

FESHM 4210: ENVIRONMENTAL BIOLOGICAL HAZARDS AT FERMILAB

Revision History

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1.0 INTRODUCTION

Hazards associated with plants, animals, and microorganisms are usually neglected since the risks are deemed acceptable and the exposures are considered non-industrial. However, poison ivy is the major cause of occupational dermatitis and bee and wasp stings are common and potentially life threatening. Microorganisms causing tetanus and legionnaire's disease are also found in the environment. This chapter describes procedures for coping with biological hazards at Fermilab.

2.0 RESPONSIBILITIES

2.1 Division/Section/Project (D/S/P) Heads

D/S/P Heads will ensure the requirements of this chapter are fulfilled.

2.2 Supervisor

Identify potential worker exposures implement necessary controls. Supervisors have a key role in assuring that their workers adhere to requisite behaviors.

2.3 ES&H Section

Work with division/sections/projects, the Medical Office, and potentially exposed personnel in assessing exposures, designing controls, training, and providing signs and labels. Assist affected divisions/sections in providing technical advice in this chapter, assessing exposures, designing controls, training, and providing signs and labels.

2.4 Medical Department

Screen potentially exposed personnel. Work with potentially exposed personnel, their management, and ESH staff to limit exposures.

2.5 Employee

Assist in identifying potential exposures and in implementing any necessary controls. Adhere to requisite safety behaviors.

3.0 PROCEDURES

Medical screening is conducted routinely prior to employment, periodically as prescribed by the Fermilab Occupational Medical Office (FOMO), and upon internal transfer. Persons at significant risk of exposure to biological hazards shall be screened by FOMO for special sensitivities (allergies) and shall receive appropriate guidance in the recognition and control of these hazards. Guidance in hazard control should include formal training but shall, as a minimum, include precautionary instructions from supervisors.

Pets, other than guide dogs, are not permitted in the interior of buildings. Specific exception may be made on a case-by-case basis for other buildings by the division/section head responsible for the building. At their discretion, division/section heads may also exclude pets from certain outdoor areas in order to protect property or equipment under their management. Pets are permitted in other areas but must be kept under control so as not to interfere with people or endanger wildlife. Questions about pets in the on-site housing should be addressed to the Housing Office.

3.1 Poison Ivy

Poison Ivy is a woody perennial that may be either a low shrub or a vine or shrub growing high into trees. It is found throughout Fermilab in open woods, fencerows, thickets, orchards, shrub beds and along buildings. All parts of this plant contain a poisonous material that may cause blistering of the skin.

3.1.1. Identification

Leaves are trifoliate consisting of 3 large shiny leaflets each 2 to 4 inches long, pointed at the tip. Leaflet edges may be either smooth or irregularly toothed. The flowers are small, green, 5-petaled, borne in a head of 1 to 3 inches long. Berries are small, white, round, and hard.



The plant changes from a bright green to a red or reddish-yellow in fall coloration. This is a variable species, not only in habit of growth, but also in leaflet shape, rooting habit, pubescence on leaves, petioles and fruit.

3.1.2. Routes of Exposure & Symptoms

Burning any part of the plant will result in the dispersion of droplets of toxin in the smoke, exposing lungs, eyes, and skin that could result in serious illness. Ingestion may cause serious stomach upset; inflammation of the mucous and alimentary canal membranes and death.

Skin irritation, also known as contact dermatitis, may be observed by those exposed to the oils in the plant during any season. The dermatitis is manifested as reddened itchy skin, which sometimes blisters. In a few days, the blisters become crusted and may take 10 days or longer to heal. If the reaction is severe or worsens, seek medical attention.

Re-exposure through contact with contaminated clothing or work implements is a hazard. The plant toxin combines with skin proteins immediately; washing will not prevent the reaction but can reduce the potential for re-exposure by removing residual amounts of surface toxin. Protective clothing should cover potentially exposed skin area. Persons experiencing a skin rash or itching due to poison ivy exposure should report to Medical, or the Fire Department after hours.

3.2 Stinging Insects

Bees, wasps, and hornets may be found throughout Fermilab. Their nests may be found in or on buildings, structures, trees, shrubs and in the ground. If bee, wasp or hornet nests need to be controlled contact the Facilities Engineering Services Section, ext.3303 or your local building manager. They have a pest control subcontractor under contract to handle these problems. To control individual insects, “Bee/Wasp Insecticide” FNAL stock #1950-1010 is available from the FNAL stockroom. Follow the manufacturer's instructions when using this product. It is a violation of Federal Law not to use insecticide according to the label instructions.

Reactions to stings can range from mild swelling to severe reactions. All stings should be reported to Medical immediately. Persons sufficiently sensitized (previously stung) may experience a potentially fatal whole-body allergic reaction. Some people are allergic to bee stings. For them, a sting can be fatal if it leads to anaphylactic shock, which causes a disruption to breathing and circulatory systems. If a sting is followed by a severe reaction such as inability to breathe or swallow or feeling faint, seek medical attention immediately- if onsite, call x3131, report to Medical, or the Fire Department after hours.

3.2.1. Minimize the Chance of Stings

Stinging insects are attracted by:

- Scented cosmetics, soaps, shampoos and detergents
- Fruit odors, sweets and alcohol
- Wasps and hornets are attracted by odors of meat and grease. The scent of food and the odor of meat or grease on a person's lips or fingers can provoke an attack.
- Brightly colored clothing

3.3 Mosquitoes

Several mosquito species are known or suspected to transmit a group of viruses that can cause illness in humans, such as West Nile Virus, Chikungunya, Malaria, or Dengue Fever. These viruses can cause inflammation of the spinal cord or brain, or cause rash, fever, joint pains, or flu like illnesses. Although outbreaks are uncommon, some caution should be exercised by outdoor workers to minimize the risk of contracting a virus.

3.3.1. Preventing Mosquito Bites

Employees working in or near mosquito breeding areas; habitats such as swamps, ditches, culverts, temporary pools or other sources of standing water, should take measures to prevent mosquito bites. When weather allows, wear long sleeved shirts and long pants to cover exposed skin. Apply mosquito repellent to open skin and clothing, as recommended by the

repellent manufacturer. Currently, the stock system carries mosquito repellent under stock #1950-0500.

Environmental Protection Agency (EPA)-registered insect repellents are proven safe and effective, even for pregnant and breastfeeding women. Use an EPA-registered insect repellent with one of the following active ingredients:

- DEET
- Picaridin
- IR3535
- Oil of lemon eucalyptus (OLE)
- Para-menthane-diol (PMD)
- 2-undecanone

All unusual skin/nerve reactions to mosquito bites should be brought to the attention of the medical staff.

3.4 Mites, Chiggers, & Ticks

Mites, chiggers, and ticks are parasites that commonly attach to persons working in tall grasses or wooded areas. The bite is typically at points of clothing restriction. The bite may be innocuous or may cause itching. In most cases, secondary infection occurs.

3.4.1. Tick Bites

Following a tick bite, if the tick is not removed completely, or is left feeding for several days, tick paralysis may occur due to a neurotoxin injected by the tick. This toxin acts upon the spinal cord, causing incoordination and paralysis. In the event of any tick bite, immediately report to Medical to rule out Lyme Disease or Rocky Mountain Spotted Fever. Consider the following when removing a tick:

- Remove the tick as soon as possible using tweezers or a tick removing tool.
- Grasp the tick as close to the skin as possible in order to grab the head and slowly pull upwards with even pressure. Do not twist or jerk the tick, as mouthparts left behind can cause local infection.
- If you're unable to remove the mouthpart, leave it alone and let the skin heal.
- DO NOT attempt to remove the tick with heat or by "painting" the tick with nail polish or petroleum jelly. You should remove the tick as quickly as possible; do not wait for it to detach.
- Wash the bite area (with soap and water or rubbing alcohol) and apply antiseptic. Monitor the bite spot for several weeks. If you experience mild to moderate illness such as achiness, stiff neck, headache, flu like symptoms, or start to develop a red bullseye like rash around the bite area, medical attention should be sought immediately- if onsite call x3131, report to Medical, or to the Fire Department after hours.

3.4.2. Chiggers

Chiggers are tiny wingless mite larvae which are found in tall grasses and weeds. Their bites can cause severe itching. First aid for chiggers focuses on reducing discomfort and preventing infection:

- The affected area should be kept clean by washing with soap and water.
- Do not scratch the wounds.
- If signs of infection occur, consult with a physician.

3.5 Spiders

Spider bites typically cause localized reactions such as swelling, pain, and redness. For those allergic or bitten by certain species such as a Black Widow or Brown Recluse, symptoms experienced may be more serious.

3.5.1. Brown Recluse Spider

The Brown Recluse Spider (also called the Fiddle-Back Spider) is a spider having a violin shaped mark on the dorsal surface of the cephalothorax. They are reclusive, highly territorial, and inhabit warm areas (in heated buildings or beam lines). The venom is a neurotoxin that produces a degenerating necrotic lesion. These spiders are easily recognized and should be avoided.

3.5.2. Spider Bites

Following a spider bite, clean the bite area with soap and water and place a cold pack over the bite area to reduce swelling. Monitor for allergic reactions. If the victim has more than minor pain, or if nausea, vomiting, difficulty breathing or swallowing occurs, medical attention should be sought immediately- if onsite call x3131, report to medical, or to the Fire Department after hours.

3.6 Deer

The deer present on site present a potential hazard to motor vehicle traffic when they cross roadways. This hazard to drivers can be avoided by careful observation of the roadway edges. Deer may carry parasites such as ticks.

3.7 Canada Geese

Canada Geese are capable of inflicting painful bites. Here are some tips for dealing with aggressive Canada Geese.

- Know where geese are likely to be in your area. Watch for geese and avoid nesting areas and goslings.
- Show them who is boss: When challenged by a goose, Fermilab's Roads and Grounds Department workers recommend making yourself look larger and more threatening by yelling and flapping your arms.

- Protect yourself. If a goose attacks, or threatens to attack, put whatever items are available to you, such as a briefcase, purse or umbrella, between you and the goose.
- **Most importantly:** Please report problem geese and their locations as soon as possible to Roads and Grounds at x3303 or your local building manager. This can help to prevent others from being harassed or attacked by the same goose. Roads and Grounds staff can place temporary fences between nests and walkways or apply deterrent chemicals to grassy areas where geese forage.

3.8 Snakes

Snakes are present and mobile on site during the spring, summer, and fall months. Though venomous varieties have not been identified, a variety of water snakes (Natrix), ribbon/garter snakes, Hognose, Fox and Ringneck snakes find habitat in this area. Snakebites can be extremely painful. In the event of any snake bite, report to Medical immediately, or the Fire Department after hours.

Snakes should be avoided when spotted and left alone when encountered. Snake bites can often be prevented by wearing ankle-high or higher boots and long pants when walking in areas inhabited by snakes.

3.9 Agents That May Exist Under Certain Conditions

3.9.1. Rabies

Rabies is a viral disease transmitted to man by rabid domestic or wild mammals. Exposure (as defined by the Center for Disease Control; MMWR 1980; 29:552,553) occurs as the result of contamination of scratches, abrasions, open wounds, or mucous membranes with infectious saliva. Effective post exposure prophylaxis is available. All bites or scratch wounds should be promptly cleaned with soap and water and medical attention sought immediately. If on site, report to Medical, or to the Fire Department after hours.

If untreated, after a variable incubation period, symptoms begin with headache, anorexia, nausea, and fever. Later, the disease progresses to exaggerated sympathetic responses and drooling, leading to convulsions or coma, and finally death. The reservoir for rabies includes skunks, foxes, bats, and raccoons. Domestic animals (i.e., cats and dogs), in particular those of unknown origin, represent modes of transmission from the (wild) animal reservoir to man. Contact with wild animals and domestic animals should be avoided. Any animals behaving suspiciously or found dead should be reported promptly to Roads and Grounds Ext. 3303 for investigation. All domestic animals (pet mammals) should be immunized against rabies.

3.9.2. Rocky Mountain Spotted Fever

Rocky Mountain Spotted Fever is a rickettsial disease, transmitted to man by the bite of infected ticks. Despite the region implied by its name, Rocky Mountain Spotted Fever is widespread throughout the United States. Sudden onset of persistent fever, headache, chills, and myalgia (muscle aches) are characteristic symptoms. If treated promptly, death is

uncommon, but 20 percent of untreated cases are fatal. The disease is best prevented by avoidance of tick-infested areas, careful removal of the tick prior to attachment, and the use of repellents.

3.9.3. Tetanus

Tetanus is a disease caused by toxins produced in the body by Clostridium tetanii. Entrance into the body occurs through penetrating or crush wounds, contaminated by animal or soil material, or items which have been in contact with animal or soil material. The toxins generated by the bacteria affect the nervous system and may lead to death. Untreated, the tetanus mortality rate is 70 percent in adults. Effective immunization and post exposure treatment is available. To minimize this risk, workers should seek medical attention whenever the skin is punctured, lacerated or abraded. Contaminated clothing should be changed daily.

3.9.4. Tularemia

Tularemia is a bacterium that is highly infectious and can enter the human body through the skin, eyes, mouth and lungs. It is a disease of rodents, especially rabbits, which may be transmitted to man by handling infected animals where material, from lesions on the infected animal, contacts cuts or scratches on the person's skin. Transmission can also be the result of bites by infected flies, fleas, ticks, and lice. Infection is best prevented by avoidance of direct contact with (potentially infected) animals, avoidance, and the use of repellents for flies, mosquitoes, and ticks.

In humans, Tularemia signs and symptoms can vary depending on the route of entry into the body, however there is always a fever. Symptoms could include headache, myalgia, chills, enlarged regional lymph nodes and elevated temperature.

3.9.5. Histoplasmosis

Histoplasmosis is caused by *Histoplasma capsulatum* which is a fungus that grows as a mold in the soil and as a yeast in animals and human hosts. Human transmission is caused by inhalation of spores from the soil that is contaminated by bird or bat feces. It is not transmitted from person to person. Most infections cause mild or no symptoms, but some can develop an acute lung infection. Those who have weakened immune systems can develop severe infection or it can spread to other organs.

Prevention is best affected by disinfecting or fixing the dust of bird or bat feces contaminated surfaces, or by the use of an appropriate mask to prevent ingestion or inhalation of infective particles.

3.9.6. Legionnaire's Disease

Legionnaire's disease is associated with specific forms of bacteria (Legionella pneumophila) sometimes found in stagnant water. The sources of the bacterium, and means of contamination,

are as yet not fully understood. Legionellosis (Legionnaires' disease) is a sometimes-fatal illness, the symptoms of which are pneumonia and/or febrile illness.

Outbreaks of the disease have been linked to exposures to industrial source waters: cooling towers, condenser tubing, air washers, refrigeration units, humidifiers, etc. Where inhalation of misted source waters is likely, employees should wear appropriate personal protection equipment: disposable dust/mist or high efficiency respirators, waterproof coveralls (Tyvek). Workers should minimize water blasting when cleaning water-holding units. Stagnant waters, air conditioner cooling towers, and infiltrations of potable water sources have been implicated in past outbreaks of Legionellosis. Stagnant water and air conditioner cooling tower water should, when possible, be avoided.

Outbreaks of febrile illness and pneumonia should be promptly investigated and should be brought to the attention of the medical staff.

3.9.7. Anthrax

Anthrax is an infectious disease, primarily of animals from which man may be secondarily infected. The causal microorganism is Bacillus anthracis, a spore-forming bacterium. The disease is pathogenic to herbivores, such as cattle and horses. Infection in man occurs most frequently from contact with sick animals or infected animal products. The route of infection may be by skin contact, inhalation of dust-containing spores, or ingestion of infected meat.

3.9.8. Lyme disease

Lyme disease can be caused by the bite of a tick carrying the Lyme bacteria. In the northeastern and central states, the deer tick carries the disease while using the white-tailed and white-footed mouse as its host. Symptoms usually appear within a few weeks after the bite and may include fatigue, stiff neck or flu-like symptoms such as fever, chills, and muscle aches. Approximately 70-80 % who are infected will develop a bull's eye rash that may or may not occur in the area of the bite.

If left untreated, this disease is known to progress to later stages which may include cardiac, joint, or neurological manifestations. For this reason, it is extremely important to treat Lyme Disease in its early stage. A blood test can confirm the diagnosis of Lyme disease; results are reliable six weeks after infection. Antibiotics are the usual prescribed treatment for Lyme disease. Prevention is the best medicine against Lyme disease. Commercial bug repellents containing at least 20% DEET (N-diethyl-metatoluamide) are effective against ticks.