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Southern Great Plains Safety Orientation

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Acronyms and Abbreviations

ANL	Argonne National Laboratory
ARM	Atmospheric Radiation Measurement
DOE	Department of Energy
OSHA	Occupational Safety and Health Administration
PGS	Precision Gas System
PPE	Personal Protective Equipment
SAR	Site Access Request
SDS	Safety Data Sheet
SGP	Southern Great Plains

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1.0 Introduction

Welcome to the Atmospheric Radiation Measurement (ARM) Climate Research Facility, Southern Great Plains (SGP) site. This U.S. Department of Energy (DOE) site is managed by Argonne National Laboratory (ANL). It is important that all visitors comply with all DOE and ANL safety requirements, as well as those of the Occupational Safety and Health Administration (OSHA), the National Fire Protection Association, and the U.S. Environmental Protection Agency, and with other requirements as applicable.

2.0 Visitor Sign-In and Sign-Out

All visitors to the ARM SGP site are required to complete a [Site Access Request \(SAR\) form](#) before visiting the site.

Visitors are required to sign the visitor sign-in log and get a visitor badge anytime they visit the Central Facility site; likewise, be sure to sign out if you are leaving the site, even if it is for lunch and you plan to come back to the site the same day. It is very important that you sign in and sign out so that, in case of an emergency, we have a way to track where you are. The visitor sign-in log is located in the reception area of the Central Facility Office Building.

Visitors going to ARM SGP Extended Facilities or other ARM SGP remote facilities are required to (1) make a check-in call from the remote site to **notify Site Operations at (331) 318-3354** of the time of arrival on-site, and (2) call again and notify Site Operations of the time of departure. Any pertinent information regarding the remote site, or operations at the remote site, such as severe weather, will be coordinated between Site Operations and the visitor during the check-in call.

When performing work at locations other than the main site, telephone contact will be used to communicate with Site Operations after your initial sign-in. You must have a cellular telephone when working at remote sites, and the number of that telephone must be given to Site Operations so you can be contacted in the event of an emergency. While on-site you may use site phones. Instructions for using these phones are below and also posted on the phones:

To Call 911 Emergency: Press 911 Dial

To call outside lines: Pick up headset, Dial 1 then the number.

3.0 Dress Code

The following dress code is applicable at all ARM SGP facilities at all times:

- Long pants (no shorts) must extend from waist to foot.
- Shirt (may be short-sleeved, minimum sleeve length 4 inches).
- Closed toe shoes that have a substantial sole (and, if out in the field, shoes with ankle support).
- NO sandals or thongs (“flip-flops”) allowed.

4.0 Personal Protective Equipment (PPE)

4.1 Hard Hat

- Required when at the Central Facility 60 m tower.
- Required when installing or operating elevated instrumentation where chance of injury from elevated structures is present. The Site Safety Officer will determine when visitor installations or activities require hard hats. The Central Facility has a limited supply of hard hats available for use by visitors.
- Required when in construction areas.

4.2 Safety Glasses

- Required in construction areas and other installation activities where eye injury could occur. Discussion of installation plans with the Site Safety Officer will determine the requirements for personnel to wear safety glasses.
- Recommended during periods of high winds.

4.3 Work Gloves

Work gloves are required when doing any work during which hand injury is possible.

4.4 Special PPE When Handling Liquid Nitrogen

The Central Facility has an on-site supply of liquid nitrogen contained in 160 L Dewar flasks. Smaller Dewar flasks can be filled from these larger containers. A fill hose is provided at the 160 L Dewar flask location. When using liquid nitrogen at any SGP facility, the following PPE is required to be worn:

- Safety goggles
- Full-face shield
- Elbow-length gauntlets
- Chemical full-body apron

5.0 Smoking, Alcohol, Drugs, and Firearms

Smoking is prohibited inside any of the buildings, enclosures, and trailers at the ARM SGP site. Smoking is allowed outside in non-fire-danger areas only. Smoking debris is to be placed in authorized receptacles only.

Alcoholic beverages, illegal drugs, and firearms are strictly prohibited at any ARM SGP facility or site.

6.0 Hazards

During your visit, we want you to be aware of some of the hazards that you might encounter and also to become familiar with safety rules designed to mitigate these hazards. We have divided them into four hazard categories as follows:

- Electrical
- Chemical
- Nonionizing radiation
- Natural
- Driving Hazards

6.1 Electrical Hazards

6.1.1 De-Energizing Equipment

Always de-energize electrically hazardous equipment before performing maintenance on it; that is, never work on live circuits that could expose personnel to an electrical hazard. If you are unsure as to whether or not the work you are planning involves electrical hazards, notify the Site Safety Officer before performing the work.

6.1.2 Lock-Out/Tag-Out Standard

We abide by OSHA's Lock-Out/Tag-Out Standard, which states that you will lock out and tag out an electrical device before working on it, so that it cannot be re-energized accidentally. Lock-out/tag-out procedures and equipment are supplied by the Site Safety Officer.

6.1.3 Ground Fault Circuit Interrupters

All outdoor receptacles, all receptacles located within 6 ft of exterior doors, and all receptacles around sinks or other water supplies shall be protected by ground fault circuit interrupters.

6.1.4 Excavation and Penetration

If you need to excavate or penetrate the ground or an existing facility, enclosure, or trailer wall, please contact the Site Safety Officer for approval before starting work. Excavations in the ground require a digging permit.

6.1.5 Portable Electrical Equipment

All portable electrical equipment (except double-insulated tools) must have a three-prong grounding plug. All portable electrical equipment shall be in good working order and is subject to inspection by the Site Safety Officer or his or her designee before use.

6.1.6 Electrical Extension Cords

If electrical extension cords are to be used, they shall be the three-wire type and have a hard or extra hard usage rating. They shall be in good condition and not compromised in any way. They shall not be connected in series, spliced, or taped. The Site Safety Officer will inspect all extension cords coming to the ARM SGP site.

6.1.7 Aluminum and Metal Ladders

Because of the conductivity of aluminum and other metals, no aluminum or metal ladders are allowed on-site. Ladders brought to the site must be in good working condition.

6.2 Chemical Hazards

6.2.1 Hazard Communication Standard

We abide by OSHA's Hazard Communication Standard. Haz/Com is also known as the "Employee Right to Know Law" and is commonly addressed in a chemical hygiene plan at laboratories and universities and in private industry.

The OSHA standard specifies that personnel have the right to know of chemicals that are used on-site. This requirement is accomplished through the chemical manufacturer's Safety Data Sheet (SDS), labels on products or containers, and the education that this standard exists.

6.2.2 Bringing Chemicals On-Site

If you are bringing any chemicals to the site, please identify them on the applicable previsit forms, or notify the Site Safety Officer. Include any chemical item, even one as benign as distilled or drinking water. All chemicals brought to the site shall be labeled and have an SDS.

6.2.3 Flammable Chemicals

All flammable chemicals shall be stored in an approved flammable storage cabinet.

6.2.4 Chemicals Used in Quantity at the SGP Site

Chemicals that the SGP site uses in quantity are helium, liquid nitrogen, and carbon dioxide.

Helium: Helium is used to launch the weather balloons and is an asphyxiate. Our supplies are kept outside.

Liquid Nitrogen: Liquid nitrogen is used to cool certain instruments. It is a cryogenic material, and hazards consist of asphyxiation and burns. The SGP site's main supply Dewar flasks are stored outside, and quantities needed for instrument use are taken inside trailers in smaller Dewar flasks. All personnel are required to wear PPE and obtain approval from the Site Safety Officer when using liquid nitrogen.

The following chemicals are used in the Precision Gas System building located by the 60-m tower:

- UN1956 Compressed Gas Nitrous Oxide systems
- Carbon Dioxide, Carbon Monoxide in Air
- Carbon Dioxide, Methane in Air
- Carbon Monoxide in Air
- Nitrogen Compressed

6.3 Nonionizing Radiation Hazards

This site contains radio frequency, microwave, and laser radiation.

Laser Radiation: All laser radiation is well contained, and appropriate engineering controls are in place to protect personnel; however, if you plan to work on instruments and are required to deliberately disable safety engineering controls (e.g., a laser interlock), then you must gain approval from the Site Safety Officer before commencing any work.

Radio Frequency and Microwave Radiation: Proper engineering controls are in place to protect site personnel while inside and on the ground near radar equipment shelters. Radio and microwave radiation transmitted from the antenna can pose a health hazard with prolonged exposure. Personnel will use exposure limits listed in Table 1 whenever working above ground level. You must contact the Site Safety Officer for approval before commencing any work above ground within the exposure range.

Table 1. Exposure Limits

Radar	Antenna Stopped Safety Zone In Meters	Antenna Rotating Safety Zone In Meters
C-SAPR	79	4
X-SAPR	71	4
X-SACR	50	3
MMCR	19	N/A
MMCR	28	N/A
Ka-SACR	133	4
W-SACR	62	2
WACR	77	N/A
SWACR	47	1

6.4 Natural Hazards

The SGP facilities are located in rural Oklahoma and Kansas, and there is a myriad of natural hazards one might encounter. Some of the more evident natural hazards follow.

6.4.1 Terrain

Rural areas have uneven ground surfaces, protruding rocks, tree branches, and other vegetation that may make walking somewhat difficult. Remember always to look before taking a step, and avoid possible tripping hazards.

6.4.2 Snakes

Oklahoma and Kansas have many different species of snakes, and most are nonpoisonous. The bite of a nonpoisonous snake can cause pain and infection but is rarely serious. Three types of poisonous snakes are found in Oklahoma and Kansas, and their bites can cause serious illness and even death. The following poisonous snakes are found in the area:

- Eastern, western, and pygmy diamondback rattlesnakes
- Water moccasin
- Copperhead

First Aid for Snakebite:

1. Stay calm.
2. Look at snake for identification (shape of head, color, and markings).
3. Seek help.
4. Keep the bite at the level of the heart.
 - Remain calm.
 - Immobilize the bitten arm or leg, and stay as quiet as possible to keep the poison from spreading through your body.
 - Remove jewelry before you start to swell.
 - Position yourself, if possible, so that the bite is at or below the level of your heart.
 - Cleanse the wound gently with water, but do not flush it; cover it with a clean, dry dressing.
 - Apply a splint to reduce movement of the affected area, but keep it loose enough so as not to restrict blood flow.
 - Do not use a tourniquet or apply ice.
 - Do not cut the wound or attempt to remove the venom.
 - Do not drink caffeine or alcohol.
 - Do not try to capture the snake, but try to remember its color and shape so you can describe it, which will help in your treatment.

6.4.3 Arachnids and Insects

6.4.3.1 Spiders

Black Widow: The black widow is a small, shiny spider, less than half of an inch long but with a leg span of up to 2 in., with a red hourglass shape on its underside. A bite from a black widow spider can cause severe pain and muscle spasms, heavy sweating, stomach cramps, nausea, vomiting, and tightness in the chest, breathing difficulty, and a sharp rise in blood pressure.

Brown Recluse: The brown recluse spider is brown or brown-yellow in color and has a dark violin-shaped area on the back. The brown recluse is found under rocks and woodpiles, as well as in closets and attics. A bite from the brown recluse can cause severe pain, reddening, blistering, and death of the tissue, followed by deep ulceration at the site of the wound. The bite may not be noticed at first. Pain at the bite site begins 1 to 4 hours later.

First Aid for Spider Bite: Try to identify the type of spider. If possible, kill the spider without smashing it beyond recognition. Call the Safety Officer or Shift Supervisor, and advise them of the situation. Then seek medical attention for your bite.

6.4.3.2 Ticks

The Lone Star tick, the American dog tick, the brown dog tick, and the black-legged tick, or deer tick, frequent Oklahoma and Kansas. Most ticks are capable of transmitting a variety of diseases, including Rocky Mountain spotted fever, Colorado tick fever, Lyme disease, and even tularemia (a disease that causes toxins in the blood; high fever is a symptom).

First Aid for Tick Bites:

1. Use tweezers to grasp the tick near its head or mouth and pull gently to remove the whole tick without crushing it.
2. Wash area thoroughly with soap and water.
3. Mark the date of the bite on the calendar. If any flu-like symptoms (such as fever, muscle pain, extreme fatigue, headache, and chills), joint pain, swollen glands, or a rash appears, see your physician. Symptoms of Lyme disease may not develop for up to two months.

To avoid ticks, tuck pant legs into socks; spray an insect repellent on pants.

6.4.3.3 Fleas and Chiggers

To avoid exposure to fleas and chiggers, do not walk in uncultivated areas or heavy vegetation. Spray an insect repellent on pants.

6.4.3.4 Gnats and Mosquitoes

Gnats: Although most gnats are not bothersome, Oklahoma and Kansas have a gnat (the buffalo gnat) that bites much like a mosquito. To repel these gnats, apply Avon Skin-So-Soft™ or vanilla extract.

Mosquitoes: To avoid contact with mosquitoes, spray an insect repellent on the outside of clothing and, if repellent is designated for it, spray on bare skin.

6.4.3.5 Blister Beetles

Blister beetles are small insects that have yellow and black strips running the entire length of the body. Their bite produces immediate pain, redness, itching, and swelling that can persist for hours.

6.4.3.6 Hornets, Wasps, Bees, and Scorpions

Hornets, Wasps, and Bees: Hornets, wasps, and bees all have a stinger, but honey bees have a stinger attached to a poison sac that is left in the wound when a sting occurs. Wasp and hornets retain their stinger and may sting repeatedly.

First Aid for Hornet, Wasp, or Bee Sting: If a stinger is present, remove the stinger from the wound by scraping a blunt object, such as a dull blade, across the wound. Symptoms usually resolve within a few hours. If symptoms such as difficulty in breathing or rapid severe swelling occur, seek medical attention.

Scorpion: All scorpions in Oklahoma and Kansas can produce a painful sting, but serious life-threatening symptoms are rare.

First Aid for Scorpion Sting: Most scorpion stings do not need medical treatment. If symptoms are severe, supportive care in a hospital is usually required. In addition to bed rest, this might include sedatives for muscle spasms and intravenous drugs to manage elevated blood pressure, agitation and pain.

6.4.3.7 Cattle and Electric Cattle Fences

At times, the pasture outside of the instrument areas may contain cattle. Cattle are, for the most part, docile animals. Please do not provoke them.

Because of the cattle, all exposed instrumentation, shelters, and platforms have either a single-strand electric fence or a barbed-wire fence. Be careful not to touch the electric wire because a mild shock is likely. All electric fences have gates; please use them. Be careful around barbed-wire fences because the small barbs are very sharp and can cause injury.

6.4.3.8 Badgers, Skunks, and Coyotes

Badgers: The badger is fairly prevalent in most parts of Kansas and Oklahoma. Badgers are small (average 20 lb) mammals that feed on small rodents, fruits, and roots. They have very sharp teeth and long sharp claws and are quite aggressive. In cooler weather, the badger will make a burrow and remain there for several months. The opening to the burrow is 6 to 8 inches in diameter. The badger is a defensive animal and will usually only attack if provoked. Should you spot a badger hole, keep your distance, and do not put your feet or hands into the hole.

Skunks: The skunk is fairly prevalent in most parts of Kansas and Oklahoma. This small mammal produces a very unpleasant odor when excited or threatened. Please keep your distance from these animals. They also can carry rabies; if bitten, seek medical attention immediately.

Coyotes: The coyote is fairly prevalent in most parts of Kansas and Oklahoma. Coyotes are small dog-like mammals. They attack small animals and livestock. Coyotes are, for the most part, very shy and afraid of humans. They do, however, sometimes carry rabies; so, if bitten, seek immediate medical attention.

7.0 Emergency Services

Local authorities (to include police, fire, and medical services) have been identified for each of the SGP site facilities. Routine and emergency coordination for these emergency services will be provided through telephone contact with the Central Facility Control Center at **(331) 318-3354**.

8.0 Emergency Situations

If emergency situations arise, first take the immediate required action (first aid, cardiopulmonary resuscitation [CPR], etc.), and then contact the Central Facility to advise of the situation. More information and guidance on emergency situation actions and reporting will be provided by the contact with the Central Facility.

9.0 Severe Weather

The Central Facility will establish the “site weather alert condition” (red, yellow, or green). The Central Facility has access to near real-time weather radar displays, plus access to the Internet weather advisory services, including the National Weather Service advisories and radar displays.

Coordination between the Central Facility and field personnel shall allow for sufficient advance warning of impending severe weather.

9.1 Site Weather Alert Condition

The SGP site currently uses a three-color system to denote the weather alert status for any given site. The site weather alert condition status will be established and modified as needed by coordination between the Central Facility and applicable personnel on-site. The following categories define the SGP weather alert condition status.

9.1.1 Green – Normal Condition

No weather watches or warnings are in effect for the site area.

9.1.2 Yellow – Watch Condition

The yellow weather alert condition is established when forecasted weather conditions may result in a severe weather situation. Severe weather is classified as thunderstorms, tornadoes, heavy rain or snow, flash floods, winter storms, heavy fog, or any other weather condition that may hamper or affect site

operations and personnel. During the watch condition, Central Facility and field personnel shall maintain their alertness to the surrounding weather conditions. Any changes noticed shall be immediately reported to the Central Facility, and responses shall be coordinated between the Central Facility and field personnel via telephone.

9.1.3 Red I – Warning Condition

The red I weather alert condition is established when forecasted severe weather is imminent. The important implication of the red I condition is for the field personnel to implement acute heightened awareness of the surrounding weather conditions and to be aware that the potential exists for a condition that may require field personnel to seek shelter at any moment. If the severe weather includes lightning, large hail, and high winds and if these events are observed within 5 mi of the site and are moving toward the site, all outside work shall be immediately stopped. At the Central Facility, personnel shall remain inside the designated site building. Field personnel shall evacuate the site to a safe location. On reaching the safe location, field personnel shall call and notify the Central Facility of their location, status, and any other relevant information until the weather threat has passed.

9.1.4 Red II – Warning: Take Cover

The red II weather alert condition denotes the threshold for immediate evacuation to an adequate storm shelter. At the Central Facility, all personnel shall immediately proceed to the underground storm shelters. One such shelter is located directly east of the front entrance of Main Office Building, and there is also one located at Shipping and Receiving in front of the North Storage Warehouse (signage is located on the door alerting you to its location). Be sure to take a cellular telephone and flashlight.

At remote facilities without storm shelters, personnel who have not otherwise sought a safe location shall immediately seek a low-lying area, such as a ditch or ravine, for cover.

Upon assessment that the severe weather event has passed, personnel shall cautiously exit the storm shelter and immediately survey the area, noting any observed damage.

After completion of the initial damage assessment, call and notify the Central Facility that you have safely survived the severe weather event, and relay information on any damage observed. The Central Facility will advise what additional actions need to be taken.

Earthquake Safety Tips

- If you are indoors, stay there. Quickly move to a safe location in the room such as under a strong desk, a strong table, or along an interior wall. The goal is to protect yourself from falling objects and be located near the structural strong points of the room. Avoid taking cover near windows, large mirrors, hanging objects, heavy furniture, heavy appliances or fireplaces.
- If you are outdoors, move to an open area where falling objects are unlikely to strike you. Move away from buildings, power lines, and trees.
- If you are driving, slow down smoothly and stop on the side of the road. Avoid stopping on or under bridges and overpasses, or under power lines, trees, and large signs. Stay in your car.

9.2 Hot Weather Exposure

Three heat-related illnesses can be caused by hot weather exposure.

9.2.1 Heat Stroke

Heat stroke is life-threatening. The victim's temperature control mechanisms stop working. The body temperature can rise so high that brain damage and death may occur if the body is not cooled quickly.

Symptoms of Heat Stroke: Symptoms include dry, hot red skin and a very high body temperature.

First Aid for Heat Stroke: First aid is to cool the victim down as quickly as possible, and call for medical help.

9.2.2 Heat Exhaustion

Heat exhaustion is less dangerous than heat stroke. Heat exhaustion typically occurs when people work in a warm, humid place where body fluids are lost through heavy sweating.

Symptoms of Heat Exhaustion: Symptoms include cool, moist pale or red skin or heavy sweating, dilated pupils, headache, nausea, and dizziness.

First Aid for Heat Exhaustion: First aid is to get the victim into a cooler place. Place victims on their back, with feet up. Cool by fanning or applying cold packs, and give 1/2 cup of water every 15 minutes.

9.2.3 Heat Cramps

Heat cramps are muscular pains and spasms due to heavy exertion and usually involve the abdominal muscles and/or the legs. It is generally thought that the loss of water and salt from heavy sweating causes cramps.

9.2.4 Hot Weather Hazard Prevention

- Drink plenty of liquids such as water and fruit and vegetable juices. Avoid soda pop and coffee.
- Restrict strenuous activity during hot periods.
- Wear loose-fitting light-colored clothing, preferably made of natural fibers such as cotton. Man-made fibers do not absorb water well. Wear a hat.

9.3 Cold Weather Exposure

During Oklahoma winter's, cold weather is almost a certainty. The two main personal effects cold weather can produce are reviewed below.

9.3.1 Hypothermia

Hypothermia results when the body loses heat faster than it can produce it. When this situation first starts to occur, the blood vessels start to constrict, and hands and feet are first affected. Next involuntary shivers begin to occur. The shivering is your body's first warning sign. Further heat loss produces speech difficulty, forgetfulness, and loss of manual dexterity, collapse, and finally death.

9.3.2 Frostbite

As your blood vessels constrict to keep vital organs warm, extremities can experience frostbite. Hands and feet are usually the first body parts affected. Frequently, frostbite begins with a burning sensation in the affected part(s), followed by a numbing phase. The numbing phase is very dangerous as this is when actual frostbite may occur. Rub snow into affected area or soak in cool water, if you believe frostbite has set in. Do NOT use warm or hot water as this may cause burns and or permanent damage. Seek medical attention as soon as possible.

9.3.3 Cold Weather Exposure Prevention

Dress warmly, wearing layered clothing. Cover all exposed flesh. If clothes become wet, change them as soon as possible.

Set up a work/rest regiment. During your rest period go into a warm area and drink warm beverages.

Check the Wind Chill Chart to determine cold weather exposure hazard guidance based upon wind and temperature.

9.3.4 Cold Weather Driving

Take along hot liquids (e.g., decaffeinated coffee), blankets, and flashlights to aid you should your vehicle become stranded in cold weather.

In snow and icy conditions, remember to allow extra time to get to your destination. Also bring along a container of sand or kitty litter to assist you in the event you get stuck.

Remember, if roads are slick and hazardous call the Highway patrol Oklahoma Road Conditions -- (405) 425-2385 or (888) 425-2385 for current road conditions and then notify the Central Facility of the situation.

10.0 Rural Driving Hazards

The SGP facilities are located in rural Oklahoma and Kansas, which means to access these sites you must travel on non-paved roads (i.e., dirt and sand/gravel roads). Thus, it is important to coordinate with the Central Facility to receive the latest information on road conditions. Remember that many of the rural roads have unmarked and blind intersections, so proceed cautiously. Finally, with the increase of the deer population in both Oklahoma and Kansas, please heighten your awareness and slow down when traveling in areas that could conceal a deer (i.e., areas that have high vegetation or are wooded). Deer tend to travel about mostly at dusk and dawn.

11.0 Safety Violations/Discrepancy

The Site Safety Officer and Site Operations Manager have the authority to cease operations of any activity that is in violation of federal, state, or local safety regulations or is in violation of the items covered in this orientation. Any person has the authority to cease operations that are immediately dangerous to life and health (imminent danger). The Site Safety Officer or the Site Operations Manager (or both) shall be immediately notified of any safety or emergency incident occurring at any ARM SGP facility.



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