



# RM – 83

## Reference F

# Backcountry Operations

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**Reference F**  
**REFERENCE MANUAL 83**  
**BACKCOUNTRY OPERATIONS**

**A. GENERAL**

- A.1. National Park Service (NPS) Park Managers will reduce the risk of disease transmission to park visitors, partners, and staff while providing opportunities to enjoy experiences in the backcountry. These guidelines are intended for NPS partners and NPS operations to ensure minimum standards for public health are maintained in the backcountry where front country standards are not achievable.
- A.2. All potable water will be obtained from approved public water systems, or obtained from a source known to be free of chemical contamination and appropriately filtered and disinfected or boiled for a sufficient length of time to kill pathogens.
- A.3. Food service will be in compliance with the relevant portions of the United States Food and Drug Administration's (FDA) most current Food Code. Certain changes as described in this Reference Manual are permitted where strict application of the code is not possible, and is in compliance with any rules of the local National Park Service unit.
- A.4. Human waste will be safely disposed of in an approved manner and in compliance with the requirements of the local National Park Service Unit.
- A.5. Backcountry visitors will be informed of known specific vector-borne diseases to which they may be exposed and provided with risk reduction strategies. Activities will be modified as appropriate to reduce the risk of disease transmission.

**B. Definitions**

- B.1. Backcountry Composter: A toilet that promotes aerobic decomposition and stabilization of human waste through the addition of a carbon source (e.g., wood shavings) and moisture. This unit requires regular maintenance to function properly.
- B.2. Backcountry: Determinations of "backcountry" will be made on a park-by-park basis, taking into account the park area's geographic circumstances. Backcountry water and wastewater systems are most often found in areas that are remote from developed areas and are not readily serviceable by motorized vehicles.
- B.3. Certified Food Handler: An individual who has completed an approved food safety training course and successfully passed the certification examination.

Approved courses and exams may be from local and state health departments, or a nationally recognized certification program. The certification must be renewed upon expiration, or if more than three years have passed since the date of issuance.

- B.4. FDA Food Code: Guidelines of the United States Public Health Service Food and Drug Administration regarding the most current guidance and strategies for safeguarding public health and ensuring food is unadulterated and honestly presented when offered to the consumer.
- B.5. Nonpotable Water: Water that is not potable.
- B.6. Potable Water: Water intended for human consumption that is free of chemical contaminants and harmful pathogens.
- B.7. Potentially Hazardous Foods (PHF): A food that requires time/temperature control for safety to limit pathogenic microorganism growth or toxin formation.
- B.8. Vector: an arthropod (e.g. insect, tick, mite) that transfers an infective agent from one host (which can include itself) to another.

## **C. Food**

- C.1. The safe storage, transport, preparation and service of food in the backcountry is quite challenging due to the inherent nature of the environment under which the parks and park partners are operating. Despite these challenges, food service must be in compliance with the relevant portions of the FDA's most current Food Code. Where a strict application of the code is not possible, the changes detailed in C.2. through C.8. are permitted.
- C.2. Food Handlers
  - a. At least one guide on each excursion will be a certified food handler and will be responsible for overseeing the storage, preparation, and serving of food. All guides are encouraged to become certified food handlers.
  - b. No persons who are ill will be allowed to prepare food. If a person has a gastrointestinal illness they will be restricted from food handling and water treatment for 72 hours after symptoms have resolved.
  - c. Guest volunteers will not be allowed to prepare or handle food other than their own. They may be allowed to perform other duties attendant to food preparation.
  - d. Bare hand contact should be minimized with ready to eat food products. Gloves or utensils are strongly encouraged when handling foods that will not be cooked.
  - e. Food handlers will not eat while preparing food.
- C.3. Handwashing

- a. Handwashing setups will be conveniently located near the food area.
- b. Handwashing setups which involve the repeated dipping of hands into the clean water container may not be used.
- c. Foodhandlers will wash their hands immediately before engaging in food preparation, after using the bathroom, and as frequently as needed to prevent contamination of food and utensils.
- d. Water used for handwashing will be as specified in section D.2. or treated with 100 PPM (two teaspoons of bleach per 1 gallon of water) chlorine. If this method is used chlorine test strips will be used to check the concentration.
- e. In extreme circumstances where sufficient treated water is not available, hand sanitizers containing 62% ethyl alcohol will be used per directions after preliminarily washing with untreated water.

#### C.4. Food Storage

- a. Potentially hazardous foods (including raw eggs) will be stored at or below 45°F.
- b. Foods will be stored so that they do not contaminate one another. Whenever possible, raw potentially hazardous foods should be stored in a separate cooler. When this is not possible (e.g. single cooler trips), raw potentially hazardous foods must be stored at the bottom of the cooler in durable leak proof containers. Double bagging is not adequate when storing raw potentially hazardous foods in the same cooler as ready to eat foods.
- c. Menus should be simplified and ingredients selected to minimize the amount of raw potentially hazardous foods that are needed on each trip.
- d. Dry foods will be stored in sealed containers to protect them from moisture and rodents.
- e. Food will be stored separately from cleaning supplies, fuel, human waste receptacles or solid waste receptacles.

#### C.5. Food Preparation

- a. Potentially hazardous food left over from a meal will not be held for re-service.
- b. Potentially hazardous food will not be prepared in advance in the backcountry and then cooled down for later service. All potentially hazardous foods cooked on site will be consumed or discarded within four hours of preparation.

#### C.6. Food Service

- a. Guest handwashing facilities will be available near the food service area. Air drying of hands is acceptable for guests. Individuals involved in preparation or service of food will use clean, disposable paper towels for hand drying.

#### C.7. Facilities

- a. If possible, a tarp will be laid down on the ground before setting up the kitchen to aid in later clean up activities.
- b. Food preparation surfaces will be in good repair without cracks or holes and easily cleanable.
- c. Provide necessary measures to prevent environmental contaminants from affecting the food. This may mean overhead and/or side protection during periods of inclement weather.

C.8. Unused Food

- a. Any food product that has been opened must be discarded at the end of the trip. Non-potentially hazardous items that will be cooked (e.g. pancake batter) and seasonings are exempt from this requirement.
- b. Unopened potentially hazardous foods will be discarded at the end of a trip (i.e., they cannot be taken on more than one trip).

## D. Potable Water

D.1. Filtration and disinfection are both required for the treatment of water unless the water is obtained from an approved public water source or is boiled. It must be emphasized to all backcountry users that nonpotable water is not safe to drink following filtration without disinfection. Failure to add disinfectant after filtration has resulted in a number of illness outbreaks at times affecting hundreds of people.

D.2. There are only three pre-approved methods of providing potable water for drinking and culinary uses:

- a. Potable Water System: Water will be obtained from an approved public water system and will be stored in containers that are free from contamination and are disinfected between every reuse. Disinfection will be provided by placing 2 tablespoons of 6% chlorine bleach in a 5 gallon container of water, mixing and allowing to stand for 30 minutes. The container will then be emptied, rinsed with potable water and then filled with water from the approved public water system.
- b. Boiling: Obtain water from a source free of known chemical contamination and brought to a rolling boil for 1 minute (or 3 minutes for elevations over 6,500 ft).
- c. Filtration and Disinfection: Obtain water from a source free of known chemical contamination, and filtering and disinfecting. Filtering will be through an “absolute” 1 micron filter, or one labeled as meeting the National Sanitation Foundation (NSF) Standard #53 for “Cyst Removal”. The filtration must be followed by disinfection. If a chlorine residual test kit is available, add drops of unscented 6% chlorine bleach until a strength of at least 1 mg/l is achieved. If no test kit is available, add 8 drops of chlorine bleach per gallon of water. Mix and let stand for at least 30 minutes before drinking.

- D.3. Alternative disinfection methods must be approved by the Public Health Consultant. Use of ultraviolet light as an alternative to adding disinfectant will not be approved. Elevated turbidity in the water can prevent the U.V. light from properly penetrating the water and can result in inadequate pathogen kills.

## **E. Human Waste**

- E.1. All human waste will be disposed of in an approved manner. Approved methods must conform to local NPS policy which may include one of the methods outlined below. Contact a local park ranger or other official representative of the park for site specific disposal requirements. Whenever there is human access into the backcountry, the problem of safely disposing of fecal waste must be addressed. In all cases, appropriate measures will be taken to protect the health of visitors and staff by minimizing risk of disease transmission as well as protecting park resources.
- E.2. The preferred option for human waste disposal is always to use permanent facilities provided by the park. These are most often located in high use or environmentally sensitive areas. Failure to use these facilities can result in significant degradation of park resources. This manual will not discuss permanent structures; those are covered in the DO RM83 B ([http://www.nps.gov/public\\_health/intra/index.htm](http://www.nps.gov/public_health/intra/index.htm)).
- E.3. There are several methods by which the NPS allows backcountry fecal waste to be collected and disposed of. Allowable methods depend on the National Park Service Unit and may differ within the park depending upon which area you are traveling. Methods of handling human feces in the backcountry can be divided into two categories: Collection/Removal and On-Site Disposal.
- E.4. Collection/Removal alternatives will be used in parks that have either high visitation and/or poor soil for fecal decomposition in the backcountry and can not sustain the On Site Disposal method. This is typical of high alpine and mountainous areas where there is little soil available and the decomposition is slow, but may also include other areas such as along rivers. There are basically three types of methods for removal:
- a. **Bag Containers:** Bag containers may only be used for the collection and disposal of fecal matter when a formal collection system is implemented by the park, or a commercially available product approved for disposal in landfills is used.
    1. Where park units have established a collection system, plastic bags are collected from those who have visited the backcountry and deposited in specially labeled containers (55-gallon drums). The drums are sealed and removed from the backcountry via pack animal or motorized device. The bagged wastes are then collected, labeled, and transported to a licensed and inspected facility for proper disposal.

2. Commercially available bagged waste receptacles such as the “Rest Stop” and “Wag Bag” are also approved for use in the parks. These bags contain an absorbent material that absorbs all the liquid much like a diaper and can be disposed of in landfills. No special handling procedures are required; licensed disposal of this waste is allowed as long as there is no free flowing liquid.
  - b. Simple Containers: Simple containers include pickle pails (5-gallon buckets with tight fitting lids) rocket boxes (20-mm ammo cans), scat packer, brief relief, and clean mountain cans. The pickle pails and rocket boxes are common devices seen on the river trips in Grand Canyon National Park and Cataract Canyon in Canyonlands National Park. Another alternative is the clean mountain cans recently developed and used in Denali National Park and Preserve by mountaineers. The full containers are typically transported to a central site and then dumped into a septic tank/wastewater treatment plant for final treatment and disposal. Any container must be sealable and able to be easily emptied, cleaned and sanitized for use on the next trip.
  - c. Complex Containers (Backcountry Composter): Fecal matter is deposited in the container and the user is required to add moss, sawdust or other organic carbon source to help with decomposition. The primary function of the composting unit is to put the fecal material in a form that is more easily transported. Once the units are 2/3rds full, the material is removed from the container or the entire container is removed via helicopter for disposal in a permitted landfill or wastewater treatment facility. The containers are washed and sanitized prior to reuse. This option is very high cost and labor intensive but is important for high use areas where very few alternatives are available.
- E.5. On Site Disposal (Cat Holes) may only be used if approved by the park. The site used for disposal will be located at least 100 feet (30 meters) from freshwater in an inconspicuous site not traveled frequently by people. The area should be elevated where water would not pool during storms, where adequate soil is available, and preferably in an area that receives maximum sunlight. Excavate a hole that is at least 6 inches (15 centimeters) deep and 4 inches (10 centimeters) in diameter. Deposit and cover the fecal material with soil and other native materials. Decomposition of fecal matter is increased if it is mixed with the soil, this can be accomplished with a stick. Toilet paper is slow to decompose and may be dug up by animals, therefore some backcountry operations require users to collect toilet paper in a separate container and carry it out for disposal, especially in arid areas. If this is required, make sure to place used toilet paper in a bag without touching the outside of the container.
- E.6. Urine should be disposed of in a permanent facility if available. However, if one is not available, pick an area at least 100 feet (30 meters) from freshwater and in an inconspicuous site not traveled frequently by people. Urinate on rocks, pine needles, or gravel, as animals are less likely to be attracted to these areas and

defoliate plants or dig up soil because of the salts in the urine. If allowed by the park, urination directly into a river with a high flow of water may be the preferred alternative.

- E.7. It is extremely important for users to wash hands with soap and water after each use. If handwashing facilities are not available hands may be cleaned with disposable hand wipes or hand sanitizer.

## **F. Vector-Borne and Zoonotic Diseases**

- F.1. Backcountry visitors have an increased risk of exposure to potential disease causing vectors. In order to reduce risk to the park visitors, partners, and staff in the backcountry, the park unit will:
- a. Communicate to backcountry users the vector-borne diseases that may be prevalent in and around the park. Contact the Public Health Consultant (PHC) for assistance.
  - b. Establish lines of open communication – this may simply consist of open communication between backcountry users and park staff to identify areas of concern, including, but not limited to: high mosquito population, rodent infestation, and die-off of rodents.
  - c. Provide appropriate risk reduction strategies to backcountry visitors, partners, and staff. Additional information may be obtained from RM83G ([http://www.nps.gov/ncro/Public\\_Health/inter/info/rms/rm83g.pdf](http://www.nps.gov/ncro/Public_Health/inter/info/rms/rm83g.pdf)).
- F.2. Risk Reduction Strategies
- a. Mosquito-Borne Diseases
    1. Wear long sleeved shirts and pants, particularly in the morning and evening hours when mosquitoes are most active.
    2. Use of an insect repellent containing DEET, Picaridin, or oil of lemon eucalyptus is effective against mosquitoes and should be used during periods of high mosquito activity.
    3. Avoid campsites that have high mosquito populations or are near areas of stagnant waters.
  - b. Plague
    1. Closure or modified use of high risk area.
    2. Surveillance for plague activity in rodent populations by public health workers, citizens reporting rodents found sick or dead, or surveys by biologists.
    3. Apply insect repellents containing DEET or Picaridin to clothing and skin, according to label instructions, to prevent flea bites if you anticipate being exposed to rodent fleas.
  - c. Tick-borne diseases
    1. Wear light-colored clothing to allow you to see ticks crawling on your clothing.



2. Tuck pant legs into socks so that ticks cannot crawl up the inside of your pants legs. The use of tall rubber boots may also provide additional protection.
  3. Apply insect repellants containing DEET or Picaridin to discourage tick attachment.
  4. Remove any tick you find on your body. Parents should check their children for ticks, especially in the hair, when returning from potentially tick-infested areas.
- d. Hantavirus
1. Avoid touching live or dead rodents or disturbing rodent burrows, dens, nests, or droppings.
  2. Do not use cabins or other enclosed shelters that are potentially rodent-infested until they have been appropriately cleaned and disinfected. To disinfect, spray rodent contaminated areas with a disinfectant or chlorine solution and wait 10 minutes before beginning cleanup.
  3. Do not pitch tents or place sleeping bags in proximity to rodent feces or burrows or near possible rodent habitat (e.g., dense brush or woodpiles).
  4. Keep food and trash in rodent-proof containers.
- e. Rabies
1. Prevent exposure to all animals, but especially sick or aggressive animals. Wild animals should not be handled, fed, or unintentionally attracted with open containers or litter.
  2. Since bat bites and scratches are difficult to detect, anyone who has slept in a cabin or other sleeping quarters where a bat was found should seek post exposure prophylaxis as soon as possible, within 10 days of the expected exposure, unless the specific bat can be safely captured and tested for rabies.
  3. After any potential exposure to a potentially rabid animal, wash the wound thoroughly with soap and water, and seek medical attention as soon as possible. The following information will be collected if possible to assist in assessment of risk:
    - a. The geographic location of the incident
    - b. The type of animal that was involved
    - c. How the exposure occurred
    - d. Whether the animal can be safely collected and tested for rabies

## **G. Illness Reporting**

- G.1. The trip leader will complete a separate Gastrointestinal Illness (GI) Report Form for each person who becomes ill with a gastrointestinal illness on a trip. The forms will be submitted within the appropriate time frame described below to the park concession specialist by all commercial visitor services or to the park superintendent by all other trips. All reported GI illnesses with documentation will be forwarded by the park to the Public Health Consultant immediately.

## G.2. Reporting timeframe

- a. If 1 or 2 persons (passengers or employees) experience any gastrointestinal illness during a trip, the illnesses and GI Report Form will be reported to the NPS at the end of the trip.
- b. If 3 or more persons (passengers or employees) experience any gastrointestinal illness during a trip, the trip leader must do the following:
  1. Complete a GI Form at the time of illness for each person who becomes ill.
  2. Notify NPS within 24 hours of the illnesses and include the following information:
    - Illness symptoms
    - Dates and times of illness onset
    - Suggestions as to the cause of the illness
    - Trip itinerary
    - Water treatment (includes sources and treatment)
    - Specific menu (includes snacks and beverages) for the entire trip
    - Food suppliers
    - Passenger manifests with contact information
    - If there was any illness at the company prior to the trip
  3. Submit all GI Forms to NPS at the end of the trip.
- c. If a complaint is received after a trip from a client or employee that a gastrointestinal illness occurred following a trip that they suspect was related to the trip, a GI Form will be filled out and forwarded to NPS

## H. FURTHER INFORMATION

1. NPS Public Health Program – Intranet Site  
([http://www.nps.gov/public\\_health/intra/index.htm](http://www.nps.gov/public_health/intra/index.htm))
2. NPS Public Health Program – Internet Site  
([http://www.nps.gov/public\\_health/index.htm](http://www.nps.gov/public_health/index.htm))
3. Public Health Consultants – Intranet Site  
([http://www.nps.gov/public\\_health/intra/admin/personnel.htm](http://www.nps.gov/public_health/intra/admin/personnel.htm))
4. Public Health Consultants – Internet Site  
([http://www.nps.gov/public\\_health/inter/admin/map.htm](http://www.nps.gov/public_health/inter/admin/map.htm))
5. The Center for Disease Control and Prevention’s Division of Vector-Borne Infectious Disease  
(<http://www.cdc.gov/ncidod/dvbid>)
6. Food and Drug Administration’s (FDA) Food Code.  
(<http://www.cfsan.fda.gov/~dms/foodcode.html>)
7. State and Local Health Departments  
(<http://www.cdc.gov/mmwr/international/relres.html>)