specifically designated and trained people whose singular function is to work with media, allowing ECs and others to do their job. While the EC and the PIO should work closely together, they have different roles that call for different people.

Who May Talk to the Press

While there will always be people who want their 15 seconds of fame in the media, they usually end up (at best) promoting only themselves, not ARES and Amateur Radio. In many cases they don't have accurate information, numbers, or a larger perspective on the situation. In the worst cases, they start guessing rather than admit that they do not have the real information.

Your job as an ARES operator is to relay messages for the partners. Refer the media to your ARES PIO, the Lead PIO, or the JIC.

Some Rules You Need to Know

Amateur Radio must *not* be used to assist news media in gathering information *when telephones or other normal means of communication are available.*

Amateur Radio operators may assist news media representatives in their efforts to gather information for relay to the public *from areas where normal communications have been disrupted.* Amateurs may ask questions of, or relay media questions to, other amateurs in the emergency area, and their responses may be recorded by media representatives.

Who Can Record and What They Can Transmit

One constant area of confusion is in the recording and retransmission of Amateur Radio messages.

- Amateur Radio operators *cannot* record and retransmit commercial radio and TV

broadcasts.

- Commercial radio and TV reporters *can* record and then broadcast Amateur Radio messages.

Reference Links

There are Basic and Advanced PIO classes offered both via online and in classrooms by many state emergency management agencies as well as the FEMA Emergency Management Institute in Emmitsburg, Maryland.

FEMA Independent Study PIO Course

<https://training.fema.gov/is/courseoverview.aspx?code=IS-29>

Section 5: Maintaining Readiness

Topic 24

Alternative Communication Methods

Objectives

Welcome to Topic 24.

After reading this topic, the emergency communications volunteer will know the pros and cons of using alternate communication systems. This topic discusses a variety of communication options that do not depend on Amateur Radio, and some circumstances in which they might be used.

Student Preparation required:

Read the FCC Rules (www.arrl.org/part-97-amateur-radio) on emergency communications before beginning this lesson.

Introduction

Amateur Radio may not always be the only or the best radio service for the job. Sometimes it is better to hand an official a radio he or she can use to stay in contact with the ARES team on site, and not saddle him or her with a ham radio “shadow.” This is particularly true for officials who must regularly deal with sensitive issues. Other voluntary agencies may use these radio services in their own operations.

The radio services discussed in this chapter are commonly available and are in general use. Other volunteers may already own radio equipment in these services, and amateur emergency communication groups should be equipped to communicate with them.

Legal Considerations

Some radio services require licenses, whereas others do not. FCC rules permit the use of “any means necessary” to communicate in order to protect life and property — *but only when no other normal means of communication is possible*. Please do not assume that this means you can just modify your radio and call for help on the local police frequency the next time you see a car crash on the highway. Law enforcement agencies are not bound by the FCC’s rules. Ham radio

operators who have called for “help” on police frequencies have been convicted of “interfering with a police agency” under state and local laws, even though the FCC had taken no enforcement action. In one case, a judge ruled that by modifying his radio in advance, the amateur had committed “premeditated” interference, a serious charge. If you are in a position to save someone’s life or property, be sure you are ready to defend your actions — and possibly lose — before pressing the mic button.

Other services, such as General Mobile Radio Service (GMRS), require a license that is relatively easy to obtain, although not free. If your group is planning to use licensed radios, obtain your license well before any emergency and keep it current. If you own a radio but no license, a lawyer could claim pre-meditation if you use it and disturb licensed users.

Using Modified Ham Radios

While it is easy to modify some VHF and UHF Amateur Radio equipment for operation in nearby public service and business bands, it is not legal to do so for regular “emergency” use. Radios used in those bands must be “Type Accepted” by the FCC for the purpose, and Amateur Radio equipment is not. If you plan to use other radio frequencies discussed in this unit, it is better to purchase the proper radio. However, if the need arises and your ham radio equipment is all you have, the FCC will probably not prosecute you for using it — if the use falls within its strict rules for emergencies (see above).

Citizens Band Radio Service (CBRS)

As a widespread system of casual communication for the public, CB radio is still quite popular among the public and truckers. Since the 1950s, CB has been available to anyone for the purpose of short-range business and personal/family communication. No licensing is required, and tactical or self-assigned identifiers are acceptable. *Do not use your amateur call sign!*

CB radios operate in the 11-meter band, on 40 designated channels from 26.965 to 27.405 MHz, with a maximum output power of four watts for amplitude modulation (AM) and 12 watts for single side band (SSB). Most use AM but a few also offer SSB. The effective range between two CB mobile stations averages between two and eight miles. Depending on antennas, terrain, and propagation, base to mobile communication is possible up to 25 miles. The use of SSB can significantly increase range, but SSB use is not widespread due to the extra cost. FCC rules permit communication to a maximum of up to 250 kilometers.

In many remote areas with little or no telephone service, families rely on CB radios for basic day-to-day communications. Many rural police and sheriff’s organizations still monitor CB traffic. In a number of states, highway patrol officers install CB units in their patrol cars with the blessing of their agencies. However, many departments that used to monitor Channel 9 have given up the practice. Radio Emergency Associated Communications Teams (REACT) groups in the area may still be monitoring.

In disaster situations, great emphasis is placed on the timely movement and distribution of supplies by truck. By far, the largest group of CB users is the trucking community. Channel 19 has been the unofficial “trucker” channel since the late 1960s, and in some areas is as good as Channel 9 when calling for assistance. Channel 9 is reserved for emergency and motorist assistance traffic only. Aside from REACT, organizations in many parts of the world monitor Channel 9 and other designated distress channels. In some countries, Citizens Radio Emergency Service Teams (CREST) teams serve the same functions as REACT.

Multiple Use Radio Service (MURS)

With little fanfare, the FCC added a new, unlicensed “citizen’s” radio service in 2000. Both personal and business operation is permitted, with a maximum power of two watts. The MURS frequencies are 151.820, 151.880, 151.940, 154.570, and 154.600. While base operation is not specifically prohibited, the service is primarily intended for mobile and portable operation.

For about 20 years, certain businesses have been able to obtain licenses for operation on what the FCC calls “itinerant” frequencies. These channels became commonly referred to as the “color dot” channels. (A color dot label on the packaging identifies the frequency of the walkie-talkie.) One of the former itinerant channels, 154.570 MHz (blue dot), is now a MURS channel. This means that a number of these low-cost 1- or 2-watt output “itinerant” radios (which are usually user programmable for itinerant channels only) could be utilized for MURS. This allows you to equip unlicensed volunteers with a VHF portable having much the same simplex capability as a 2-meter handheld.

Family Radio Service (FRS)

Almost anywhere, in most every situation, you can find FRS radios in use. Family Radio Service portables are useful, effective, and inexpensive. Like CB, the Family Radio Service is designed for short-range personal communications. Campers, hikers, vacationers, and families on weekend outings use FRS units to keep in touch.

There are 14 available UHF channels, and 38 different Continuous Tone Coded Squelch System (CTCSS) codes to limit background chatter and noise. Output power is from 100 to 500 mw, depending on the model. In an effort to standardize the ability to call for help using FRS, REACT recommends the use of FRS Channel 1 (462.5625 MHz) with no CTCSS tone as an emergency calling channel. REACT is also lobbying the manufacturers of FRS equipment to suggest this plan in the user information packed with new radios. A petition to the FCC requesting that this be made official was denied in late 2001. Monitoring the channel is recommended to all persons in outdoor areas whenever possible.

The first seven FRS channels are shared with the General Mobile Radio Service. Although the original rules seem to prohibit it, a later FCC Report and Order explicitly permit communication between the two services. The chance of a distress call being heard on either service is greatly increased on these seven common channels.

Most FRS radios are available with two or 14 channels, although single channel radios can be found. It is important to note that the channel numbers on each radio are not always interchangeable between these units.

General Mobile Radio Service (GMRS)

The GMRS consists of 15 UHF frequencies between 462.5625 and 462.7250 MHz. Eight are paired with matching repeater inputs five MHz higher, as with amateur and commercial systems. Seven “interstitial” channels are shared with FRS, and operation there is restricted to simplex with a maximum of five watts. Power on the other channels is limited to 50 watts. GMRS stations have the option of working only simplex modes if desired, even on paired channels. There is no frequency coordination, and users must cooperate locally to effectively use channels. CTCSS codes are the same as for FRS, and the first seven channels are common to both services. FM voice operation is permitted, but digital modes and phone patches are not.

Operating a GMRS station will require a low-cost system license from the FCC. You can apply using the FCC’s online Universal Licensing System. System licenses are currently granted only to individuals. A system includes any and all radios operated by family members and may include fixed, mobile, and repeater equipment. Use under the license is restricted to members of the licensee’s immediate family. Licenses to entities other than individuals are no longer issued, but non-individual entities licensed before July 31, 1987, may continue to renew their licenses, and may not increase or modify their use.

The frequency of 462.675 MHz is recognized for emergency and travel information use, and is monitored by many REACT teams nationwide. Many teams operate repeaters on this and other frequencies.

Current uses for GMRS involve mostly personal and family communications. Hiking, camping, and convoy travel are all common GMRS applications. GMRS use for emergency services is limited by the licensing requirements but could be pressed into service in a disaster situation. One or more members might wish to become licensed if use of GMRS is likely, especially for liaison with locally active REACT teams.

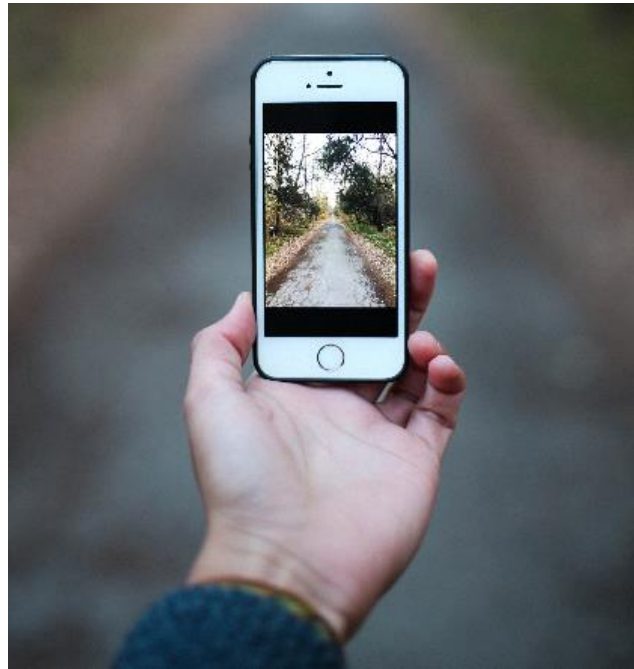
Public Safety Radio

There are instances when the use of police and fire radio frequencies is possible. The agency itself might allow and train you for such use, or an individual officer may ask you to use his radio to call for help when he cannot. Keep your transmissions short and to the point. Do not tie up the channel with long explanations, and cease transmitting if you are told to do so.

Cellular Phones

In a widespread disaster situation, these phone systems may become overloaded; however,

networks are far more resilient and robust than they once were. If a message is too sensitive to send via any two-way radio, try your cell phone. Cellular phone transmissions, especially digital, are considerably more secure. In addition, it is possible to send photos, files, and even video over the cellular network. An important consideration is that text messaging utilizes less bandwidth on the network and often works when voice and data do not.



Marine Radio

FM marine radios operate on internationally allocated channels in the 160 MHz band. HF SSB radios operate on a variety of channels between 2 and 30 MHz. Operation of FM stations for vessels in United States waters does not require a license, but operation on the HF channels does. Particularly in coastal areas along major rivers or the Great Lakes, it may be a good idea to have a FM marine radio in your group's inventory. During major storms, you can monitor Channel 16, the distress channel. If you hear a vessel in distress whose calls are going unanswered by the Coast Guard, you may legally answer from an unlicensed land-based station under the FCC's "emergency communications" rules. If the Coast Guard is in communication with the vessel, do not transmit. Most other land-based operation is illegal, except where authorized by an FCC coast station license.

Aviation Radio

AM radios operating in the 108 – 136 MHz band are used in aircraft and in certain limited vehicles and ground stations. FCC licenses are required for all stations. Emergency Locator Transmitters (ELTs) are automatic devices that transmit a distress signal on 121.5 and 406 MHz.

Marine Emergency Position Indicating Radio Beacons (EPIRBs) transmit digital ID codes on

406 MHz and a low-powered homing signal on 121.5 MHz

The land-based Personal Radio Beacons (PRBs) transmit on 121.5 MHz. While it is unlikely that you will ever need to use an aircraft band radio except where it is provided by the partners, it is good to be familiar with the radio service. Monitoring these frequencies for ELT, EPIRB, and PRB signals and distress calls is always a good idea.

Couriers

Since pre-history, runners have carried messages from place to place. When we are asked to deliver a sensitive or lengthy message, and fax and phone lines are out of service, hand delivery might be the best choice if travel is possible. Acting as a courier does not necessarily eliminate the use of radio, since couriers need to be dispatched from place to place. Courier service is actually an excellent marriage of old and new technologies.

Reference Links

Amateur Radio FCC Rules

www.arrl.org/part-97-amateur-radio

Citizen's Band Radio Service (CBRS) Rules

<https://www.fcc.gov/wireless/bureau-divisions/mobility-division/citizens-band-radio-service-cbrs>

Emergency Locators

www.sarsat.noaa.gov/emercns.html

Family Radio Service (FRS) Rules

<https://www.fcc.gov/wireless/bureau-divisions/mobility-division/family-radio-service-frs>

General Mobile Radio Service (GMRS) Rules

http://wireless.fcc.gov/services/index.htm?job=service_home&id=general_mobile

Multiple Use Radio Service (MURS) Rules

http://wireless.fcc.gov/services/index.htm?job=service_home&id=multi_use

Part 95 Rules

<https://www.ecfr.gov/cgi-bin/text-idx?SID=b037d8443e356eb8bc55d8f546f40a7b&mc=true&node=pt47.5.95&rgn=div5>

Review

Flexibility is important in disaster situations. Use of other communication systems may improve

the overall effectiveness of the emergency communication response. Depending on the situation, trained Amateur Radio operators may have a variety of options from which to choose.

Section 5: Maintaining Readiness

Topic 25

Hazardous Materials Awareness

Objectives

Welcome to Topic 25.

This topic introduces you to the reporting of hazardous materials (HazMat) incidents and stresses personal safety awareness for emergency communications volunteers.

Student Preparation required:

None.

Introduction

Amateur Radio operators may encounter HazMat incidents during operations, or they may be asked to assist with emergency communications in such incidents. Proper training is required for your own safety. Moreover, a wrong move during a HazMat operation can endanger not only your own safety, but also the safety of other responders, as well as the entire local community.

The term “hazardous materials” (HazMat) refers to any substances or materials, which, if released in an uncontrolled manner (e.g., spilled), can be harmful to people, animals, crops, water systems, and/or other elements of the environment. The list is long and includes explosives, gases, flammable and combustible liquids, flammable solids or substances, poisonous and infectious substances, radioactive materials, and corrosives. Refer to Occupational Safety and Health Administration (OSHA) 29 CFR 1910.1200 and General Services Administration for definitions of hazardous materials. One of the major problems faced by emergency responders is determining which chemicals are involved and their potential hazards.

Hazardous Chemicals on the Move

As the primary regulatory agency concerned with the safe transportation of such materials in interstate commerce, the US Department of Transportation (DOT) has established several

systems to manage HazMat materials. These include definitions of various classes of hazardous materials, placards and other marking requirements for vehicles, containers, and packages to aid in rapid identification of cargoes, and an international cargo commodity numbering system.

The DOT requires that all freight containers, trucks, and rail cars transporting these materials display placards identifying the hazard class or classes of the materials they are carrying. The placards are diamond-shaped, 10 inches on a side, and color-coded, and they show an icon or graphic symbol depicting the hazard class (flammable, caustic, acid, radioactive, etc.). They are displayed on the ends and sides of transport vehicles. A four-digit identification number may also be displayed on some placards or on an adjacent rectangular orange panel. If you have spent any time on the roads, you have undoubtedly seen these placards or panels displayed on trucks and railroad tank cars. You may recognize some of the more common ones, such as “1993,” which covers a multitude of chemicals, including road tar, cosmetics, diesel fuel, and home heating oil. You may have also seen placards with the number “1203” (gasoline) on tankers filling the underground tanks at the local gas station.

In addition to truck and rail car placards, warning labels must be displayed on most packages containing hazardous materials. The labels are smaller versions (4 inches on a side) of the same placards used on vehicles. In some cases, more than one label must be displayed, in which case the labels must be placed next to each other. In addition to labels for each DOT hazard class, other labels with specific warning messages may be required. Individual containers also have to be accompanied by shipping papers that contain the proper product name, the four-digit ID number, and other important information about the hazards of the material.



Hazardous Chemicals in Buildings

The National Fire Protection Association (NFPA) has devised a marking system to alert firefighters to the characteristics of hazardous materials stored in stationary tanks and facilities. This system, known as NFPA 704M, can also assist citizens visiting a site in identifying the hazard presented by the stored substance. Use of the system is voluntary, unless specified by local codes.

The NFPA 704M label is diamond-shaped and is divided into four parts, or quadrants. The left quadrant, colored blue, contains a numerical rating of the substance's health hazard. Ratings are made on a scale of 0 to 4, with a rating of 4 indicating a danger level so severe that a very short exposure could cause serious injury or death. A 0, or no code at all in this quarter, means that no unusual hazard would result from the exposure.

The top quadrant of the NFPA symbol contains the substance's fire hazard rating. As you might expect, this quadrant is red. Again, number codes in this quadrant range from 0 to 4, with 4 representing the most serious hazard.

The NFPA label's right quadrant, colored yellow, indicates the substance's likelihood to explode or react. As with the health and fire hazard quadrants, ratings from 0 to 4 are used to indicate the degree of danger. If a 4 appears in this section, the chemical is extremely unstable, and even under normal conditions may explode or react violently. A 0 in this quadrant indicates the material is considered stable even in the event of a fire.

The bottom quadrant is white and contains information about any special hazards that may apply. There are three possible codes for the bottom quarter of the NFPA symbol:

1. OXY means this material is an oxidizer. It can easily release oxygen to create or worsen a fire or explosion hazard.
2. The symbol W indicates a material that reacts with water to release a gas that is either flammable or hazardous to health.
3. If the material is radioactive, the usual tri-blade "propeller" symbol for radioactivity will appear.

Guidelines for Handling HazMat Incidents

1. Once you are in a safe position uphill and upwind, try to identify the material. However, it cannot be emphasized enough that you *must* stay well away from the site. Do *not* be tempted to get just a little closer so that you can read placards or other items. If you cannot read these items using a spotting scope or binoculars, simply report what you can see from a safe position. If you are able to see from a safe position, look for:
 - The four-digit number on a placard or orange panel.
 - The four-digit number preceded by "UN/NA" on a shipping paper, package, or drum.
 - The name of the material on the shipping papers, placard, or package.
2. Call for help immediately and let the experts handle the situation. Remember, even ordinary firefighters and police are prohibited by federal law from taking certain actions at some

HazMat incidents. Do not attempt to personally take any action beyond your report and preventing others from approaching. This is an instance when it is vitally important to know your limitations, not just for your own safety, but also for the safety of others.

3. When reporting a HazMat incident, include the following information:
 - Identify yourself.
 - Give your current location and the location of the incident, i.e., street address or cross streets, road and mile marker, distance from nearest town, etc.
 - Briefly describe what you see (from a distance), i.e., liquid spill, gaseous cloud, etc., and any placard numbers or other information you can safely see.
 - If a gaseous cloud or liquid spill exists, give the direction the contaminant is flowing or moving. Give any pertinent weather or other information you can observe from a safe distance that might help the experts in responding to the incident. Be concise.

Reference Links

Details of the placards and emergency response procedures can be found in the comprehensive *DOT Emergency Response Guidebook*, copies of which may be available for your review at your local emergency management, police, sheriff, or fire department. A copy is also available online at:

<https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/ERG2016.pdf>

NOTE: The 2016 version is the most recent Emergency Response Guide

The 2016 ERG manual is available at no-cost for both Apple and Android devices:

<https://www.phmsa.dot.gov/hazmat/erg/erg2016-mobileapp>

You may also consult your Local Emergency Planning Committee (LEPC) or State Emergency Response Commission (SERC) concerning what role Amateur Radio might have in your local plan.

For more information about hazardous materials in general, contact:

FEMA, Technological Hazards Division
Federal Center Plaza, 400 C St., SW
Washington, DC 20472
(202) 646-2861

Review

If you happen upon a hazardous materials incident, first take precautions to protect yourself and others with you by remaining at a safe distance, upwind and uphill. Next, report any basic

information you can safely gather, including placard legends and numbers, wind conditions, scene conditions, and other information to the appropriate public safety partner. Take no direct action except to report what you witness and to protect yourself and others.

Section 5: Maintaining Readiness

Topic 26

Marine Communications

Objectives

Welcome to Topic 26.

Reading this topic is intended to give you, the emergency communicator, a basic knowledge of marine communications and the proper procedures to follow in the event of a maritime emergency.

Student Preparation required:

Understand the following definitions:

Vessel: A general term for all craft capable of floating on water and larger than a rowboat.

Ship: A general term for larger seagoing vessels of every kind.

Boat: A term applied to smaller craft propelled by oars, sails, or engines.

Marine: An adjective meaning related to or connected with the sea.

Introduction

The most common marine radio mode is VHF-FM, (156 to 162 MHz), with an effective range from ship to ship of 10 to 15 miles, and ship to shore of 20 to 30 miles. Vessels that routinely travel outside this distance generally have MF/HF-SSB, satellite communications, or both. CW communication on MF/HF is no longer used.

No license is currently required for pleasure boats operating on the VHF-FM channels in US territorial waters. The FCC limits VHF-FM marine radios to a maximum of 25 watts. Radios are also required to be capable of 1-watt operation for short-range and in-harbor use. For more regulatory information, visit <https://www.fcc.gov/wireless/bureau-divisions/mobility-division/maritime-mobile/coast-radio-stations>

The use of VHF and MF/HF marine radios is restricted to vessels on the water. The use of portables or mobiles to communicate with crew on shore is not allowed. Certain commercial users, such as marinas, marine towing services, and fish canneries may be licensed for limited base operations on certain channels. In an emergency, however, the FCC rules are suspended, and you may use whatever means of communication are necessary to protect life and property.

Channel Selection

Marine VHF-FM frequencies have been assigned channel numbers, and all are designated for specific uses. Channel 16 has been designated worldwide as a distress and calling frequency. All vessels are required to maintain a listening “watch” on Channel 16 while underway. With the growth of boating and the elimination of mandatory radio licenses for certain vessels operating in domestic waters, Channel 16 has suffered from abuse and overuse. To maintain the integrity of Channel 16 as a distress frequency, Channel 9 has been designated as an alternate calling frequency. While Channel 16 can be used for routine calling, most calls should be made on Channel 9. This would apply to owners of newer marine radios, which are capable of simultaneously monitoring both Channel 9 and Channel 16 using either a “scan” or “dual watch” function.

The designated use for every marine channel is contained in the manual that comes with all VHF-FM radios. For example, Channel 13 is designated for navigational purposes, and a number of channels are used for inter-ship communication. Others are not for public use. Channel 83 is reserved for use by the Coast Guard Auxiliary. Channel 22 is for public communication with the Coast Guard, but it may not be used by boaters unless they are specifically instructed to do so by the Coast Guard radio operator on Channel 16. Channel 22 is also used by the Coast Guard to broadcast “Notice to Mariners” (NTM) messages, after announcing them on Channel 16. Channel 6 is an Inter-Ship Safety channel, often used for search and rescue operations.

A list of all marine channels and their assigned uses can be seen at:
<https://www.navcen.uscg.gov/?pageName=mtVhf>

Frequencies for Key Marine VHF Channels

Channel	Frequency	Used by
9	156.45	Calling
22	157.1	Coast Guard - NTMS
16	156.8	Calling/Distress
23	157.15	Coast Guard
17	156.85	State/Local Gov't. Shore Sta.
68	156.425	Inter-Ship
18	156.9	Commercial Inter-ship
69	156.475	Inter-ship
21	157.05	Coast Guard
83	157.175	Coast Guard Auxiliary

Spoken Emergency Signals

To simplify identification of marine radio traffic, certain prowords are used. When you hear one of these, you should listen carefully, write down any information, and refrain from transmitting on the frequency until necessary. The prowords are listed below, with an explanation of each.

- “MAYDAY MAYDAY” — This call has the highest priority and urgency. The vessel calling is threatened by grave or immediate danger and requires immediate assistance. If you hear this call, copy the information on paper, resist the urge to contact the party calling, and listen first for a reply from a Coast Guard unit. Only if no response is heard should you attempt communication with the vessel in distress.
- “PAN PAN” (pronounced “pawp-pawp”) — Known as an “urgency” call. The vessel calling has an urgent message concerning the safety of a vessel or person. Again, copy the message, but respond only if no answer is heard. This signal may also be used by the Coast Guard for certain urgent messages to all vessels on the channel.
- “SECURITE” (pronounced “securitay”) — This safety signal is used for official messages about the safety of navigation or important weather warnings. The Coast Guard can be heard using this proword in regular “notice to mariners” transmissions.
- “SILENCE” — The Coast Guard may declare SILENCE on a specific channel. Only those units actively involved in an incident may transmit on that frequency until the Coast Guard lifts the order.

Incident Reporting

There are two types of incidents that ham radio operators should report directly to the Coast Guard:

- Vessels in distress. Report these directly to the nearest Coast Guard station.
- Oil and chemical spills in public waters. Report these to the Coast Guard’s National Response Center (NRC) at 800-424-8802.

The secondary reporting method is via the NRC website at www.nrc.uscg.mil/. If neither is available, try contacting the nearest Coast Guard facility.

Distress Information

If you hear a distress call, listen first to see if the Coast Guard responds within a minute or two. If they do not, attempt to gather the following information:

- Position of the vessel involved, number of persons on board, nature of the distress.
- Name of the vessel.
- Call sign (if any).
- Length and type of vessel.
- Color.
- Any descriptive features — number of masts, flying bridge, etc.
- Weather conditions on scene.
- Frequency being used to communicate with the vessel.
- On-board emergency equipment: Life raft, Emergency Position Indicating Radio Beacon (EPIRB), and class of EPIRB, if possible.

Once you have the information, advise all persons on board to don life jackets, and contact either 911 dispatch or the closest Coast Guard facility by phone. In some cases, a local fire or police boat may be able to respond more quickly than the Coast Guard, which may be some distance away.

Identify yourself as an Amateur Radio operator relaying an emergency message. Pass on all the information that you have gathered and assist as requested. Provide your name and phone number or other means of contact so that responding local public safety agencies or the Coast Guard may reach you if needed. It may be possible that you are the only station that can communicate with the distressed vessel.

Routine Communication

Calling a vessel on a marine channel is very similar to 2 meters. If using Channel 9, transmit the name of the vessel you want to talk with twice, followed by your station's name twice, and the channel designation. For example: "Fishy Business, Fishy Business, this is Dream Boat, Dream Boat, Channel 9."

Listen for at least 30 seconds before repeating the call. Once you get an answer, direct the station to shift to a "working" channel: "Fishy Business, this is Dream Boat; shift to Channel 69."

In order to avoid confusion on congested channels, FCC rules require you to identify your vessel on each transmission, although some stations shift to a shortened call after the initial contact is established. *The use of 10 codes and "Q" signals is not permitted on marine VHF-FM.*

MF/HF SSB Communications

Vessels that operate further offshore may operate a MF/HF-SSB unit on designated channelized international frequencies. Vessels using a MF/HF radio must also have a VHF-FM radio aboard. A complete list of MF and HF maritime frequencies and assignments can be seen at www.navcen.uscg.gov/?pageName=mtHighFrequency

Many boaters carry HF Amateur Radio aboard. A listing of Amateur Radio maritime nets is on the ARRL Web at www.arrl.org/arrl-net-directory. These nets may also be used to pass emergency traffic. Distress traffic received over MF/HF-SSB should be handled in the same way as on VHF-FM.

NOAA Weather Radio Frequencies

Channel	Frequency (MHz)
WX1	162.400
WX2	162.425
WX3	162.450
WX4	162.475
WX5	162.500
WX6	162.525
WX7	162.550

Channel numbers, e.g., WX1, WX2, etc. have no special significance but are often designated this way in consumer equipment. Other channel numbering schemes are also prevalent.

Source: US Coast Guard: <https://www.navcen.uscg.gov/?pageName=mtVhf>

The NOAA weather radio network provides voice broadcasts of local and coastal marine forecasts on a continuous cycle. The forecasts are produced by local National Weather Service Forecast Offices. Coastal stations also broadcast predicted tides and real-time observations from buoys and coastal meteorological stations operated by NOAA's National Data Buoy Center. Based on user demand, and where feasible, offshore and open lake forecasts are broadcast as well.

Coverage

The NOAA Weather Radio network provides near continuous coverage of the coastal US, Great Lakes, Hawaii, and populated Alaska coastline. Typical coverage is 25 nautical miles offshore but may extend much further in certain areas.

To expand NOAA Weather Radio coverage in the state of Alaska, the National Weather Service (NWS) and U.S. Coast Guard are partnering to establish a network of low-power 5-watt NOAA Weather Radio transmitters at 24 USCG "high" sites located from the Dixon Entrance to Bristol Bay. These low-power transmitters operate on standard NWR frequencies under joint licensing with the NWS. See NWR at USCG Sites in Alaska at www.nws.noaa.gov/om/marine/aknwr.htm.

Locations of coastal NOAA Weather Radio stations are listed on the Station Listing and Coverage page at www.nws.noaa.gov/nwr/coverage/station_listing.html.

Several NOAA Weather Radio transmitters operate as “Marine-Only,” broadcasting marine information on a more rapid cycle than is possible with “All-Hazard” transmitters. These are typically established as part of a cooperative effort between the local marine community and the National Weather Service. For information on how to establish a “Marine-Only” NOAA Weather Radio transmitter in your area, contact the National Weather Service.

Many NOAA Weather Radio receivers are also programmed for three additional frequencies: 161.650 MHz (marine VHF Ch. 21B), 161.775 MHz (marine VHF Ch. 83B), and 163.275 MHz. The first two frequencies are used by Canada for marine weather broadcasts; the latter (163.275 MHz) was used by the National Weather Service for earlier weather broadcasts and later for internal coordination in the event of a power outage, but it is no longer in active use.

Most VHF marine radiotelephones have the ability to receive NOAA Weather Radio broadcasts. However, it is recommended that a separate NOAA Weather Radio receiver be carried aboard so that mariners may maintain a simultaneous watch on NOAA Weather Radio and marine VHF channels.

Audio

Recorded voice broadcasts have been largely supplanted by a computer-synthesized voice. Efforts continue to both expand the coverage of the NOAA Weather Radio network and improve the audio quality. The older computer-synthesized voice was a product of six-year-old technology and has been replaced in response to user demands for a clearer, more human-sounding voice system.

Reference Links

FCC regulatory information

http://wireless.fcc.gov/services/index.htm?job=service_home&id=maritime

US Coast Guard

www.uscg.mil/

Radio Information For Boaters

<https://www.navcen.uscg.gov/?pageName=mtBoater>

Review

Marine radio uses both VHF-FM and MF/HF-SSB. Coastal operations are on VHF-FM, and Channel 16 is the international emergency channel. If you hear an unanswered distress call, you may assist by answering the call and relaying the information to the nearest Coast Guard or local marine patrol office.

Student Activities

Section 5 (Topics 21-26)

NOTE: These activities are for student review only and are not required to be submitted.

Topic 21

1. Describe how you would help a new emergency communications group member deal with stress during an emergency.
2. Develop a list of at least five possible partners jobs that would also require your communication skills and share the list.
3. Build a list of frequencies your local ARES group uses when activated.

Topic 22

1. Describe how you would provide for your own home, family, and health during an emergency.
2. Prepare a personal-needs checklist for yourself.
3. Describe two major disaster threats in your area. For each threat, list five actions you would take as a precaution to protect your home and family.

Topic 23

1. Talk to your local EC and learn who the designated PIO is for ARES in your group or locality. If possible, contact this person and interview him or her as to their duties. Describe the role of the PIO.

Topic 24

1. Develop a list of at least three potential uses for non-ham radios in public service or emergency communication efforts in your area. You may base this on past or potential events. Describe which alternate radio system(s) best meets the need of each situation on your list and explain why.

Topic 25

1. Describe how you would handle the following situation:

You are assisting with damage assessment following a severe weather outbreak, reporting damage and casualties to the local fire and police agencies. Cresting a hill, you see a tank trailer overturned on the road ahead. No one else is around. A variable wind is blowing the leaking fumes in several directions unpredictably. You cannot see the placards on the truck from where you are.

Topic 26

1. If you live within 50 miles of a seacoast, a major navigable river, or any of the Great Lakes, identify the U.S. Coast Guard station nearest to your community and its contact information.