6. HEALTH AND SAFETY

Storm water sampling activities may occur when the sampling environment and/or storm water discharges create hazardous conditions. Hazardous conditions associated with sampling include:

- Hazardous weather conditions (e.g., wind, lightning, flooding, etc.)
- Sampling in confined spaces (e.g., manholes)
- Hazards associated with chemicals
- Biological hazards (e.g., rodents and snakes)
- Physical hazards (e.g., traffic, falling objects, sharp edges, slippery footing, and the potential for lifting injuries from opening or removing access panels and manhole covers, etc.)

It is essential that sampling personnel be aware of these hazards. Sampling personnel should be trained to evaluate potentially hazardous situations and develop ways for handling them. Since sampling hazards can be life threatening, safety must be the highest priority for all personnel. This chapter outlines general health and safety issues and concerns. Additional references discussed below should be consulted for more specific guidance to avoid adverse health and safety situations.

6.1 GENERAL TRAINING REQUIREMENTS

Preparation and training of all sampling personnel should be completed before beginning any sampling task. Extreme care should be taken to allow for safety precautions including proper equipment and appropriate operational techniques, sufficient time to accomplish the task, training on potential hazards, and emergency procedures. EPA's Order 1440.2 sets out the policy, responsibilities, and mandatory requirements for the safety of personnel who are involved in sampling activities. This order, which is found within the EPA NPDES Compliance Monitoring Inspector Training: Sampling manual, provides further guidance to applicants' storm water sampling personnel. Basic emergency precautions include having access to both local emergency phone numbers and communication equipment (i.e., phones or radios), and ensuring that personnel are trained in first aid and carry first aid equipment.

6.2 NECESSARY SAFETY EQUIPMENT

Exhibit 6-1 contains a list of safety equipment that may be appropriate depending on the characteristics of the sampling site.

EXHIBIT 6-1. LIST OF SAFETY EQUIPMENT	
Flashlight	18-inch traffic cones
Meters (for oxygen, explosivity, toxic gases)	Insect/rodent repellant
Ladder	Ventilation equipment
Safety harness	50 feet of 1/2-inch nylon rope
Hard hat	Safety shoes
Safety goggles	Rain wear
Coveralls	Gloves (rubber)
Respirator	First aid kit
Reflective vests	Self-contained breathing apparatus
Source: Adapted from NPDES Compliance Monitoring Inspector Training: Sampling, U.S. EPA, August 1990.	

6.3 HAZARDOUS WEATHER CONDITIONS

Common sense should dictate whether sampling be conducted during adverse weather conditions. No sampling personnel should place themselves in danger during high winds, lightning storms, or flooding conditions which might be unsafe. Under extreme conditions, a less hazardous storm event should be sampled.

6.4 SAMPLING IN CONFINED SPACES

Confined spaces encountered by storm water sampling personnel typically include manholes and deep, unventilated ditches. A confined space is generally defined as a space that is somewhat enclosed with limited access and inadequate ventilation.

The National Institute of Occupational Safety and Health (NIOSH) has developed a manual entitled "Working in Confined Spaces" which should be consulted prior to confined space entry. Also, several

States have developed specific procedures which should also be consulted. Unless they have been trained for confined space entry, sampling personnel should avoid entry under all circumstances.

6.4.1 HAZARDOUS CONDITIONS IN CONFINED SPACES

Confined spaces pose a safety threat to sampling personnel because of low oxygen, explosivity, and toxic gases. When entering a confined space, a qualified person should ensure that the atmosphere is safe by sampling to test for oxygen levels, potential flammable hazards, and toxic materials known or suspected to be present. If atmospheric conditions are detected, the confined space should be ventilated or sampling personnel should use a self-contained air supply and wear a life line. At least one person should remain outside of the confined space in the event that problems arise. If atmospheric testing has not been properly conducted, the confined space should not be entered. Manholes can also pose a threat to safety because of the small confined area, slippery surfaces, sharp objects, unsafe ladders, etc.

6.4.2 SPECIAL TRAINING REQUIREMENTS

Personnel should not enter into a confined space unless trained in confined space entry techniques. Such training covers hazard recognition, the use of respiratory equipment and atmospheric testing devices, use of special equipment and tools, and emergency and rescue procedures. In addition, at least one member of the sampling crew should be certified in basic first aid and Cardiopulmonary Resuscitation (CPR). Sampling personnel should, on an annual basis, practice confined space rescues.

6.4.3 PERMIT SYSTEM

If entry into a confined space is necessary, an entry permit system should be developed which includes a written procedure. This permit should include, at a minimum:

- Description of type of work to be done
- Hazards that may be encountered

- Location and description of the confined space
- Information on atmospheric conditions at confined space
- Personnel training and emergency procedures
- Names of sampling personnel.

The manual developed by NIOSH discusses this permit system in more detail. Furthermore, the Occupational Safety and Health Administration (OSHA) proposed a rule on June 5, 1989 (54 FR 24080) that would implement a permit system. The rule is expected to be finalized and published late in 1992.

6.5 CHEMICAL HAZARDS

Sampling personnel can also be at risk of exposure to hazardous chemicals—either chemicals in the actual storm water discharge or the chemicals that have been placed in the sample collection containers for sample preservation. Therefore, direct contact with the preservatives and the storm water (if hazardous chemicals are suspected to be present) should be avoided. Sampling personnel should wear gloves and safety glasses to avoid skin and eye exposure to harmful chemicals. Sampling personnel should be trained to avoid exposure and instructed as to what to do if exposure occurs (e.g., flush the eyes, rinse the skin, ventilate the area, etc.).

6.6 BIOLOGICAL HAZARDS

Storm water sampling personnel may also encounter biological hazards such as rodents, snakes, and insects. The sampling crew should remain alert to these hazards. As mentioned in Section 6.2, necessary sampling equipment, for certain locations, should include insect/rodent repellant and a first aid kit.

6.7 PHYSICAL HAZARDS

The sampling crew should be aware of a number of physical hazards that could cause accidents at the sampling site. These hazards include traffic hazards, sharp edges, falling objects, slippery footing, and lifting injuries from removing manhole covers. Sampling personnel should pay close attention in order to prevent these safety hazards at all times.

If the sample point is in a manhole, a street gutter, or ditch near the street, particular attention must be given to marking off the work area to warn oncoming traffic of the presence of the sampling crew. Traffic cones, warning signs, and barricades should be placed in appropriate places around the sampling point.