Chapter 15
Waste Handling In The Field

In general, everything taken into the field must be brought out. This includes used food containers, empty fuel drums, toilet paper, urine, human solid waste, used dish water, and everything else that is brought into the field. There are a few specific situations where human waste may be disposed of in the field (see section 15.1).

15.1 Human Waste Management

The NSF's Policy on Management of Human Wastes in Antarctica at Field Locations states the following:

> There will be no discharge of human waste to ice-free areas or freshwater systems either directly onto the land or into any pits, trenches, or similar devices. All human waste will be disposed of in such a way that it is either discharged directly to the sea or containerized for retrograde. Treatment to reduce the volume of waste through the use of composting toilets or similar devices is to be encouraged at fields camps with extended occupancy.

Everything brought into the field must be removed, including human waste. There are two environments where personnel are allowed to dispose of human waste in the field: marine environments and glacial environments.

15.1a Human Waste Disposal in Marine Environments

USAP personnel working in marine environments may dispose of human waste and domestic liquid waste, or gray water, directly into the sea. Waste must be dumped directly into the water, but not at the tidal zone. All other waste must be collected for disposal at McMurdo, Palmer, or on a research vessel.

15.1b Human Waste Disposal in the Accumulation Zone of Glaciers

USAP personnel working in field camps situated in the accumulation zone of glaciers (i.e., in snow covered areas), may dispose of human waste and gray water into the snow. All other waste must be collected for disposal at McMurdo, Palmer, or on a research vessel.

15.1c Human Waste Disposal in All Other Environments

In all other field environments, USAP personnel must collect solid human waste, urine, and gray water and return them to McMurdo, Palmer Station, the research vessel, or Punta Arenas, Chile. Solid human waste collected in ziplock bags may be placed in 20 gallon poly containers. A small number of urine bottles may also be placed in the 20 gallon poly container, provided the total volume of liquid in the container does not exceed approximately one gallon. These containers are incinerated in the U.S. and cannot have large amounts of free liquids.

Unbagged human waste may also be collected in 55 gallon drums, along with urine and gray water. Please do not put plastic bags or other materials into solid waste/urine/gray water drums, as these drums are dumped into wastewater treatment plants in the U.S., and the plants cannot process plastic materials. Groups that are moving field locations frequently may use 5 gallon poly containers in place of 55 gallon drums for urine, gray water and unbagged human waste. All containers must be marked as GRAY WATER, URINE, and/or HUMAN WASTE, as appropriate.

15.1d Human Waste Containers

In McMurdo, the human waste containers are available from the BFC. Personnel working in an area of the Peninsula that does not allow seawater access must use human-waste containers and retrograde the waste at the end of the season. Human waste containers will be provided with your field equipment from Punta Arenas.

All personnel doing day trips in the field must pack-out all human waste. Pee bottles and ziplock bags are used for this purpose and are available at Palmer Station.

15.2 Hazardous Waste Management

Hazardous waste procedures are the same for the entire USAP program. All hazardous waste is returned to the states by vessel. Hazardous wastes encountered in field settings generally fall into the following categories:

Operational Hazardous Waste: Contaminated, used, and excess fuel, oil, glycol, etc. must be retained in or returned to the original container, if possible. If the wastes are in the original container, they may have a drum tag already attached. The tag must be completed, signed, and returned with the waste.

Laboratory Hazardous Waste: All laboratory wastes are considered hazardous and must be segregated and labeled. This category includes reagents, mixtures, laboratory glass, plastic (including gloves, vials, pipettes, and bench liners), debris, biological wastes, and sharps. This category does not include radioactive and highly toxic lab wastes.

Chemical Wastes: Small-volume chemicals are packed in the original containers and labeled as HAZARDOUS WASTE. A Hazardous Waste Identification Sheet (HWIS) must accompany the wastes. Mixtures must have the "recipe" on the container and HWIS.

Radioactive Waste: Special handling and documentation are required for radioactive waste. Generators of radioactive wastes are required to attend a briefing prior to generating any Low-Level Radioactive Waste (LLRW) or using radioisotopes. Guidance on specific procedures for segregation, collection, and documentation of radioactive wastes are provided at the briefing.

Highly Toxic Waste: All wastes contaminated with highly toxic chemicals, carcinogens, mutagens, and poisons (e.g., osmium tetroxide, potassium cyanide, etc.) must be segregated, clearly labeled, and turned

over using the HWIS Standard Operating Procedure.

Other Hazardous Wastes: Other hazardous wastes include batteries of any kind, aerosol cans (full or empty), and fluorescent light bulbs.

15.2a Hazardous Waste Containers

Fuel and other hazardous products that are contained in drums are issued to the user with a tag. This tag is a simple form that enables the USAP to track the use of these hazardous products easily from start to finish. Once the drums are issued to the user, he/she must accept responsibility for them and complete the remainder of the tag, before returning the partial or empty drum to McMurdo, Palmer, Punta Arenas, or a research vessel. .

15.2b Using Drum Tags to Mark Hazardous Waste

Tags are used for hazardous waste; however, the tags are not to be pre-attached to hazardous waste accumulation drums. Field personnel are responsible for attaching the tags when the drum begins active accumulation of hazardous wastes.

- CHECK “OTHER” when the drum begins active accumulation of hazardous wastes, in the field.

- COMPLETE the S-EVENT/PROJ CODE, LOCATION, and DATE OUT blocks on the front of the drum tag.

- CHECK the “OTHER” space in the container use information section and indicate the specific hazardous waste being collected. The tag serves as the proper label of the container.

- RADIOACTIVE WASTE also requires documentation on waste profile sheets.

15.2c Notes on Premix

If a drum of mogas is converted to Premix by the addition of 2-cycle oil, the tag must be replaced by the person preparing the premix. The shaded PREMIX block must be checked off with indelible ink marker. S-EVENT/PROJ CODE, LOCATION, and DATE OUT must also be completed by the person preparing the premix.

15.3 Hazardous Waste Spill Response

Any amount of hazardous material spilled on the ground must be cleaned up. All personnel deploying to a field site must be prepared to clean up potential spills. To be prepared, all USAP personnel going into the field must:

- Be equipped with a spill-response kit.
- Know how to clean up a spill.
- Know to whom to report a spill.
- Be prepared to record the GPS coordinates of any spill.

15.3a Spill Response in the McMurdo System

Spill response training is provided to researchers during the Field Safety Training Program. Spill kits are made available to researchers by the BFC; however, it is each science group's responsibility to make sure they have a kit with them in the field. Permanent camps and large deep-field camps are equipped with spill response kits for use in the camp.

All spills, no matter what size, must be reported to the Firehouse in McMurdo. Field personnel may report spills via radio communication to the Field Operations Communication Center (FOCC) ("Mac Ops") and ask them to pass the information to the Firehouse.

Large spills may require outside assistance. McMurdo has a spill- response team in place for these potential situations.

15.3b Spill Response in the Peninsula System

Spill response information will be sent to personnel deploying to field camps in the Peninsula area that are not directly supported by Palmer Station. Researchers working in these types of camps are responsible for ensuring that all personnel in their group fully understand the spill response measures. Spill kits are provided by the contractor and should be requested on the SIP. If communication with Palmer Station is possible, any spill reports must be passed to the Palmer Station

Manager. If communication with Palmer is not possible, retain the information and pass it to the NSF when you have redeployed.

Personnel working at Palmer Station will receive spill-response training from station personnel once on site. Spill kits are available at the station. All spills at Palmer or the surrounding islands must be reported to the Palmer Area Manager.

15.3c How to Remediate a Small Spill

- Contain the spilled material using sorbents, snow, dirt, or some other media capable of holding in liquids.

- If feasible and safe, absorb the spilled material using sorbents from local spill kits or, if the spill is on snow, shovel the snow up and place into 20-gallon polys or plastic bags to be disposed of at station.

- Report the spill, however small, during your next radio check-in.

15.4 The McMurdo Waste System

Since the annual resupply vessel returns to the U.S. after delivery, the USAP is able to retrograde waste via the vessel every year. Recycling and segregation of waste are key to the program, and all field personnel are required to fully cooperate with the system and segregate waste in the field. There is no exception to this

rule. Everyone deploying to McMurdo and/or outlying locations must attend a Waste Management Briefing. Researchers will receive information on the briefing times from the NSF Representative upon arrival in McMurdo.

Segregating is a fundamental part of waste handling in McMurdo. Glass, metal, aluminum, plastic, and cardboard are the typical categories that small field groups deal with. In the field, waste must be separated into plastic bags separately, and each bag must be labeled with the science group number.

Personnel working in the Dry Valleys will typically return waste to McMurdo using resupply helicopter flights. Waste that has not been properly cleaned and separated will be staged for personnel to deal with upon their return from the field.

15.4a Segregating and Labeling Waste Bags in the McMurdo System

Collect waste into separate bags according to the categories below, and label each bag with your science or event number and the appropriate waste category.

- **Glass:** All food-contaminated glass jars and cans must be cleaned before they can be disposed. Gray water from doing dishes or snow, and a rubber spatula can be used by tent campers to easily clean cans and jars after each meal.
- **White Paper**
- **Aluminum Cans Only**

- **Light Metal:** includes any metal less than 1/8 inch including banding and tin cans. Tin cans must be clean with both ends cut off and flattened.
- **Heavy Metal**
- **Cardboard**
- **Wood**
- **Burnable Food Waste:** includes food waste, all other burnable items, and food-contaminated waste.
- **Construction Debris:** includes dormitory products (product containers) and construction debris.
- **Vermiculite:** is reused unless contaminated with hazardous waste If it is contaminated, follow the hazardous waste procedures.

15.4b Environmental and Waste Procedures in the Dry Valleys

The Dry Valleys contain geological and biological features that date back thousands to millions of years. Many of these ancient features could be easily damaged by human actions; therefore, visitors must have as little impact as possible. Personnel working in the Dry Valleys will be given a complete copy of the NSF document titled *Environmental Code of Conduct for Field Work in the McMurdo Dry Valleys*. The following is a summary of the document.

Do not:

- Urinate or defecate into the environment.
- Disturb any natural feature.

- Slide down scree or sand dunes.
- Mark on rocks.
- Collect rocks and fossils except for scientific and educational purposes.
- Use explosives on lakes.
- Leave anything frozen into the lake that can ablate and cause contamination.
- Swim or dive in the lakes.
- Walk in or close to stream beds.
- Disturb mummified seals or penguins
- Leave any travel equipment behind (e.g., ice screws, pitons).
- Build cairns.
- Leave markers or equipment for more than one season without labeling.
- Damage delicate rock formations.
- Use chemical-based fluids on glacial ice.

Do:

- Use a urine bottle for urine and ziplock bags for feces
- Pack-in/ pack-out.
- Report all spills.
- Obtain a spill kit and know how to use it.
- Use a spout to pour fuel.
- Use vehicles only on snow and ice surfaces.
- Travel only on established trails whenever possible.
- Camp far away from lake shores and stream beds.
- Reuse old campsites when possible.
- Secure equipment at all times to keep wind from blowing it away.

- Clean all sampling equipment to avoid cross-contamination between lakes.
- Use solar and wind power as much as possible.
- Remove all waste.
- Use fixed helicopter pads.
- Take steps to prevent the accidental release of chemicals and isotopes.
- When permitted to use radioisotopes, precisely follow all instructions.
- Use a drip pan when changing vehicle oil.
- Keep sampling holes clean and secure all equipment.
- Back fill soil pits to prevent wind erosion.
- Collect the minimum sample of endolithic community required for analysis.
- Minimize the use of liquids on glacial ice to avoid contaminating the record.

15.5 The Peninsula Waste System

USAP personnel working in the Antarctic Peninsula area are required to remove all waste from the field. However, because of the difficulties of moving waste between countries, the program disposes non-hazardous waste in Chile. There is no recycling program in place; therefore, waste is simply collected for disposal .