



SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY  
DEPARTMENT OF GEOLOGY AND GEOLOGICAL ENGINEERING

# LABORATORY AND FIELD SAFETY GUIDELINES 2019-2020

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## IMPORTANT NUMBERS

### **Emergency 9-1-1**

**Campus Safety at (605) 394-6100 (x6100 on campus phones)**

Incident Reporting: report **ALL** accidents, incidents and near misses.

<http://www.sdsmt.edu/Campus-Services/Environmental-Health-and-Safety/Incident-Reporting/>

## ABBREVIATIONS

Laboratory and Field Safety Committee (LFSC)

Paleontology Research Laboratory (PRL)

Mineral Industries (MI)

Americans with Disabilities Act (ADA)

Geology (GEOL)

Geological Engineering (GEOE)

Composite Risk Index (CRI)

Black Hills Natural Sciences Field Station (BHNSFS)

Personal Protective Equipment (PPE)

## 1. INTRODUCTION

The purpose of this laboratory and field safety guideline is to provide safety practices and procedures to be followed by employees, students, visitors, and other personnel working in each GEOE/GEOL research laboratory and participating in field-related activities, to protect them from potential health and physical hazards. The guideline establishes safety practices to promote safety in the laboratory and in the field; however, each individual has the first and foremost responsibility for ensuring that good health and safety practices are implemented during laboratory and field activities.

There are three main steps to eliminate serious and unwanted consequences of laboratory and field accidents:

1. Define and assess hazards and risks in work environment (indoor or outdoor)
2. Minimize assessed risks and secure the work environment against serious hazards
3. Develop a fast and appropriate response and report system for emergencies

Different environments and lab/field activities involve different health and safety risks for individuals and groups. The laboratory and field safety committee developed this guideline in order to increase awareness for safety hazards and risks, and to provide students, faculty, visitors, and other employees with a safe research and teaching environment.

This guideline describes assessed hazards and risks that may be present while teaching and/or conducting research in the labs and during field-related activities; provides lists of safety rules to minimize risks; explains instructions for laboratory and field equipment to provide secure work environments; and includes instructions and required forms for early and efficient emergency responses. Listed safety rules and instructions must be read and followed by each individual (student, faculty, visitor, other employees) while teaching and/or working in GEOL/GEOE research laboratories and during field-related activities.

## 2. LABORATORY SAFETY GUIDELINE

### 2.1 LABORATORY SAFETY HAZARDS

Prior to beginning laboratory work, faculty, students, and staff are required to take applicable in-person training for: (1) General Hazard Communication and Lab Safety Training, (2) Hazardous Waste and Storeroom Procedures, and (3) BioSafety, if needed, and to complete affiliated online tests for each training. Please contact your lab manager for information on what in-person and online training is required prior to beginning laboratory work. All individuals conducting laboratory work are required to obtain annual re-certifications for training as well.

The Mineral Industries (MI) building is the location of three departments: Materials and Metallurgical Engineering; Mining Engineering; and Geology and Geological Engineering and one program in Atmospheric and Environmental Sciences. The MI building includes sample preparation and data processing laboratories for geomechanics, geodynamics, petrography, groundwater, energy research, and experimental petrology. Individuals working in labs should seek additional lab safety material and guidelines related to their lab from the lab manager. Note, these additional guidelines are intended to supplement this document and do not supersede the guidelines included in this document.

The PRL is a research component of the SDSMT Museum of Geology. It provides a safe, environmentally-controlled location for the Museum of Geology's fossil, geological, and archival collections. The building houses geochemistry, preparation, and fabrication laboratories for preparation, preservation, and conservation of fossils and other geological samples.

Students and faculty are subject to additional hazards involving fossil or rock sample preparation and processing in the PRL and MI laboratories. This section explains safety hazards that may be present in both PRL and MI research laboratories.

#### 2.1.1 CHEMICALS AND SPECIMENS OF SPECIAL INTEREST

Molding and casting of fossil material in PRL laboratories and preparation of starting materials for experiments and preparation of run products involves the use of hazardous chemicals, including but not limited to the following: synthetic major element oxides-carbonates-sulfates, trace and rare earth elements (REEs), acids, acetone, ethanol, corrosives, and flammable materials. Rock sample processing laboratories in the MI building may also contain some hazardous chemicals such as hydrochloric acid (HCl). The use of hazardous chemicals should be restricted to fume hoods. Some reagent oxides, trace and REEs, rock, soil, ore, and water samples may carry high health risks due to radioactivity or carcinogenic materials in their composition. Access to these materials is restricted. Other potential hazards include compressed gases including hydrogen (H<sub>2</sub>), nitrogen (N<sub>2</sub>), oxygen (O<sub>2</sub>), and carbon dioxide (CO<sub>2</sub>), and high temperature furnaces that can go up to 1300°C.

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### 2.1.2 SHARP TOOLS AND OBJECTS

Fossil preparation often involves the use of specialized hand tools which can be sharp. Broken glass, some rock chips, saws, knives, razor blades, and needles are typical items in labs that can be hazardous.

Mineral and rock (synthetic or natural) preparation usually requires the use of various sharp objects (razor blades, saws, knives, broken glass, diamond tipped parkers, etc.) in the laboratories. Rock-cutting saws in the sample preparation laboratory must be handled carefully and instructions should be obtained and practiced at least once under the supervision of the principal investigator.

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### 2.1.3 PNEUMATIC TOOLS

Pneumatic tools (air scribes, air abrasive units) are often used in fossil preparation. Special safety concerns are associated, including hand and eye protection. These tools must not be used for anything other than their intended purpose or without training.

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### 2.1.4 ENVIRONMENTAL HAZARDS

Use of rock hammers and hand tools in confined settings can be hazardous. Students, faculty, and volunteers often work in a quarry setting or on an outcrop in close proximity to each other. Picks, shovels, rock hammers, and small hand tools are often used in the field and lab. As such, personal space and specific safety concerns arise, including eye protection, hand protection, and awareness of flying debris.

Persons working in the PRL labs must be careful with fumes and dust particles, corrosives, and flammable materials and notify laboratory authorities immediately if a dangerous situation occurred when handling with those hazardous materials. Fume hoods should not be used for storage of materials and should be always clean and organized.

Respiratory protection and other personal protective equipment must be used when preparing fossils or rock samples. It is also required when handling hazardous chemicals or rock/mineral specimens in the lab

Hydrogen-oxygen torches, high temperature (1300°C) box and 1 atmosphere quench and gas-mixing furnaces are commonly used in the Experimental Petrology laboratory. In order to use these in preparation of run products of experiments, hand protection (proper tongs) and face shield usage is required. Especially for hydrogen-oxygen torches in addition to hand protection and face masks, any loose hair needs to be tied back to limit fire hazards. Torches and furnaces must only be used after appropriate training by approved personnel.

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### 2.1.5 LIFTING AND MOVING HEAVY MATERIAL

Flipping large jackets often requires the use of specialized heavy equipment. Cables under high tension and come along cable pullers are sometimes used for moderate-sized jackets. Large equipment such as backhoes and loaders are utilized for larger jackets. In general, students are moved to a safe distance and are allowed to observe

only. All necessary safety precautions and personal protection equipment (PPE) must be employed when working under these conditions.

Similarly, rock or soil samples and cores can be heavy, and their safe storage in the classroom or laboratory is very important in order to avoid serious safety risks. When moving such heavy geologic materials and objects in and out of the lab, all necessary safety precautions must be employed.

Using a ladder in PRL and MI laboratories is always a safety hazard that carries a risk of falling and sustaining an injury. Ladders should only be used on flat, level, clean, and stable surfaces. The ladder should be in full contact with the floor at the bottom and to the surface at top. Never climb a ladder alone—always have someone else supporting the ladder. Climbing on shelves is dangerous and is prohibited. Use special equipment to lift or remove objects on higher shelves.

The quench and gas mixing furnaces that are used to run experiments are located on the metal benches where the furnace top (lid) that was used to insert the experimental assembly is higher than eye level. Therefore, step type ladders are located in front of the furnace and are used to insert experimental assemblies into the furnace.

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#### 2.1.6 ELECTROCUTION HAZARDS

Extension cords, outlets, and electrical tools are potential safety hazards in the PRL and MI research laboratories. Damaged cords, outlets, and electrical tools that do not operate appropriately may cause serious injury due to electrocution.

All extension cords and cables must be organized in the laboratory. They should not be tangled or crowded in the room or counters, or they may cause accidents. If cables are torn or damaged, laboratory authorities must be notified, and the damaged cords or electrical tools must be replaced immediately.

Some furnaces are connected to temperature controller units. Experimental assemblies may be connected to a temperature reader with spaghetti cables and platinum metal. Pulling these cables or moving the controller unit when an experiment is in-progress is not allowed under any condition.

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#### 2.1.7 BIOHAZARDOUS MATERIAL

The handling and preparation of modern skeletal material involves exposure to both sharp instruments (scalpels, skinning knives), and potentially biohazardous materials (animal remains, etc.). Any faculty, students, or staff involved in the collection of potentially biohazardous materials are required to take the annual SDSMT Environmental Health and Safety (EHS) BioSafety training offered at the start of each semester and the affiliated online test prior to working starting work (<https://www.sdsmt.edu/Campus-Services/Environmental-Health-and-Safety/Training/>). All potentially biohazardous solid chemicals and flammable gases have material safety data sheets that can be found in the laboratory containing such substances.

## 2.2 PERSONAL PROTECTIVE EQUIPMENT

Examples of personal safety equipment available in PRL and MI research laboratories:

<p><b>Safety goggles or glasses</b></p> <p>(Use when handling with hazardous chemicals; rock-cutting equipment etc.)</p>	
<p><b>Gloves</b></p> <p>(Use when handling hazardous chemical or biological materials and specimens; refer to manufacturer details for chemical compatibility)</p>	
<p><b>Hearing protection</b></p> <p>(Use when operating noisy rock and fossil preparation equipment)</p>	
<p><b>Face mask or shield</b></p> <p>(Mask - use during fossil and preparation, when handling with chemicals, fumes, dust. Shield – use in experimental petrology lab)</p>	
<p><b>Protective rubber apron</b></p> <p>(Use when operating fossil and rock preparation equipment, handling with chemicals)</p>	

 If you cannot locate personal protective equipment (PPE) in the laboratory, ask the supervisor of the lab to get required PPE before working in the laboratory. The pictures above show good examples of PPE; PPE available in SDSMT labs may have different colors, sizes, and other features.

## 2.3 PERSONAL SAFETY IN THE PRL AND MI LABORATORIES

Every person who works in the PRL and MI laboratories must follow these safety rules in order to minimize safety risks in the lab during the operation:

- Obtain proper training from EHS and the principal investigator prior to beginning lab work.
- Follow the list of lab protocols and/or hazards posted on the door (or entrance) of each research lab.
- Lab work should not be conducted alone or after hours. If lab work must be completed after hours, approval must be given by the principal investigator of the research laboratory.
- The principal investigator of the lab must be notified before processing any hazardous chemicals or biological samples or radioactive materials or flammable gases in the PRL or MI laboratories.
- Undergraduate or graduate students are not permitted to handle high-risk, hazardous samples or chemicals alone.
- Each research facility has an evacuation plan. Learn the emergency exits and know your location and its distance to the nearest emergency exit.
- Persons with serious medical conditions should never work alone in the laboratory. Inform the principal investigator of the lab about your condition. For the safety of all lab workers, it is also the principal investigator's responsibility to ask each individual about serious health conditions prior to allowing work access in the lab.
- Do not use elevators during/after fires or earthquakes.
- Students or faculty without prior experience and certification should not operate a forklift truck to lift heavy objects.

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### 2.3.1 AVOID UNNECESSARY EXPOSURE

- Skin contact with chemicals should be avoided. Use the appropriate gloves and other PPE. Gloves must be disposed of after every use.
- If there is a need to smell chemicals, use the wafting technique. Never directly smell and never taste chemicals.
- Do not pipette by mouth; use a mechanical pipette or pipette bulb.
- Vent any experiment that may discharge toxic or noxious chemicals into a local chemical fume hood.
- Flammable, corrosive or toxic volatile materials must be trapped when they are evaporated, for example with rotary evaporators or similar devices.

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### 2.3.2 HOUSEKEEPING, SAFE STORAGE AND DISPOSAL OF CHEMICAL, SHARP WASTE, AND HAZARDOUS SPECIMENS

- Acids and corrosives should be stored in an acid-protection cabinet when not in use and be clearly labeled. Flammables must be stored in a cabinet designed for flammable materials.
- Lab areas are to be kept clean and uncluttered. This will help prevent spillage, breakage, personal injuries, and unnecessary contact with chemicals.
- Contaminated glassware should be cleaned daily.

- Broken glass must be stored in a plastic-lined glass disposal box. Razor blades, needles, and other sharp waste must be placed in a sharps container separate from other trash. Sharps containers are available from the SDSM&T chemical storeroom.
- Hydrogen-oxygen torch area should always be clean, free of any flammable chemical powders, paper, and fabrics.
- Chemical waste should be stored in clearly labeled containers with the date, detailed contents, producer name, and hazard (i.e., carcinogenic, oxidizer). Appropriate bottles and hazardous waste labels are available in the SDSM&T chemical storeroom for free (<http://www.sdsmt.edu/Campus-Services/Environmental-Health-and-Safety/University-Chemical-Storeroom/> ).
- Chemical containers must be properly emptied and cleaned prior to disposal. Glass bottles will be uncapped, washed out with an appropriate solvent, triple rinsed with water and placed in the glass container for disposal.
- Waste bottles must be sealed.
- Do not mix wastes.
- When ready to dispose, fill out the chemical waste form at this link: <https://www.sdsmt.edu/Campus-Services/Environmental-Health-and-Safety/Docs/Chemical-Waste-Form/>
- For laboratory clean-out of more than 10 chemicals, please contact Margaret Smallbrock ([Margaret.Smallbrock@sdsmt.edu](mailto:Margaret.Smallbrock@sdsmt.edu)) before completing forms.
- Chemical waste can be dropped off during Campus Chemical Storeroom hours or pickup time can be scheduled.
- Spills must be cleaned up immediately from work areas and floors.
- Doorways and walkways within the lab must not be blocked or used for storage.
- Floors must be kept dry at all times.
- Access to exits, hallways, emergency equipment, and utility controls must never be blocked.
- Equipment and instrumentation must be cleaned to remove spillage and contamination before repair or calibration service is requested. Service personnel will be informed of any hazardous contamination prior to servicing.
- Any samples with high radioactivity or chemical/biological hazard must be stored and disposed carefully. These must not be left unattended without a sign, label, or notification.

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### 2.3.3 WALK-IN FREEZER RULES FOR PRL LABORATORIES

In order to help prevent freezer accidents:

- For personal safety, inform other people (laboratory supervisor, staff or faculty) when you need to do work in the freezer and carry your cell phone.
- Prevent or reduce condensation inside coolers or freezers. Condensation causes the floor to become wet and slippery or ice to form, leading to slips and falls. If you notice condensation or ice on the floor, notify your supervisor.
- If there is any ice build-up on the floor, this should be scraped off weekly to prevent trips and falls. Post warning signs on the door to increase awareness of the floor condition.

- Good housekeeping is vital in preventing lifting and trip-and-fall injuries. Persons working in coolers and freezers should maintain orderly rows and aisles; packaging, debris, and single stock items on the floor are trip-and-fall hazards.

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#### 2.3.4 PERSONAL SAFETY HABITS IN THE LABORATORY

- Eating, drinking, gum chewing, and cosmetic application are not permitted in the laboratory. All food and drink must be left outside of the laboratory.
- Smoking or vaping are not allowed on campus except in designated parking lots inside of vehicles.
- Food must not be stored in a refrigerator that has been or is being used to store chemicals.
- No glassware or utensils that are used for laboratory operations shall be used for storage, handling, or consumption of food or beverages.
- Hands must be washed before leaving the lab. Areas of exposed skin, i.e. forearms, should be washed frequently if there is potential of contact with chemicals.
- Long hair must be securely tied back. Loose clothing should be secured.
- Shoes that cover the entire foot must be worn in laboratories at all times. Sandals, flip-flops, and similar shoes are not allowed.
- Appropriate clothing must be worn at all times. The principal investigator and Campus Safety set guidelines for what is appropriate for different labs. Shorts, capris, skirts (that do not cover the entire leg), sleeveless shirts, must not be worn where chemicals are present.
- Proper eye protection must be worn at all times in a laboratory. Proper protection necessary for a laboratory is determined by the principal investigator and Campus Safety for that laboratory. Proper protection includes, but not limited to, chemical splash safety goggles, face shields, and safety glasses.
- Employees wearing contact lenses must be informed of the special hazards associated with their use (i.e., absorption of chemicals from the air) and must inform their supervisors so that appropriate measures can be taken in an emergency. For increased safety, contacts should not be worn when working with chemicals.
- Be alert to unsafe conditions. It is the responsibility of each individual to assure a safe working environment for themselves and other workers in the laboratory and to bring unsafe conditions to the immediate attention of their supervisor.
- Prevent chemical spills and chemical or biological contamination as much as possible. In the event of a spill or break, notify others in the lab immediately. The principal investigator must be informed about any accidents, spills, or “close calls” in the lab.
- Any spills or accumulations of chemicals on work surfaces must be removed as soon as possible using techniques that minimize residual surface contamination. Do not attempt to clean up a spill if you have not received proper training. **Call Campus Safety at (605) 394-6100 (x6100).** It will be assessed by trained personnel who will ensure that proper clean-up techniques are employed.

### 2.3.5 BEHAVIOR IN THE LABORATORY (ADOPTED FROM SDSMT CHEMICAL HYGIENE AND LAB SAFETY MANUAL-2013)

- Workers should act in a professional manner at all times.
- Horseplay and practical jokes are expressly forbidden.
- No undergraduates are allowed to work in a lab containing hazards alone. The institution also highly discourages graduate student work alone in laboratories, especially after business hours.
- Unapproved personnel are not allowed in the laboratories.
- Any visitor to the laboratory is to be escorted by a worker and is the responsibility of that worker. Appropriate safety rules must be observed.
- Contact information is posted on all laboratory doors. If an experiment is being run unattended, this information must cover the proper contact information in case of a catastrophic event.
- Workers shall be aware of the location and proper operation of laboratory safety equipment such as eye wash stations and emergency showers.
- The Nuclear Regulatory Commission strictly regulates the use of radioactive sources and radiation producing equipment. Before any radioactive source or radiation producing equipment is brought into the laboratory, the Campus EHS Director and/or the campus Radiation Officer must be consulted for appropriate permits, training and standard operating procedures (see section 20.0 – Radionuclides in the SDSMT Chemical Hygiene and Lab Safety Manual, for other relevant information).

### 2.3.6 SPECIAL LABORATORY PROCEDURES FOR MI ROCK PREPARATION LABORATORY

- Hearing protection (noise attenuating earmuffs or ear plugs) are required whenever people are using rock-cutting machines.
- Appropriate clothing must be worn (no shorts, capris, skirts or sleeveless shirts). Confine long hair and loose clothing. Open-toed shoes or sandals are not permitted.
- Persons who want to use the rock-cutting saw in rock preparation lab must be trained prior to their first usage of the machine. Ask laboratory supervisors about training options.
- Protective rubber aprons and safety goggles or glasses must be worn during sample preparation.
- Do not operate the rock-cutting saw if it is loose or damaged. Notify the principal investigator immediately.

## 2.4 ASSESSMENT OF SAFETY HAZARDS AND RISKS

Any person using the MI and PRL research facilities must take responsibility for assessing and reporting all safety risks and hazards to the principal investigator of the laboratory or the department head. The reported safety risks and hazards should be assessed by the authorities and required action should be taken in order to minimize or eliminate potential of any accident, damage or loss.

## 2.5 CHECK-IN AND CHECK-OUT SYSTEM

Keeping a record of usage of laboratories and special equipment is very critical in terms of reducing safety risks. If your research facility has a logbook to record a person's name and time of operation, those log files must be well-maintained and can be accessible all

the time. Logbooks must be signed when checked in the lab and before checking out the lab. For safety reasons, students and faculty are encouraged to inform their colleagues or laboratory supervisors if they plan to work in the laboratory after business hours.

## 2.6 COMMUNICATIONS – INCIDENT REPORT SYSTEM

In the event of an emergency, dial **9-1-1 (9-9-1-1 on campus phones)** for police, fire or ambulance. Utilize the campus safety booklet if needed.

After notifying emergency personnel, notify Campus Safety at **(605) 394-6100 (x6100 on campus phones)**. Watch for the arrival of emergency personnel and assist in directing them to the site of the emergency.

**You will need to report an emergency situation by doing the following:**

- **Dial 9-1-1 (9-9-1-1 on campus phones)**
- Explain the nature of the emergency
- Provide your full name
- The phone number from which you are calling
- Your location
- Answer all questions and do not terminate the phone call until the 9-1-1 dispatcher is finished

If the emergency is **not** life threatening, contact Campus Safety at **(605) 394-6100 (x6100 on campus phones)** followed by the laboratory supervisor (contact info posted on door).

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### 2.6.1 CHEMICAL SPILL OR LABORATORY ACCIDENT:

- **Get out of immediate danger.**
- If necessary, **evacuate the building** by pulling the nearest fire alarm.
- **Always stay upwind of the spill** (wind blowing from you towards spill).
- **Contact campus safety at (605) 394-6100 (x6100 on campus phones).**
- Contact laboratory supervisor (contact info posted on door).

Do NOT attempt to clean up a chemical spill if you have not received proper training. It will be assessed by trained personnel who will ensure that proper clean-up techniques are employed. Offensive odors from ventilation systems should be reported as well.

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### 2.6.2 MEDICAL EMERGENCY ON CAMPUS:

- **Dial 9-1-1 (9-9-1-1 on campus phones).**
- **Do not move** the person unless there is an immediate threat to life.
- If trained to administer first aid, such as bleeding control and CPR, do so.
- If possible, avoid contact with bodily fluids.
- If exposed to **suspected** infectious materials, notify an emergency responder upon arrival.
- **Remain with the person** until help arrives.
- If possible, send someone else to meet emergency responders.

- **Notify Campus Safety at (605) 394-6100 (x6100 on campus phones** at the earliest convenience.

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### 2.6.3 INCIDENT REPORTING: REPORT **ALL** ACCIDENTS, INCIDENTS AND NEAR MISSES.

<http://www.sdsmt.edu/Campus-Services/Environmental-Health-and-Safety/Incident-Reporting/>

## 2.7 LABORATORY SAFETY TRAINING

Online training available from the office of Environmental Health and Safety covers basic laboratory safety applicable to most laboratories but does not cover specific hazards that may be present in particular working situations.

<http://www.sdsmt.edu/Campus-Services/Environmental-Health-and-Safety/Training/>

- Laboratory safety training, covering the same topics, is available at least once per semester and is usually announced via e-mail at the start of each semester.
- All personnel working in a laboratory are required to complete safety training as outlined in section 2.1 of this document.
- Supervisors should also make all personnel aware of potential hazards and the procedures for dealing with those hazards that are present in the specific laboratory environment on the first day of laboratory work.

### 3. FIELD SAFETY GUIDELINES

#### 3.1 FIELD SAFETY HAZARDS & RISKS: AWARENESS & PREPAREDNESS

##### 3.1.1 FIELD SAFETY HAZARDS AWARENESS

Fieldwork should not be conducted alone at any time. At each field location, field trip leaders are responsible for conducting a job hazard analysis, identifying potential hazards, communicating these hazards to participants, and instructing participants on how to avoid and manage these hazards. Potential hazards may include:

- Dehydration
- Heat stroke/heat exhaustion
- Hypothermia
- Sunburn
- Fatigue
- High altitude
- Endemic (regional) diseases
- Wildfires
- Rock falls and avalanches
- Uneven terrain
- Severe weather
- Wildlife
- Water bodies (drowning)
- Tools and equipment
- Other people
- Severe allergic reactions

##### 3.1.2 AWARENESS OF LOCAL CUSTOMS AND RESOURCES

Rubbin (1999) suggests that: “for domestic field work, it is important to know local ordinances and customs (e.g., speed limits, “wet” vs. “dry” counties, observation of “Blue Laws”) as well as what emergency and non-emergency resources are available, including medical care, vehicle repair, stores etc. For field activities outside the US borders, travelers should also be aware of national laws and legal systems, cultural-language differences.”

It is the responsibility of faculty or student organization to check and obtain available information about the location of a field trip or field project. Each attendee is responsible for checking local customs, cultural differences, food preferences, transportation options etc. for the location to which they will be traveling. However, the person in charge for arranging such field activity is the major authority who must notify attendees on any local ordinances and customs.

If there are some activities or personal behaviors that may cause issues due to cultural differences or miscommunication, those culturally sensitive points must be explained to attendees of an international field activity.

In any domestic or international field activity, people should be warned about unsecure locations or places.

### 3.2 PERSONAL PROTECTION EQUIPMENT (PPE)

- Safety glasses should be worn when hammering rocks or soft-steel chisels
- Rain gear during inclement weather
- Extra long-sleeved fleece/wool layers
- Sunscreen (SPF 30)
- Sun hat (three- to seven-inch brim)
- Insect repellent (30-50% DEET)
- Sturdy footwear that provides ankle support
- Work gloves
- Personal first-aid kit

### 3.3 PERSONAL PROTECTION APPLICATIONS

#### **Active drilling (oil and gas/core/reverse circulation) and/or mining (open pit/underground):**

- Hard hats, protective footwear (hard toed boots/slip-on protection a.k.a. “clackers”) and safety glasses must be worn as directed or needed.
- Additional PPE items may include hearing protection, respirators/self-rescuers, high-visibility/reflective safety vest, safety belts and lanyards, harnesses, gloves and chemical- or fire-resistant clothing (coveralls).
- Appropriate clothing must be worn (no shorts, capris, skirts or sleeveless shirts). Confine long hair and loose clothing. Open-toed shoes or sandals are not permitted.

#### **Field Activities (field trips, field projects etc.):**

- Safety glasses should be worn when hammering rocks or soft-steel chisels.
- Rain gear is recommended during inclement weather
- Extra long-sleeved fleece/wool layers should be worn for protection against hazardous insects, plants.
- Sunscreen (SPF 30) should be used for protection
- Especially when working in arid, hot climates, a sun hat (three- to seven-inch brim) should be worn for protection
- Insect repellent (30-50% DEET) should be used against insects in the field.
- Sturdy footwear that provides ankle support should be worn to minimize the risk of falling.
- Work gloves are recommended for field activities, especially when it involves rock or soil sampling.
- A personal first-aid kit must be carried all the time.

### 3.4 PERSONAL SAFETY RULES AND APPLICATIONS

#### 3.4.1 TRAVEL-RELATED SAFETY RULES

- Vehicle operators must possess a valid driver’s license appropriate to the vehicle they are operating and be particularly conscious of their responsibilities for the safe passage of the participants.

- An alternate, qualified operator should be identified for each vehicle should the primary operator become unable to operate the vehicle.
- If driving a state vehicle, the operator, or potential operator, must be a state employee or authorized volunteer. If the operator, or potential operator, is a student, he/she must fill out a “Student State Vehicle Use Form,” and any necessary supplemental forms, prior to the field trip. If traveling out of state, drivers may also need to file a “Request for Out of State Travel” form.
- All drivers must be covered by appropriate vehicle insurance. State employees are covered by state insurance, volunteer student drivers are covered by the state insurance as well; however, students’ personal vehicle insurance can still be requested in order to authorize students for operating a vehicle.
- Operators will at all times drive safely, are responsible for being aware of applicable laws, and will operate their vehicles in compliance with those laws.
- Operators will make a particular effort to acquire an appropriate amount of rest before driving.
- No person may operate a vehicle if under the influence of alcohol, non-prescription drugs, or otherwise impaired.
- Vehicles may only be used for official business associated with the field trip unless special permission is granted by the field trip leader.
- Vehicles will be properly equipped for the terrain in which they are to be operated.
- Vehicles used to carry passengers on a field trip must have a valid safety inspection and all components must be in safe operating condition.
- At all roadside stops, drivers will make every reasonable effort to park in a safe location off the road. Most jurisdictions have laws applicable to signage for vehicles parked on the road or on the shoulder (e.g. placement of warning markers); field trip leaders should be aware of these laws and ensure that they are followed.
- The number of passengers in a vehicle may not exceed the number of seats for which there are operable seat belts. Seat belt laws must be obeyed.
- For aquatic vehicles, approved floatation devices must be provided for each occupant. No aquatic vehicle may have more passengers than designed nor carry more weight than its safety rating. Each aquatic vehicle must be equipped with potable water, first aid kit, signaling devices.
- ATV’s will be used for field trips only by field trip leaders and participants who have had the proper instruction and training in the use of the ATV.

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### 3.4.2 PREVENTION OF CLIMATE-RELATED ISSUES

#### HEAT

Heat stroke is a serious heat-related illness that is caused by your body overheating ( $\geq 104^{\circ}\text{F}$ ), usually as a result of prolonged exposure or physical exertion in high temperatures.

#### **How is Heat Stroke/Sun Stroke different from Heat Exhaustion?**

The body has stopped cooling itself down by lack of sweating and has overheated (hyperthermia).

#### **How to prevent Heat Stroke/Sun Stroke:**

Wear loose-fitting, lightweight, light-colored clothing. Avoid sunburn, drink plenty of fluids, wear a hat, let your body acclimate to the heat, and pace yourself.

**Signs and Symptoms of Heat Stroke/Sun Stroke:**

- Throbbing headache and high fever (104°F)
- Dizziness, lightheadedness or trouble standing up
- Lack of sweating with red, hot, and dry skin with a high body temperature ( $\geq 104^\circ\text{F}$ )
- Nausea and vomiting
- Rapid heartbeat and shallow breathing
- Confusion, disorientation or staggering
- Constricted pupils

**Treatment for Heat Stroke/Sunstroke: Self-medicate by drinking water, rest, and cool down. ALWAYS call 9-1-1 and notify instructors.**

- Place victim in a shady area. Remove any tight, restrictive or unnecessary clothing.
- Sponge person down with water to help lower body temperature and fan them to promote evaporation and cooling.
- Drink small amounts of fluids (i.e. water, juice or sports drinks containing electrolytes) often to the equivalent of two quarts to rehydrate if victim is conscious and able to do so.

**COLD<sup>1</sup>**

**Hypothermia** is a medical emergency that occurs when your body loses heat faster than it can produce heat, causing a dangerously low body temperature. Normal body temperature is around 98.6°F (37°C). Hypothermia occurs as the body temperature passes below 95°F (35°C).

When your body temperature drops, your heart, nervous system and other organs cannot work normally. Left untreated, hypothermia can eventually lead to complete failure of your heart and respiratory system and to death.

Hypothermia is most often caused by exposure to cold weather or immersion in a cold body of water. Primary treatments for hypothermia are methods to warm the body back to a normal temperature.

Possible causes of hypothermia include<sup>2</sup>:

**Cold exposure.** When the balance between the body's heat production and heat loss tips toward heat loss for a prolonged period, hypothermia can occur. Accidental hypothermia usually happens after cold temperature exposure without enough warm, dry clothing for protection.

However, much milder environments can also lead to hypothermia, depending on a person's age, body mass, body fat, overall health, and length of time exposed to cold temperatures. Certain medical conditions such as diabetes and thyroid conditions, some

<sup>1</sup> <http://www.mayoclinic.org/diseases-conditions/hypothermia/basics/definition/con-20020453>

<sup>2</sup> <http://www.webmd.com/a-to-z-guides/what-is-hypothermia>

medications, severe trauma, or using drugs or alcohol all increase the risk of hypothermia.

Hypothermia symptoms include:

- Shivering, which may stop as hypothermia progresses (shivering is actually a good sign that a person's heat regulation systems are still active)
- Slow, shallow breathing
- Confusion and memory loss
- Drowsiness or exhaustion
- Slurred or mumbled speech
- Loss of coordination, fumbling hands, stumbling steps
- A slow, weak pulse
- In severe hypothermia, a person may be unconscious without obvious signs of breathing or a pulse

### **What Is the Treatment for Hypothermia?**

Hypothermia is a potentially life-threatening condition that needs emergency medical attention.

If medical care is not immediately available:

- Remove any wet clothes, hats, gloves, shoes, or socks and replace with dry clothing if possible.
- Protect the person against wind and further heat loss with extra dry clothes and blankets.
- Move gently to a warm, dry shelter as soon as possible.
- Begin rewarming the person with extra clothing. Use warm blankets. Other helpful items for warming are an electric blanket to the torso area and hot packs and heating pad on the torso, armpits, neck, and groin; however, these can cause burns to the skin. Use your own body heat if nothing else is available.
- Take the person's temperature if a thermometer is available.
- Offer warm liquids, but avoid alcohol and caffeine, which speed up heat loss. Do not try to give fluids to an unconscious person.

If the hypothermic person is unconscious, or has no pulse or signs of breathing, call for emergency help right away. CPR should be given immediately if a pulse cannot be felt and there is no sign of breathing. Feel for the pulse for up to a whole minute before starting CPR, because the heart rate may be extremely slow, and you should not start CPR if there is any heartbeat present.

CPR should be continued, in the absence of signs of breathing or a pulse, until paramedics arrive, or the person is taken to a hospital.

In cases of advanced hypothermia, hospital treatment is required to rewarm the core temperature.

Seek immediate medical help for anyone with hypothermia. **Call 9-1-1** if you suspect severe hypothermia.

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## LIGHTNING AND OTHER DANGEROUS WEATHER CONDITIONS

- When you see lightning or hear thunder, seek shelter immediately. Wait 30 minutes after the last thunder or lightning strike or until the storm passes to continue activities.
- If lightning or thunder are encountered while working at higher elevations or in exposed regions, move to lower elevations, forested areas or depressions and stay clear of tall, isolated trees. Squat low to the ground and cover your head if in an open area. Do not sit on ground – your field boots are good insulators.

### **What to do during inclement weather:**

- If you encounter heavy rainfall while in the field, put on your rain gear, take cover, and wait at least 20 minutes for rainfall to lessen or subside. The Rocky Mountain Region and the Black Hills regularly experience sporadic late afternoon thunderstorms.
- If heavy rainfall lasts more than 20 minutes, head back to vans for shelter and to await further instructions.
- If severe hail occurs seek shelter in a structure or vehicle and avoid windows or turn your back to windows in a vehicle. If no shelter is available, crouch down and cover head with arms, protect skull and spine with anything available such as a backpack, book, slab of bark or anything that will shield head and spine from direct hailstone strikes.
- Fieldwork can be completed during mist or light rainfall conditions.

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## 3.4.3 PREVENTION OF ALTITUDE-RELATED ISSUES

Altitude sickness commonly occurs above 8,000 feet. It presents as a collection of nonspecific symptoms, acquired at high altitude or in low air pressure, resembling a case of flu, carbon monoxide poisoning, or a hangover.

- For every 1,000 feet of elevation gain, the available oxygen decreases by about 3.5%.
- For every 1,000 feet of elevation gain, the air temperature drops about 3.5 degrees.
- For every 1,640 feet of elevation gain, the solar UV index increases by ~10%.
- For every 1,000 feet of elevation gain, allow yourself one day to acclimatize (produce more hemoglobin, i.e., red blood cells).

One or more of the following symptoms may indicate altitude sickness (above 8,000 feet):

- Lack of appetite, nausea, or vomiting
- Fatigue or weakness
- Dizziness or lightheadedness
- Insomnia
- A “pins and needles” tingling sensation
- Shortness of breath upon exertion
- Nosebleed
- Persistent rapid pulse
- Drowsiness

- Excessive flatulence
- General malaise
- Peripheral edema (swelling of hands, feet, and face)

**When Hiking/Working at higher altitudes:**

- To help maintain your balance on uneven terrain, keep your nose above your toes (i.e., maintain your center of gravity over your feet, the two main contact points).
- On steep slopes, maintain three points of contact.
- You may want to maintain a slower pace so as to keep your body working without overexerting.
- Try to maintain a breathing/stepping rhythm so as to keep your body working without overexerting. As a rule of thumb, try to match every step with a breath when climbing steep terrain at higher altitudes.
- Avoid hiking on loose scree or talus, but, if you must do so, be careful how and where you place your feet and hike across the scree or talus diagonally or in a switchback style. Dig your toes in (i.e., kick step) when going uphill and dig your heels in when going downhill.
- Avoid hiking on wet, slippery surfaces, but if you must do so, take shorter steps and plant your feet so the entire boot sole contacts the surface.

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#### 3.4.4 PREVENTION OF WILDLIFE SAFETY RISKS

During field activities in or out of the U.S, you may encounter various wildlife safety hazards such as venomous snakes, predatory animals, poisonous plants, etc. The wildlife hazards and risks vary from location to location. Potential wildlife hazards and risks must be considered, and necessary information should be acquired from agencies (i.e. Forest Service, divisions of wildlife protection).

**Appendix-1** summarizes the most common wildlife hazards, prevention from these listed hazards and first-aid in case of emergency. **Note that wildlife hazards can be either similar or very different for different locations. It is everyone’s personal responsibility to become familiar with local wildlife hazards in the specific location of field activity.**

**Do NOT approach wildlife!**

If any wild animal changes its behavior due to your presence, you are too close. Do not approach wildlife, no matter how tame or calm they may appear to you. If you are in a national or state park, obey instructions from park staff on scene.

**You must stay at least 100 yards (300 feet) away from all large animals (bison, elk, bighorn sheep, deer, moose, coyotes).**

**Do Not Feed Wildlife!**

Wild animals that are fed by humans lose their fear of humans and can become aggressive. These animals are often threatening to public safety.

For further information, the USGS Safety Manual for Field Operations is highly recommended:

<https://prd-wret.s3-us-west-2.amazonaws.com/assets/palladium/production/s3fs-public/atoms/files/445-3-h.pdf>

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#### 3.4.5 HUMAN-RELATED SAFETY CONCERNS

- Harassment, including sexual harassment, against any individual for any reason is not tolerated. Any unwelcome actions will be reported to the SDSMT Title IX coordinator following SD Board of Regents policies (<https://www.sdbor.edu/policy/documents/1-17.pdf>).
- SDSMT has zero tolerance for workplace violence in the lab or field.
- During field-related activities, including field trips, and field camps, intruders should be prevented from entering the camp site.
- If there is a door or window not operating properly to provide security for the field location, the person in charge of arranging the field activity must be notified and necessary repair or replacement must be done immediately.
- Any stranger may pose a serious security risk for the attendees of the field trip or camp. Therefore, students and faculty should take precautions with strangers in the field activity areas at any time.
- The person in charge for arranging the field trip or camp must notify attendees about any incident in the vicinity of the field area (active shooting, burglary, homicide etc.).
- All field stations, vehicles, and camp areas must be secured and locked down when attendees are not present in the area.
- In both domestic and international field camps, attendees must be warned about any local incidents and they should not allow strangers inside the field station for security reasons.
- Consumption of alcohol, drugs or any illegal substances is strictly prohibited during field activities. This rule includes field camps and classes, or field trips arranged by SDSMT student organizations. Not only students and faculty, but also guests, must NOT consume alcohol or drugs in the field location.

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#### 3.4.6 PROTECTION OF NATURE AND PROTECTED SITES

If field activity is conducted in a protected area, national park or any location with protected species present, field activity attendees must be careful and protective in order to minimize habitat alteration in the location.

Activities involving caves should include a training session on attendees' responsibilities and risks, as well as protective and preventative actions for the safety of people and cave biota. Bats and other cave species must never be fed, harmed, killed, or transported from their original location. Any fieldwork in caves requires cleaning and decontamination of gear after visiting the cave to prevent the spread of white-nose syndrome, a deadly fungus impacting bats across North America, following the latest recommendations (<https://www.whitenosesyndrome.org/static-page/decontamination-information>).

### 3.5 FIELD ACTIVITY SAFETY PRECAUTIONS

All individuals must avoid any misbehavior that may create serious safety risks for other participants or environment during a field activity. Instructors and field manuals (syllabi, field camp manuals etc.) explain rules of conduct or misbehavior policy clearly, and violations of rules of conduct may result in probation or dismissal from the field courses.

- Act in a professional manner at all times. Use common sense. Pranks, practical jokes, horseplay, or other acts of mischief may be dangerous and should be avoided.
- Trash should be contained. Pack out any that you pack into the field.
- Avoid climbing directly above another person or group. If you must pass above on a slope, always warn those below you.
- If you accidentally dislodge a rock loose and it rolls or falls downhill, shout “rock” as loud as you can so that everyone down slope has a chance to react. Do not roll or throw rocks down slopes or over cliffs.
- Smoking and vaping are allowed only in designated areas. Use extreme caution during red flag conditions as noted by the U.S. Forest Service.
- Cross fences by either crawling under or through with assistance. Always leave gates the way you found them. If open, leave open and if closed, make sure they are closed after passing through.
- Do not place your hands or feet in places that you cannot see to avoid the possibility of being bitten by a venomous snake or scorpion. Snakes like ledges and rock piles. Be careful there.
- Check each night for ticks and watch for them on others.
- When you see lightning or hear thunder, seek shelter immediately.
- If lightning is visible while working at higher elevations or in exposed regions, move to lower elevations, forested areas or depressions and stay clear of tall, isolated trees. Squat low to the ground and cover your head if in an open area.
- Carry enough water (min. two liters) to avoid dehydration and/or heat illness (heat exhaustion/heat stroke) during hot weather conditions.
- Do not go onto steep hillsides that you believe beyond your capacity. Your feeling of security on slopes may increase as your trekking experience grows.
- Use appropriate PPE in the field and help instructors and TAs maintain a safe work environment for everyone.
- Excavation of fossil jackets is often cause for safety concern because their size can range from a few pounds to several tons. Application of plaster can expose users to splash-back, so eye protection is required. Undercutting large jackets can put workers at risk if a jacket shifts. As such, workers are generally moved away from undercutting when this type of danger is prevalent. Large jackets are shored up and stabilized by any means possible (wood, bricks, earthworks, etc.).

### 3.6 CHECK-IN AND CHECK-OUT SYSTEM

Prior to departure, the department should be informed about the details of the field trip (time, duration, distance of the trip, attendees etc.). Safe completion of the field trip needs to be reported as well. Use the Geology & Geological Engineering Student Travel Agreement & Checklist form located here:

<https://www.sdsmt.edu/Academics/Departments/Geology-and-Geological->

[Engineering/Docs/GGE student travel form/](#). If any emergency or safety issue arises during the field trip, it should be reported to Campus risk management.

### 3.7 COMMUNICATIONS – INCIDENT REPORT SYSTEM

#### Field Emergency reporting procedures

You will need to report an emergency situation by doing the following:

- **If you have cell service**, dial 9-1-1 for police, fire or ambulance.
- Explain the nature of the emergency.
- Provide your full name.
- The phone number from which you are calling.
- Your location (nearest 9-1-1 address if possible).
- Answer all questions and **do not terminate the phone call until the 9-1-1 dispatcher is finished**.
- Call an instructor or teaching assistant to inform them of the emergency and your location.

Or

- **If you don't have cell service**, blow your safety whistle three times in succession with a short pause in between blows. Each whistle blow should last three seconds. Hang your orange bandana on a tree branch or wave to attract attention and easily identify your location.
- Wait for help to arrive.
- Once help arrives, have them contact an instructor or teaching assistant if one is not immediately present.

#### Evacuate field area in case of emergency or inclement weather:

All instructors and students will meet where the vehicles are parked when they are called or hear one five-second safety whistle blow that may be repeated several times. This is the signal to stop what you are doing and immediately return to the parking area for further instructions.

### 3.8 STUDENT ORGANIZATION FIELD TRIPS

While planning a field trip that is not a requirement of a class, student organizations should follow the rules posted on the webpage of SDSMT Travel Risk Management: <http://www.sdsmt.edu/Campus-Services/Environmental-Health-and-Safety/Risk-Management/Student-Organization-Risk-Management/Travel-Risk-Management/>

Preparing for the trip:

- Each student should complete the travel agreement and health statement form found in travel risk management page. The student agreement form may not necessarily under all circumstances relieve one from any liability; it does constitute an acknowledgement by the person signing of known risks. The student forms should be provided to at least three administrators (program advisor, faculty advisor, department head, or another administrator familiar with the program).
- The trip coordinator should complete the trip travel contact information also found in the travel risk management page. A copy of the form must be provided to the

student leadership, involvement, and community engagement (SLICE) coordinator and one copy must be taken on the trip.

- Student travel insurance can be purchased through the business office prior to the trip.
- The vehicle to be used should pass a comprehensive safety inspection conducted by a qualified mechanic. In addition, the people driving the vehicle should also conduct a visual inspection to detect any obvious problems such as a flat tire.

Equipment and other necessities:

- Alternate routes or plans to accommodate any unforeseen circumstances
- Good, detailed map of the entire area to be traveled, including any possible alternate routes
- First aid kit, flares, flashlights, etc.
- Cellular phone
- Have the phone number and location of area hospitals with driving directions

## 3.9 FIELD SAFETY TRAINING

### 3.9.1 GENERAL FIELD SAFETY ORIENTATION

Instructors will inform students about field-related hazards and risks prior to arranged field activities and remind them of important safety rules at the field site. Because different field locations may involve different field safety hazards and risks, instructors will explain safety rules for the specific location of the field trip to students and provide precautions in and outside of the field areas.

### 3.9.2 FIELD CAMPS SAFETY AND ORIENTATION TRAINING

BHNSFS has recently offered programs at eight different field stations, and each location has unique geographical and geological features along with safety risks and hazards. Field camp instructors will explain the safety rules to students on the first day of each week's project in order to remind them of the importance of safety in the field. All students and instructors should follow field-related safety rules listed in this guidebook.

Other than natural safety hazards and risks, cultural differences should also be considered for each field location. Instructors will explain local customs and cultural differences in order to avoid unwanted situations and prevent human-related safety risks during field activities in and outside the U.S. It is also participants' responsibility to research and collect information about the foreign country and its customs that they will experience during the 3-5 week field camp.

## 4. REQUIRED FORMS

### 4.1 MEDICAL HEALTH CONDITION SHORT FORM (APPENDIX-2):

A sudden onset of pain or emotion or sudden attack or convulsion (i.e. epileptic seizure) can result in serious accidents and unwanted consequences during a lab work or field activity. Therefore, the Medical Health Condition Form can be used to collect necessary

health condition information about students, faculty members and staff utilizing SDSMT facilities including MI and PRL laboratories.

If a person has a serious medical or diagnosed health condition, it is his/her responsibility to inform the person in charge for the facility about serious health problems and medical treatments required in case of an emergency. It is also recommended that the person in charge for the laboratory should ask the person to fill out and return the medical health condition form to our department secretary prior to use of the laboratory for the first time.

SDSMT ADA Services regularly send out ADA forms to notify faculty about required accommodations. Please notify instructor if you have ADA accommodations.

For field activities, a longer and more detailed version of the medical condition form is recommended.

#### 4.2 BHNSFS MEDICAL FORM FOR FIELD CAMPS AND OTHER FIELD ACTIVITIES (APPENDIX-3)

Field trips as a requirement of some courses do not require submission of a liability waiver, since the person taking the course accepts that it is a required component of the course and he/she accepts involved risks. However, field trips arranged by the student organizations must be reported to SDSMT Travel Risk Management and required forms must be provided before the field trip (refer to the webpage below for required forms and up-to-date information).

<http://www.sdsmt.edu/Campus-Services/Environmental-Health-and-Safety/Risk-Management/Student-Organization-Risk-Management/Travel-Risk-Management/>

The webpage above provides all required information and forms designed to offer SDSMT student organizations a guide to follow when planning, organizing, and implementing programs, or other activities that involve travel requirements (e.g., conferences, competitions, etc.).

#### 4.3 DEPARTMENT FIELD TRIP AGREEMENT & CHECKLIST FORM (APPENDIX-4)

Prior to the departure of field trips, students must complete the Geology & Geological Engineering Student Travel Agreement & Checklist form referenced in the appendix.

## 5. APPENDICES

### 5.1 APPENDIX-1: SOME EXAMPLES OF COMMON WILDLIFE HAZARDS THAT MIGHT BE ENCOUNTERED DURING A FIELD ACTIVITY

Note: This appendix does not list all wildlife hazards and more detailed information about specific locations should be obtained before the field activity.

#### 5.1.1 RABIES

Rabies is present in wild mammals in some parts of the US and abroad. You may become infected with rabies if you are bitten or licked by an infected animal on broken skin, or if saliva or brain and nerve tissue comes into contact with your eyes, broken skin (cuts or scratches), or mucous membranes such as lips, mouth, or nasal passages. Rabies is almost always fatal in humans and animals, although symptoms may not show for several weeks.

Rabid animals may exhibit one or more of these symptoms:

- Loss of fear of humans
- Glazed, poorly focused stare
- Frequent shifting of aggressive behavior from one object to another
- Stubborn, undeterred approach
- Staggering gait
- Biting the ground or other inanimate objects such as sticks or rocks
- Lack of reflex response if struck by a thrown object
- Excessive salivation

If you suspect you have been exposed to an animal that may have rabies, inform the field trip instructor or organizer and seek medical care immediately.

- Kill the animal, if you are able to do so.
- Do not shoot it in the head or cut up the carcass. Diagnosis of rabies is accomplished by taking samples of central nervous system tissue, preferably from the brain.
- Place the animal in a strong, leak-proof bag. It can be frozen.
- Contact the local fish and wildlife office for directions about where to take the carcass.

#### 5.1.2 BEARS

In areas where bears are present or are frequently seen:

- Keep all food and garbage stored in bear-proof containers.
- Be alert for tracks and other signs of bear activity.
- Wear a bell or other item that makes noise as you walk; the noise will alert wildlife of your presence and most animals will get out of your way. Be alert and make extra noise after a period of rest, such as eating lunch or taking notes.
- When possible, stay in groups of three or more people.
- The best way to avoid a bear is to take all necessary precautions to avoid surprise encounters.

Bear attack—If precautionary measures fail and you are charged by a bear, you can still usually defuse the situation. Bear pepper spray is a good last line of defense and it is effective in more than 90 percent of the reported cases where it has been used.

- Become familiar with your pepper spray, read all instructions, and know its limitations.
- Bear pepper spray must be instantly available, not in your pack. However, remember that carrying pepper spray is not a substitute for vigilance and good safety precautions.
- If you have a surprise encounter with a bear, do not run. Slowly back away.
- If a bear charges, stand your ground and use your bear spray. It has been highly successful at stopping aggressive behavior in bears.
- If a bear charges and makes contact with you, fall to the ground onto your stomach and “play dead.”
- If you are injured by a bear (regardless of how minor), or if you observe a bear or signs of a bear, report it to a park ranger of the local fish and wildlife office as soon as possible. Someone’s safety may depend on it.

Camping in bear country:

- Never camp in an area that has obvious evidence of bear activity, such as digging, tracks, or scat.
- Odors attract bears, so avoid carrying or cooking odorous foods.
- Keep a clean camp.
- Do not cook or store food in your tent.
- All food, garbage, or other odorous items used for preparing or cooking food must be secured from bears.
- Food, cooking gear, and scented articles must be suspended when not in use or stored in bear-proof containers.
- Treat all odorous products such as soap, deodorant, or other toiletries in the same manner as food.
- Do not leave packs containing food unattended, even for a few minutes.
- Do not allow bears or other wildlife to obtain human food. Allowing a bear to obtain human food even once often results in the bear becoming aggressive about obtaining such food in the future.
- Aggressive bears present a threat to human safety and eventually must be destroyed or removed from the park.
- Sleep a minimum of 100 yards (91 m) from where you hang, cook, and eat food.
- Keep your sleeping gear clean and free of food odor. Do not sleep in the same clothes worn while cooking and eating.

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### 5.1.3 COUGARS OR MOUNTAIN LIONS

The cougar is also commonly known as a mountain lion, puma, mountain cat, catamount, or panther. Fatal cougar attacks are extremely rare and occur much less frequently than fatal dog attacks, fatal snake bites, fatal lightning strikes, or fatal bee stings. A total of 27 people in North America were killed by cougars between 1890 and 2018. As with many predators, a cougar may attack if cornered, if a fleeing human

stimulates their instinct to chase, or if a person “plays dead.” Standing still however may cause the cougar to consider a person easy prey.

- Exaggerate the threat to the animal through intense eye contact, loud but calm shouting, and any other action to appear larger and more menacing. This may make the animal retreat.
- Do not run. Try to back away from the cougar slowly. Sudden movement or flight may trigger an instinctive attack.
- Do not turn your back on a cougar. Face the cougar and remain upright.
- Do all you can to enlarge your apparent body size. Do not crouch down or try to hide. Pick up sticks or branches and wave them about.
- If a cougar attacks, fight back with sticks and rocks, or even your bare hands. Fighting back can be effective in persuading an attacking cougar to disengage.

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#### 5.1.4 PIGS OR HOGS

Wild pigs (feral hogs) have extremely strong jaws to crack open hard-shelled nuts such as hickory nuts and pecans. As they predate upon or scavenge animal carcasses, they can easily break bones and often consume the entire carcass, often leaving little if any sign behind.

The likelihood of a human being impacted by a hog/vehicle collision or contracting a disease from a wild pig is low. The risk of a physical attack by a wild pig is even lower. Where the rare wild pig attack occurs, it is usually during a hunting scenario where dogs are used to bay or corner a pig in a spot and the pig “runs through” the associated hunters standing nearby. Occasionally, humans inadvertently walk between a sow and her litter and the sow reacts to protect her young. Totally unprovoked attacks outside of these two scenarios are rare. Given a choice, wild pigs usually flee rather than fight.

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#### 5.1.5 WOLVES

Wolves rely on their speed and quickness to ensure their safety. Sometimes when people inadvertently stumble upon an occupied wolf den, the adult wolves will dash toward them, and then veer off suddenly with sharp barks and snorts. Commonly the wolves then retreat and howl repeatedly, but they may rush toward the intruder again. The vocalization behavior is very consistent when wolves are defending a den.

If you are surrounded by wolves at close range that are howling or barking at your presence, you almost certainly are near a den or rendezvous site where young wolves are resting. One group of hikers were so taken by the loud barking and rushing behavior of a wolf pack that they climbed nearby trees until the wolves withdrew. An equally effective strategy is to retreat along the original route. Typically, wolves do not aggressively defend kill sites to the point of attack, although they may growl or briefly run at a human intruder. Wolves commonly retreat into concealing cover and remain silent when they are flushed from a kill.

Generally, wolves only act with extreme aggression in self-defense when they are:

- Cornered by being caught in a trap.
- Pursued to the point of contact by a snowmobile, aircraft, or boat.
- Injured and feel they are unable to escape because of the injury.

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### 5.1.6 VENOMOUS SNAKES

Venomous snakes found in the United States include rattlesnakes, copperheads, cottonmouths/water moccasins, and coral snakes. Although death is relatively rare, some persons with a severe allergy to snake venom may be at risk of death if bitten. About 7,000 to 8,000 persons per year receive venomous bites in the United States. About 5 of those die. The number of deaths would be much higher if the victims did not seek medical care.

**Symptoms**—Signs or symptoms associated with a snake bite may vary depending on the type of snake, but may include:

- A pair of puncture marks at the wound
- Redness and swelling around the bite
- Severe pain at the site of the bite
- Nausea and vomiting
- Labored breathing (in extreme cases, breathing may stop altogether)
- Disturbed vision
- Increased salivation and sweating
- Numbness or tingling around your face and/or limbs

#### **Preventing Snake Bites**

Everyone should take the following steps to prevent a snake bite:

- Do not place your hands or feet in places that you cannot visually inspect from a distance to avoid the possibility of being bitten. Snakes like ledges and rock piles—be careful. Use your rock hammer to move or overturn a rock before you reach out to grab it with your bare hands.
- If you observe a venomous snake, please inform those around you of the location of the potential threat and notify an instructor.
- If you hear a snake rattle, then it is a rattlesnake, and you should back up the same way you arrived and go around by leaving a wide margin of space. Be aware that rattlesnakes will not always rattle.
- Do not try to handle any snake.
- Stay away from tall grass and piles of leaves when possible.
- Avoid climbing on rocks or piles of wood where a snake may be hiding.
- Be aware that snakes tend to be active at night and in warm weather.
- Wear boots and long pants when working outdoors.
- Wear leather gloves when handling brush and debris.

#### **Treatment for a Snake Bite: Call 9-1-1 and notify instructors**

- Move beyond striking distance of snake if still present (at least six feet, but even further if it is a large snake) and do not attempt to capture it. If possible, identify the snake.
- Quickly remove jewelry or constricting items near the bite before you start to swell.
- Immobilize bitten area and remain calm and still.
- Cover bite wound with a clean, dry dressing.
- Position yourself, if possible, so that bite area is at or below your heart.
- Carry victim to vehicle, if possible, and transport to nearest hospital.

- Try to remember the color and shape of the snake, which can help with treatment of the snake bite.
- Keep still and calm. This can slow down the spread of venom.

If you cannot get to the hospital right away:

- Lie or sit down with the bite below the level of the heart.
- Wash the bite with soap and water.
- Cover the bite with a clean, dry dressing.

**DO NOT do any of the following:**

- Pick up the snake or try to trap it
- Wait for symptoms to appear if bitten—seek immediate medical attention
- Apply a tourniquet
- Slash the wound with a knife
- Suck out the venom
- Apply ice or immerse the wound in water
- Drink alcohol as a painkiller
- Drink caffeinated beverages

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#### 5.1.1.7 BEES, WASPS, AND HORNETS

Bees, wasps, and hornets are found throughout the United States and are most abundant in the warmer months. Nests and hives may be found in trees, under roof eaves, or on equipment such as ladders.

**Prevention**—Take the following steps to prevent insect stings:

- Wear light-colored, smooth-finished clothing
- Avoid perfumed soaps, shampoos, and deodorants
- Do not wear cologne or perfume
- Avoid bananas and banana-scented toiletries
- Wear clean clothing and bathe daily (sweat may anger bees)
- Wear clothing to cover as much of the body as possible
- Avoid flowering plants when possible
- Keep work areas clean. Social wasps thrive in places where humans discard food.
- Remain calm and still if a single stinging insect is flying around—swatting at an insect may cause it to sting.
- If you are attacked by several stinging insects at once, run to get away from them. Bees release a chemical when they sting, which may attract other bees.
- Go indoors. A shaded area is better than an open area to get away from the insects.
- If you are able to physically move out of the area, do not attempt to jump into water. Some insects (particularly Africanized honeybees) are known to hover above the water, continuing to sting once you surface for air.
- If a bee comes inside your vehicle, stop the car slowly and open all the windows.
- People with a history of severe allergic reactions to insect bites or stings should consider carrying an epinephrine auto injector (EpiPen) and should wear a medical identification bracelet or necklace stating their allergy.

**First aid**—If someone is stung by a bee, wasp, or hornet:

- Have someone stay with the injured person to be sure that he or she does not have an allergic reaction.
- Wash the site with soap and water.
- Remove the stinger using gauze wiped over the area or by scraping a fingernail over the area.
- Never squeeze the stinger or use tweezers.
- Apply ice to reduce swelling.
- Do not scratch the sting as this may increase swelling, itching, and risk of infection

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### 5.1.8 SCORPIONS

Scorpions usually hide during the day and are active at night. They may be hiding under rocks, wood, or anything else lying on the ground. Some species may also burrow into the ground. Most scorpions live in dry, desert areas. However, some species can be found in grasslands, forests, and inside caves.

**Symptoms**—Symptoms of a scorpion sting usually subside within 48 hours and may include:

- A stinging or burning sensation at the injection site (very little swelling or inflammation)
- Positive “tap test” (i.e., extreme pain when the sting site is tapped with a finger)
- Restlessness
- Convulsions
- Roving eyes
- Staggering gait
- Thick tongue sensation
- Slurred speech
- Drooling
- Muscle twitches
- Abdominal pain and cramps
- Respiratory depression

**Prevention:**

- Wear long sleeves and pants
- Wear leather gloves
- Shake out clothing or shoes before putting them on
- People with a history of severe allergic reactions to insect bites or stings should carry an epinephrine auto injector (EpiPen) and should wear a medical identification bracelet or necklace stating their allergy.

**First aid**—Take the following steps if you are stung by a scorpion:

- Contact a qualified health care provider or poison control center for advice and medical instructions.
- Ice may be applied directly to the sting site (never submerge the affected limb in ice water).
- Remain relaxed and calm.
- Do not take any sedatives.

- Capture or photograph the scorpion for identification if it is possible to do so safely.

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### 5.1.9 VENOMOUS SPIDERS

Venomous spiders found in the United States include the black widow and brown recluse. Spiders are usually not aggressive. Most bites occur because a spider is trapped or unintentionally contacted.

**Symptoms**—Symptoms associated with spider bites can vary from minor to severe. Although extremely rare, death can occur in the most severe cases. Possible symptoms resulting from a spider bite include the following:

- Itching or rash
- Pain radiating from the site of the bite
- Muscle pain or cramping
- Reddish to purplish color or blister
- Increased sweating
- Difficulty breathing
- Headache
- Nausea and vomiting
- Fever
- Chills
- Anxiety or restlessness
- High blood pressure

**Prevention:**

- Inspect or shake out any clothing, shoes, towels, or equipment before use.
- Wear protective clothing such as a long-sleeved shirt and long pants, hat, gloves, and boots when handling stacked or undisturbed piles of materials.
- Minimize the empty spaces between stacked materials.
- Remove and reduce debris and rubble from around the outdoor work areas.
- Trim or eliminate tall grasses from around outdoor work areas.
- Store apparel and outdoor equipment in tightly closed plastic bags.
- Keep your tetanus boosters up-to-date (every 10 years). Spider bites can become infected with tetanus spores.
- Stay calm. Identify the type of spider if it is possible to do so safely. Identification will aid in medical treatment.

**First aid**—Take the following steps if you are bitten by a spider:

- Wash the bite area with soap and water
- Apply a cloth dampened with cold water or filled with ice to the bite area to reduce swelling
- Elevate bite area if possible
- Do not attempt to remove venom
- Notify your supervisor, immediately seek professional medical attention

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#### 5.1.10 ANAPHYLAXIS/ANAPHYLACTIC SHOCK

Anaphylaxis or anaphylactic shock is a serious and potentially life-threatening allergic reaction. It can occur within seconds or minutes of exposure to a food (i.e., peanuts) or insect venom (i.e., bee sting) to which you are allergic. Anaphylaxis requires an injection of epinephrine (EpiPen) into the thigh and a follow-up visit to an emergency room at the hospital. Without immediate treatment, anaphylaxis can be fatal.

##### **Signs/Symptoms:**

- Skin reactions - hives/welts with possible itching and flushed (red color) or pale skin
- Swollen lips/tongue/throat - constriction of airways with possible wheezing/hoarseness and trouble breathing/swallowing
- A weak and rapid pulse - may have dizziness or fainting/passing out (due to a dangerous drop in blood pressure)
- Nausea/stomach cramping, vomiting or diarrhea

##### **Prevention:**

- Wear a medical alert necklace/bracelet and/or carry an Anaphylaxis Action Plan card
- Keep an emergency kit with prescribed medications available (EpiPen) – alert your field partner where this is kept and how to use it in case assistance is needed
- Use caution around stinging insects
- Carefully read all food labels

##### **First Aid:**

- Call 911 or emergency medical help and notify instructors
- Have the person administer their epinephrine autoinjector by pressing it into their thigh (you may have to assist them if needed)
- Make sure the person is lying down and elevate their legs
- Check the person's pulse and breathing – if necessary, administer CPR if they have stopped breathing or their heart has stopped beating

5.2 APPENDIX-2: MEDICAL HEALTH CONDITION SHORT FORM

Name: \_\_\_\_\_ DOB: \_\_\_\_\_ Gender: M F

**Emergency contact details:**

Name and relationship: \_\_\_\_\_

Home phone: (\_\_\_\_) \_\_\_\_\_ Cell phone: (\_\_\_\_) \_\_\_\_\_

Email: \_\_\_\_\_

**Personal/Family physician contact details:**

Name: \_\_\_\_\_

Office phone: (\_\_\_\_) \_\_\_\_\_

Medical Insurance Carrier: \_\_\_\_\_

Policy Number: \_\_\_\_\_

- 1.) Do you have a history of Asthma? Yes \_\_\_\_\_ No \_\_\_\_\_
  
- 2.) If yes to either, will you carry an EpiPen and/or inhaler? Yes \_\_\_\_\_ No \_\_\_\_\_
  
- 3.) Do you have any known allergies, food allergies or allergic reactions? If yes, please explain:
  
  
- 4.) List medications that you are currently taking including dosages and frequencies:
  
  
  
  
  
- 5.) Do you have any chronic medical problems (i.e., heart, lungs, kidneys, neurological disease, etc.)? If yes, please explain:
  
  
  
  
  
- 6.) Do you have any medical problems and/or mental health issues that may interfere with your ability to work in PRL and MI laboratories? If yes, please list them:

5.3 APPENDIX-3: BHNSFS MEDICAL FORM FOR FIELD CAMPS AND OTHER FIELD ACTIVITIES

Name: \_\_\_\_\_ DOB: \_\_\_\_\_ Gender: M F

**Emergency contact details:**

Name and relationship: \_\_\_\_\_

Home phone: (\_\_\_\_) \_\_\_\_\_ Cell phone: (\_\_\_\_) \_\_\_\_\_

Email: \_\_\_\_\_

**Personal/Family physician contact details:**

Name: \_\_\_\_\_

Office phone: (\_\_\_\_) \_\_\_\_\_

Medical Insurance Carrier: \_\_\_\_\_

Policy Number: \_\_\_\_\_

- 1.) Are you allergic to bee stings? Yes \_\_\_\_\_ No \_\_\_\_\_
  
- 2.) Do you have a history of Asthma? Yes \_\_\_\_\_ No \_\_\_\_\_
  
- 3.) If yes to either, will you carry an EpiPen and/or inhaler? Yes \_\_\_\_\_ No \_\_\_\_\_
  
- 4.) Do you have any known allergies, food allergies or allergic reactions? If yes, please explain:
  
  
- 5.) List medications that you are currently taking including dosages and frequencies:
  
  
  
  
  
- 6.) Do you have any chronic medical problems (i.e., heart, lungs, kidneys, neurological disease, etc.)? If yes, please explain:

**7.) Do you have any medical problems and/or mental health issues that may interfere with your ability to do rigorous field work? If yes, please list them:**

**8.) Do you require any special dietary needs for prescribed medical and/or religious reasons? If yes, please explain:**

#### 5.4 APPENDIX-4: DEPARTMENT FIELD TRIP AGREEMENT & CHECKLIST FORM

Refer to latest version of the Geology & Geological Engineering Student Travel Agreement & Checklist form located at the following link:

[https://www.sdsmt.edu/Academics/Departments/Geology-and-Geological-Engineering/Docs/GGE\\_student\\_travel\\_form/](https://www.sdsmt.edu/Academics/Departments/Geology-and-Geological-Engineering/Docs/GGE_student_travel_form/)

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