

# Research Safety Summary - View

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- Embedded links will be unavailable outside of the RHACS system. Forest Service JHAs (ORNL annotated) attachments to the RSS are also provided as information only copies.
- Non-ORNL collaborators may read these selected documents for background information but **the official copy is maintained as a hardcopy document at the SPRUCE Office, in Grand Rapids.**
- Non-ORNL collaborators must read this hardcopy version and sign the appropriate acknowledgement form which will be maintained as an official SPRUCE record.

RSS No	7728.4									
Status	Authorized									
Minor Revisions	None.									
Last Modified by	Jacobs, Gary K ( <a href="#">25715</a> ) on 6/28/2012 2:11:45 PM									
Notice	This information is <b>current as of 7/26/2012 9:13:55 AM</b> . The official copy of this Research Safety Summary is the online version. Before using a printed copy, you must verify that it is the most recent version. Any printed copies provided to individuals for the purpose of controlling work must be controlled in accordance with the <a href="#">Document Control</a> subject area.									
Title	ESD Off-Site: Minnesota SPRUCE Experiment--Climate Change Response SFA									
Approvals/Authorizations	<table border="1"> <thead> <tr> <th>Date/Time</th> <th>Name</th> <th>Role</th> </tr> </thead> <tbody> <tr> <td>6/28/2012 2:11:23 PM</td> <td>Jacobs, Gary K (<a href="#">25715</a>)</td> <td>Group Leader</td> </tr> <tr> <td>6/28/2012 2:11:38 PM</td> <td>Jacobs, Gary K (<a href="#">25715</a>)</td> <td>Division Work Authority</td> </tr> </tbody> </table>	Date/Time	Name	Role	6/28/2012 2:11:23 PM	Jacobs, Gary K ( <a href="#">25715</a> )	Group Leader	6/28/2012 2:11:38 PM	Jacobs, Gary K ( <a href="#">25715</a> )	Division Work Authority
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Description Text	<p>Experimental work under the Response SFA will focus on the identification of critical response functions for terrestrial organisms, communities, and ecosystems. Both direct and indirect effects of these experimental perturbations will be analyzed to develop and refine models needed for full Earth system analyses. Response SFA research will be organized around a climate change manipulation focusing on the combined response of multiple levels of warming at ambient or elevated CO2 (eCO2) levels.</p> <p>A more detailed discussion of the scientific goals/outcomes of the proposed work can be found in the expanded project description attachment and the project's website: <a href="http://mnspruce.ornl.gov/">http://mnspruce.ornl.gov/</a></p> <p>The experiment will provide a platform for testing mechanisms controlling vulnerability of organisms and ecosystems to important climate change variables (e.g., thresholds for organism decline or mortality, limitations to regeneration,</p>									

	<p>biogeochemical limitations to productivity).</p> <p>The experiment will evaluate the response of existing biological communities to a range of warming levels from ambient to +8°C. The ambient, +4°C and +8°C warming treatments will also be conducted at eCO<sub>2</sub> (in the range of 800 to 900 ppm).</p> <p>The experiment will be conducted in a Picea mariana [black spruce] – Sphagnum spp. forest in northern Minnesota. This ecosystem located at the southern extent of the spatially expansive boreal peatland forests is considered to be especially vulnerable to climate change and to have important feedbacks on the atmosphere and climate.</p> <p>This science plan for the Response SFA also describes support for core long-term tracking of the hydrologic, biogeochemical and biological response of the Walker Branch Watershed to inter-annual climatic variations.</p>
Description File	<a href="#">Project Description.pdf</a>
Division	X042: Environmental Sciences Division
Start Date	9/8/2009
End Date	None.
Account	None.
General Notes	<p><b>Note 1: Nearly all field work for this RSS will be performed at the Marcell Experiment Station in Minnesota managed by the United States Forest Service (USFS). RSS participants will read and understand Job Hazards Analyses (JHAs) required by the USFS to work at the site as part of the work control package.</b></p> <p><b>Note 2: Be advised that nearly all JHAs attached to this RSS have been annotated by ORNL Subject Matter Experts (SMEs). The annotations have been made in order to document (1) certain Forest Service requirements that have been waived or (2) where some requirements for the ORNL participants have been clarified or established within this RSS instead.</b></p> <p><b>Note 3: Not all Forest Service JHAs are attached here at this time. The scope of this RSS (and attached JHAs) is limited to the potential hazards (and subsequent controls) that are expected to exist for the initial survey/sampling campaigns to occur within the next year. Other JHAs and RSS hazard questions &amp; controls will be identified and implemented via major or minor revisions before additional phases of lab or field work commence.</b></p> <p><b>Note 4: As discussed in multiple JHAs, each RSS participant working at Marcell, must possess CPR, First-Aid, and Bloodborne Pathogen Training qualifications.</b></p> <p><b>Note 5: A daily pre-job safety briefing is recommended to discuss the goals, tasks, and associated hazards for the day's activities.</b></p>

General Attachments	<p><b>These documents are provided as information copies.</b></p> <p><a href="#">JHA/Field Work (ORNL SME Annotated August 2010).doc</a>;  <a href="#">JHA/Fieldwork_jha (ORNL SME Annotated August 2010).doc</a>;  <a href="#">JHA/Insect (ORNL SME Annotated August 2010).doc</a>;  <a href="#">JHA/Personal Safety (ORNL SME Annotated August 2010).doc</a>;  <a href="#">JHA/Plants &amp; Animals JHA (ORNL SME Annotated August 2010).doc</a>;  <a href="#">JHA/Soil sampling (ORNL SME Annotated August 2010).doc</a>;  <a href="#">JHA/Tick (ORNL SME Annotated August 2010).doc</a>;  <a href="#">JHA/Weather (ORNL SME Annotated August 2010).doc</a>;  <a href="#">JHA/Dehydration (ORNL SME Annotated August 2010).doc</a>;  <a href="#">Ladder Use (ORNL SME Annotated August 2010).doc</a>;  <a href="#">RSS 7728 QEA FINAL (updated 06-2012).pdf</a></p>
Point of Contact	Horton, C Yvonne ( <a href="#">15139</a> )
Division Work Authority	Fowler, David E ( <a href="#">27217</a> )
Principal Investigator	Hanson, Paul J ( <a href="#">29602</a> );
PI Delegates	Hanson, Paul J ( <a href="#">29602</a> );
Group Leaders	Jacobs, Gary K ( <a href="#">25715</a> );
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Required Reviewers	Childs, Joanne ( <a href="#">742253</a> ) - <i>Lab Space Manager</i> ; Childs, Steve Evans ( <a href="#">34637</a> ) - <i>WSR review</i> ; Dugger, John P ( <a href="#">980499</a> ) - <i>SSD/DSO reviewer</i> ; Huczko, Kathy ( <a href="#">927469</a> ) - <i>Project Manager reviewer</i> ; Stump, Jarrad D ( <a href="#">902929</a> ) - <i>Lead POC/DSO for this version of the RSS</i> ;
Optional Reviewers	Horton, C Yvonne ( <a href="#">15139</a> ) - <i>Optional Division POC reviewer</i> ; Jacobs, Gary K ( <a href="#">25715</a> ) - <i>Optional Group Leader reviewer</i> ; Phillips, Jana Randolph ( <a href="#">746669</a> ) - <i>Optional Lab Space Manager</i> ; Sabo, Karen A ( <a href="#">966556</a> ) - <i>Optional Quality reviewer</i> ;
Lab Space Managers	Childs, Joanne ( <a href="#">742253</a> ); Phillips, Jana Randolph ( <a href="#">746669</a> )
Locations	<a href="#">Building 0907, Room 102</a> - <i>Lab work on samples from Minnesota</i> ; <a href="#">Building 0907, Room 103</a> - <i>Lab work on samples from Minnesota</i> ; <a href="#">Building 102GRAND, Room 01</a> - <i>SPRUCE Project Office</i> ; <a href="#">Building 1506, Room 129B</a> - <i>Lab work on samples from Minnesota</i> ; <a href="#">Building 1521, Room 101</a> - <i>Lab work on samples from Minnesota</i> ; <a href="#">Building 1521, Room 102</a> - <i>Lab work on samples from Minnesota</i> ; <a href="#">Building 1521, Room 103</a> - <i>Lab work on samples from Minnesota</i> ; <a href="#">Field Work</a> - <i>Work in Black Spruce - Sphagnum Bog</i> ; <a href="#">Off-Site Work</a> - <i>Minnesota research site</i>
Nepa Documentation	NEPA Document Number 3627X. Following the preparation and review of an Environmental Assessment on the SPRUCE project, a Finding of No Significant Impact was found and we have permission to proceed. All the planned lab work here at ORNL also falls within the scope of ESD's Division Categorical Exclusion (CX) for Small Scale R&D projects (2657X) For the initial site sampling & field work currently covered by this RSS, it has been determined that the new off-site deployment activities (e.g. activity bullets 1, 7 and 9 of the CX) also fall within the same ESD CX. This current Categorical Exclusion (CX) is available

	<p>online at the NEPA Homepage: <a href="http://www-ep.ornl.gov/nepa/PDFDocs/2657X.pdf">http://www-ep.ornl.gov/nepa/PDFDocs/2657X.pdf</a>; Consult EPO/ECR or POC if you feel any planned activities might fall outside of the scope of this CX. Note: Further NEPA review and evaluation of the planned experimental work in Minnesota is underway. National Environmental Policy Act (NEPA) Review of Project: FY2010 Environmental Sciences Division Project, SPRUCE Experiment (3530X) was not agreed to by DOE-ORO and the process for an Environmental Assessment Determination (EAD) has been initiated.</p>
<p>Hazards</p>	<p>5.0 This operation involves the potential for electrical shock or the release of other hazardous energy (mechanical, pressure, steam, etc.)</p> <p><b>Hazard Notes:</b>  Battery charging will be conducted within the field and at the 102GRAND location, because some instruments use batteries or plug into power strips, and batteries must be recharged.</p> <p>A gas powered generator will also be used within the field to provide power to the remote sample locations.</p> <p><b>Control Notes:</b>  All electrical equipment (non-battery, i.e., using AC current) used in the field will be GFCI protected (either by in-line GFCI extension cord or GFCI circuits.)</p> <p>Electrical field equipment that stays outdoors unattended should be listed by a National Recognized Testing Laboratory (e.g., UL) for outdoor use.</p> <p>Corded electrical equipment cords and battery cords will be visually inspected based upon duration of use (daily if practical) by the user for defects (loose parts, deformed or missing pins, pinched, crushed, or deteriorated outer insulation, etc.). Cords will be removed from service if defect or damage is observed. Cords subject to pedestrian traffic will be protected to eliminate physical damage and minimize tripping hazards.</p> <p>Sealed LI-COR batteries will be charged in a designated area. Batteries will not be charged when frozen, as this increases the likelihood of fracturing the battery casing. Batteries that have visible signs of damage will not be connected to the charger and will be taken out of service for proper disposal.</p> <p>Note: Deep cycle batteries may be charged by participants of this RSS, but manufacturer's instructions for charging/safety will be followed. In addition, the work-aid at the following link, <a href="https://portal.ornl.gov/sites/eesd/ops_west/RSSDocuments/FinalPDFs/Marine-Auto-ATV-BatteryCharging.pdf">https://portal.ornl.gov/sites/eesd/ops_west/RSSDocuments/FinalPDFs/Marine-Auto-ATV-BatteryCharging.pdf</a>, will be followed during these activities and posted within the battery charging area.</p> <p><b>Locations:</b>  Building 102GRAND, Room 01  Field Work  Off-Site Work</p> <p><b>Attachments:</b>  <a href="#">Husky Generator Users Manual (uploaded 2011).pdf</a></p>

7.1 This operation involves work conducted under the [OSHA Laboratory Standard](#).

**Potential Training:**

Chemical Hygiene Plan Rev 5 RRD

General Hazard Communication

ORNL Hazard Communication Job Specific Training

OSHA Lab Standard Training - Includes site-specific

**Requirements:**

[Chemical Safety](#)

[Exposure Assessments](#)

**Hazard Notes:**

Some activities occur in laboratories to prepare and process samples before and after field-deployment.

At the present time, all of the associated lab activities present no or very low hazards to the participants. Any lab activities for this RSS that may present significant ESH hazards will most likely be controlled by other authorized ESD RSSs that occur in these lab/process areas.

**Control Notes:**

All participants working in these labs must be trained to the CHP and have site specific training to the space(s).

All work in labs controlled by the CHP require safety glasses with side shields as the minimum level of eye protection, unless official LSM signage (approved by POC/DSO) provides waivers to this requirement.

Be advised that most, if not all, lab activities will be covered and described in better detail in other authorized RSSs such as [RSS 4788](#) and [RSS 2524](#). All staff/guests performing activities covered by such "associated" RSSs must also be a listed participant of and adhere to the requirements of them.

**Locations:**

Building 0907, Room 102

Building 0907, Room 103

Building 102GRAND, Room 01

Building 1506, Room 129B

Building 1521, Room 101

Building 1521, Room 102

Building 1521, Room 103

**Attachments:**

None.

7.2 This operation involves work conducted under the [OSHA Hazard Communication Program \(HAZCOM\)](#).

**Potential Training:**

General Hazard Communication

ORNL Hazard Communication Job-Specific Training

**Requirements:**

[Exposure Assessments](#)

**Hazard Notes:**

Some chemicals (e.g. isopropyl alcohol) shall be transported to and used within the field location in non-laboratory settings.

**Control Notes:**

All participants working with chemicals in the field must be ORNL HAZCOM trained and be familiar with the materials (i.e., have access to and be aware of the product MSDSs).

To meet HAZCOM labeling requirements, secondary chemical containers (not used/stored in "labs") must be labeled with the identity of the hazardous chemical(s) and appropriate hazard warnings (via words or symbols) which provide at least general information regarding the physical and health hazards. This labeling requirement applies unless: the hazardous chemical(s) is only used by the person transferring the chemical from the primary container; the person that performed the transfer has constant control of the container; AND, the chemical is completely used within the work shift.

Chemical-specific PPE and safety precautions will be followed as prescribed in the MSDS unless discussion(s) with ES&H POC or Division Safety Officer (DSO) determines other precautions or PPE are required.

**Locations:**

Field Work  
Off-Site Work

**Attachments:**

None.

- 7.7 This operation involves chemicals or wastes that are [flammable](#) or [combustible](#).

**Requirements:**

[Chemical Safety](#)

[Exposure Assessments](#)

[Personal Protective Equipment](#)

[Storing and Handling Flammable and Combustible Liquids](#)

**Hazard Notes:**

Gasoline will be transported to and used in the field for the gas powered generator.

Small amounts of isopropyl alcohol will be transported to and used in the field for cleaning sampling tubing and instrumentation.

**Control Notes:****General Controls for Flammable & Combustible Liquid Storage:**

Small amounts of flammable and combustible liquid storage (including waste) outside of approved storage devices is permitted in each lab (i.e., up to 4 liters in general lab area/benchtops and up to 4L in a hood can be stored outside of a cabinet or refrigeration unit approved for such flammable/combustible liquid storage). More information and requirements for combustible and flammable storage and handling can be found in SBMS at:

<http://sbms.ornl.gov/sbms/sbmsearch/subjarea/chemsafe/chemsafepro4.cfm>

**GASOLINE HANDLING IN FIELD:** Gasoline is listed as an eye irritant, safety glasses with side shields shall be worn when fueling equipment from portable containers.

Refer to Question 15.1 regarding transportation issues for gasoline.

**Locations:**

Building 102GRAND, Room 01

Field Work

Off-Site Work

**Attachments:**

None.

8.11 This operation involves the use of quarantined soils, plants, or pests.

**Requirements:**

[Movement of Soils, Plants or Plant Products, or Other Contaminated Equipment](#)

**Hazard Notes:**

This question has been marked to raise awareness since USDA or State quarantine restrictions change with time.

Evaluation of local restrictions on the transportation of soils and plant materials to-and-from the research locations must be evaluated.

Note: Precautions should be taken to avoid cross-contamination of "clean" soils with other quarantined soils.

**Control Notes:**

**Marcell Experiment Station Soils:** The research site north of Grand Rapids, MN currently has no known restrictions. We may bring back soils and leaf liter, and ultimately dispose of them, with no restrictions.

**Locations:**

Building 0907, Room 102

Building 0907, Room 103

Building 1506, Room 129B

Building 1521, Room 101

Building 1521, Room 102

Building 1521, Room 103

Field Work

Off-Site Work

**Attachments:**

None.

8.12 This operation generates excavated soils.

**Requirements:**

[Excavated Soil, Radiological Management of Excavation/Penetration](#)

**Hazard Notes:**

Manual soil coring/sampling will be performed on this project. Some of these cores into deep peat may be over 1 meter deep. Experimental plots

within which all research sampling will take place will be identified and controlled by marked boundaries.

**Control Notes:**

All of the soil coring/sampling to be performed will be performed off-site. As a result, ORNL's excavation/penetration requirements are not applicable.

It is the responsibility of the PI and RSS participants to ensure that any requirements of the USDA Forest Service facilities be met before any such sampling is performed in order to avoid buried utilities, etc. If ground penetrations are to be made outside of the bog (Marcell Experiment Station) footprint a Minnesota state required One-Call shall be made (1-800-252-1166) prior to conducting the work.

**Locations:**

Field Work  
Off-Site Work

**Attachments:**

None.

- 9.2 This operation involves exposure to moving or rotating parts, such as motors, shafts, pulleys, belts, or any other potential mechanical energy.

**Requirements:**

[Occupational Hazard Controls](#)

**Hazard Notes:**

A chainsaw will be used during work activities for the collection of tree/peat samples.

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Some hand and portable power tools (e.g. drills, bow saws, etc.) may be used during work activities.

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A manually operated high lift jack will be used to lift/obtain peat samples from the bog.

**Control Notes:**

**Chainsaw and Clearing Saw Controls:**

All staff/guests operating such power tools and their back-up/support personnel must be a listed participant of and adhere to the requirements (including PPE, training, etc) of the authorized version of [RSS 893](#).

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When using hand and portable power tools users shall ensure that they have donned the proper PPE for the device being used (e.g. safety glasses with side shields where flying particles/debris are being generated). Note: If there is a potential for injury to the face a face shield shall be used in addition to safety glasses.

Workers hands shall not contact any moving or rotating part of the equipment (such as when using a drill, saw, etc.). A safe working distance for the rest of the body shall be maintained from the moving or rotating parts of the equipment to prevent loose fitting clothing from contacting and being drawn into the moving parts.

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When using the high lift jack participants shall be aware of potential pinch points as well as the potential for the binding gear to fail, resulting in the hand crank free spinning producing the potential to be struck by the crank or caught in the gear.

**Locations:**

Field Work  
Off-Site Work

**Attachments:**

None.

11.2 This operation involves a vessel operated at greater than 100 psi.

**Requirements:**

[Design](#)

**Hazard Notes:**

Portable pressure chambers will be used to conduct plant moisture stress (PMS) measurements. These instruments are pressurized/operated by filling a portable tank from a nurse tank (standard size cylinder).

**Control Notes:**

**Plant Moisture Stress (PMS) Controls:**

- All participants using this instruments must be familiar with their use and follow manufacturer guidelines and operating instructions which can all be found at <http://pmsinstrument.com/> and at <http://pmsinstrument.com/tutorials/tutorials.htm>
- All in-service regulators shall be receipt inspected and only field portable tanks having a hydrostatic acceptance test within the last 5 years will be used.
- All cylinders not internal to the instruments, will be stored and used valve end up, with cylinders secured to prevent instability.
- Portable tanks (secondary chemical containers) filled for use in the field must be properly labeled with identity of the hazardous chemical(s) and appropriate hazard warnings to meet Hazcomm requirements UNLESS the following conditions exist: (a)The contents will be used by only one person who has constant control over the container, and (b)The person transfers the hazardous chemical from a labeled container; and, the transferred gas will be immediately used (i.e. during the work shift) by the person performing the transfer.

**Locations:**

Building 102GRAND, Room 01  
Field Work  
Off-Site Work

**Attachments:**

None.

11.5 This operation involves compressed gases at greater than 100 psi.

**Requirements:**

[Compressed Gas Cylinders and Related Systems](#)

**Hazard Notes:**

Compressed Nitrogen will be used at the offsite location during the course of these experiments.

Other calibration gases (such as compressed air, CO<sub>2</sub>, CH<sub>4</sub>) will be used both within the field and at the 102GRAND lease space.

**Control Notes:**

Standard best laboratory practices will be observed in the use of gas cylinders: Labels on compressed gas cylinders will be checked to verify the stated contents prior to use. Cylinders will be secured and stored in an appropriate area until needed. Users will determine to the best of their ability that cylinders are not defective or leaking. Regulators will be placed by trained personnel and will be inspected if their integrity is questioned.

Calibration gases will be maintained as a mixture containing concentrations within an ambient range (<1,000ppm CO<sub>2</sub>; <100ppm CH<sub>4</sub>).

NOTE: All requirements and guidance on compressed gas cylinder use can be found at: [http://sbms.ornl.gov/sbms/SBMSearch/subjarea/cgc/cgc\\_sa.cfm](http://sbms.ornl.gov/sbms/SBMSearch/subjarea/cgc/cgc_sa.cfm)

**Locations:**

Building 102GRAND, Room 01  
Field Work  
Off-Site Work

**Attachments:**

[RSS 7728 Nitrogen release worst case scenario 102Grand.pdf](#)

12.0 This operation involves sources of [thermal hazards](#), such as heaters, ovens, [cryogenics](#), or uninsulated steam lines.

**Requirements:**

[Exposure Assessments](#)

**Hazard Notes:**

Commercial drying ovens are used in the labs following field sampling campaigns, etc.

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Samples may be treated or preserved via the use of dry-ice and/or liquid nitrogen.

**Control Notes:**

Typical drying temperatures range from 60 to 105 °C. Appropriate insulated gloves should be worn to avoid burns when handling hot materials.

Follow any and all posted signage associated with the equipment.

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**Cryogenic & Dry Ice Controls:**

Cryo/thermal gloves are available for use when extended handling time of cold materials is required while inside freezers or while removing items

from freezers. Gloves (cotton, leather or other material) that eliminate the direct contact and minimize temperature transfer between the objects being handled and the skin may be used when more dexterity is needed and handling time is minimal.

At minimum, safety glasses with side shields are required any time cryogenic liquids, exposed to the atmosphere, are present. Goggles provide the best protection for the eyes. A full face shield **shall** be used when a cryogenic liquid is transferred to an open container where there is a potential for bubbling.

Tongs shall be available for removing samples from liquid nitrogen.

Only containers specifically designed for the purpose of holding cryogenic liquids should be used when freezing samples with liquid nitrogen.

Further info can be found in the controlling SBMS Exhibit:

<http://sbms.ornl.gov/sbms/SBMSearch/subjarea/GSH/ExhibitCryogens.cfm>

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**Dry Ice Usage Controls (see Q15.4 for additional dry ice shipping controls)**

- (1) Never store dry ice in an airtight container/use loose fitting lids to prevent pressure build-up
- (2) Do not touch dry ice with your skin! Use tongs, insulated (thick) gloves or an oven mitt and safety glasses with side shields when handling dry ice.
- (3) Use in a well ventilated area and keep the material away from your face/breathing zone.

**Dry Ice Supplemental information:** If field trucks are not utilized, be cautious if transporting dry ice inside vehicles compartments. Dry Ice should be in closed coolers. One should have adequate ventilation of the vehicle compartment and should not recirculate the air in the vehicle.

**Note: Transport of dry ice in government vehicles by RSS participants is not restricted; however, If participants should need to prepare and ship samples and/or materials on dry ice other than by ground transport, DOT function-specific training must be taken (there is currently no ORNL qualification number for this training and records of this outside training will be maintained by the DTO).**

**Locations:**

Building 0907, Room 102  
Building 102GRAND, Room 01  
Building 1506, Room 129B  
Building 1521, Room 101  
Building 1521, Room 103  
Field Work  
Off-Site Work

**Attachments:**

None.

13.1 This operation involves sources of [excessive noise](#). (E.g., such that you would have to shout at a distance of 3 feet to communicate to a co-worker, or louder than busy traffic.)

**Requirements:**

[Exposure Assessments](#)

[Hearing Conservation](#)

**Hazard Notes:**

Hearing protection may be required during the use of some types of equipment associated with this project (e.g. some hand/portable power tools, within close proximity of gas powered generators, chainsaws, etc.).

**Control Notes:**

Participants of this RSS that use hearing protection devices (ear plugs and/or muffs), either on a mandatory or when used for other tasks on a voluntary basis, must understand why the PPE is required and review the proper use and fit of hearing protection devices document attached to this section of the RSS.

**Locations:**

Field Work

Off-Site Work

**Attachments:**

[Ear Plug Fitting Instructions and NIOSH Information.pdf](#)

13.3 This operation involves [ergonomic hazards](#).

**Requirements:**

[Exposure Assessments](#)

[Occupational Hazard Controls](#)

**Hazard Notes:**

Carrying field equipment and sampling gear (tools, batteries, etc.) can present ergonomic hazards if loads are not carried properly, etc. Foot travel from nearest vehicle parking location to Bog site is ~ 1/2 mile.

Traveling on bog boardwalks when wet represents a plausible slipping and/or twisting hazard.

**Control Notes:**

As outlined in several of the JHAs in the attached USFS package, participants should avoid awkward positions and should follow proper lifting and carrying techniques.

**Tips for Lifting Heavy Items:** Lifting is strenuous, and proper bending and lifting techniques are strongly encouraged in order to perform it safely. By bending at the knees instead of at the waist and lifting with the large, strong muscles of the legs instead of the small muscles of the back, back injuries can be prevented and may reduce the potential for lower back pain.

For most workers, lifting loads over 20 kgs. (44 lbs.) results in an increased number and severity of back injuries. Personnel should be very cautious and use proper lifting techniques when lifting any load, especially those loads approaching 40 lbs. A team lift is recommended for all loads with weights at or above 40 lbs. Individuals should seek assistance, even for lesser

weights depending on their personal capabilities and the bulkiness of the item.

Bog boardwalks are being elevated above the surrounding saturated conditions to keep them dry. Methods for adding abrasive or non-skid surfaces to the bog boardwalks shall be utilized to further limit the potential for slips, trips, twists, and falls when the boardwalks may be wet from precipitation. When the boardwalks are covered with snow in winter special care including shoveling off the boardwalks should be taken to ensure their safe use.

**Locations:**

Field Work  
Off-Site Work

**Attachments:**

None.

13.5 This operation involves work in [extreme climates](#) or temperatures.

**Potential Training:**

Heat Stress Training

**Requirements:**

[Occupational Hazard Controls](#)

**Hazard Notes:**

Field work in hot and especially cold conditions. Work outdoors with potential for inclement and/or severe weather conditions.

**Control Notes:**

As outlined in several of the JHAs (e.g., "dehydration", "fieldwork", "snowshoe travel", "weather") in the attached USFS package, participants must follow many controls to maximize their safety during severe weather events in northern Minnesota (heavy snow, thunderstorms, etc depending upon the time of year)

Participants working in the field need to be aware of heat and cold stress symptoms. For more information regarding extreme climates or temperatures see links below:

<http://www.osha.gov/Publications/osha3154.pdf>

<http://www.osha.gov/Publications/osha3156.pdf>

During inclement weather, if you can hear thunder or see lightning you are within the strike distance of the lightning. Stop your activities, evacuate the site and seek safe shelter immediately. Safe shelter may be obtained in a permanent structure or in a vehicle with windows closed. If there is not time to get to such protected areas, find a low-lying, open place that is a safe distance from trees, poles, or metal objects, or standing water that can conduct electricity. Get into and stay in a tucked position.

**Additional ORNL Controls to supplement USFS JHAs:**

- [Wait thirty minutes after the last strike before resuming field activities.](#)
- [Travel to and from hotel/lodging areas to the Marcell Experiment](#)

Station via rental vehicles or government vehicles may involve may require winter driver skills and practices that rarely needed in east Tennessee. Participants should keep heavy blankets and emergency supplies in vehicles during the winter periods.

**Locations:**

Field Work  
Off-Site Work

**Attachments:**

None.

13.7 This operation involves [elevated work areas or platforms](#).

**Requirements:**

[Fall Protection, Scaffolding, and Aerial Lifts](#)

[Ladders](#)

[Occupational Hazard Controls](#)

**Hazard Notes:**

Elevated work may be conducted from scaffolding.

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To access instrumentation and trees it may be necessary to occasionally use a step ladder and/or extension ladder. The spongy surface of the bog may make the safe use of a ladder difficult.

**Control Notes:**

Personnel who will be erecting, dismantling, and using scaffolding associated with this project will complete required training to receive the following ORNL certifications/qualifications:

- Erecting/Dismantling Scaffold Safely
- Using Scaffold Safely/Performing Work

The scaffolding to be erected and utilized during this project will put the user at approximately 7 feet high. **Users shall not exceed 10 feet** or fall protection requirements will be in effect, which will be outside of the user's training.

Plywood shall be affixed to the foot pads of the scaffolding to increase the surface area/contact between the scaffolding and the surface of the bog. This is to ensure the stability of the scaffolding while performing work.

Those working on the ground to support the work being conducted on the scaffolding shall wear hard hats and safety glasses with side shields to protect the individual from overhead/falling hazards.

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Ladder use in bogs must be supported by a solid surface and include a spotting individual to ensure that the ladder does not shift from its position on the soild board or walkway. Ladder users shall be familiar with the SBMS [Using Ladders Safety](#) procedure, the US Forest Service Ladder Use

JHA located within the General Attachments section, and shall possess the ORNL Ladder Safety Training.

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Note: Temporary, but stable drop down walkways have been designed for use within the bogs after stationary boardwalks are installed in the bog.

**Locations:**

Field Work  
Off-Site Work

**Attachments:**

None.

- 15.1 This operation involves packaging or transporting chemicals, [hazardous materials](#), or [radiological materials](#) off-site.

**Potential Training:**

Contact [Division Training Officer](#) for assistance in determining training needs.

**Requirements:**

[Commercial Motor Vehicle](#)  
[Off-Site Transportation](#)  
[Off-Site Transportation of Nonhazardous, Hazardous and Radioactive Materials, and Hazardous Waste Shipments](#)

**Hazard Notes:**

Participants will have need to transport gasoline, compressed gas cylinders, and/or liquid nitrogen to the off-site field locations.

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Rental vehicles will be used for work activities at the MN locations.

**Control Notes:**

Only project participants who have completed DOT Materials of Trade (MOT) training are permitted to transport hazardous chemicals by vehicle. The controlling subject area requires that such transport shall only occur in government vehicles and if material(s) being transported meet the MOT exception (applicable Packing group, volume limits, packed securely, properly labeled, etc). Gross Weight of all hazardous materials must be less than 440 lbs.

See subject area for restrictions on the use of other types of vehicles (e.g. rental or personal vehicles)

**Specific Note Regarding Gasoline Transport:**

The volume limits per container for Gasoline (DOT Class 3 flammable liquid, Packing Group II) is further reduced by other OSHA requirements such that the it must be transported in safety cans with capacities of 5 gallons or less.

**NOTE: If you have not previously ascertained whether a particular chemical/volume fall within MOT limits, you must first verify with Transportation and Packaging Management Organization (TMO).**

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An SBMS variance request ([#729](#)) was submitted requesting the approved

use of rental vehicles to be used for transporting materials to and from the work site (S1 bog) and other areas of Northern MN. This variance has been approved and transportation via rental vehicles shall be permitted.

**Note: Damage to rental vehicles from work activities may result in added expenses to the project (such as repair and/or purchase of the vehicle from the rental agency).**

**Locations:**

Field Work  
Off-Site Work

**Attachments:**

None.

16.0 This operation involves offsite work other than travel, office environments, and conferences

**Requirements:**

[Export Control](#)

[Foreign Travel](#)

**Hazard Notes:**

Most field work will be performed in northern Minnesota on the Marcell Experimental Forest operated and maintained by the USDA Forest Service.

Hazards- unexpected emergency requiring outside assistance in a field situation and ensuring all parties understand the responsibility of the others.

**Control Notes:**

When working off-site, staff ensure they consider any special precautions that may be needed in unusual environments. Local work control processes and health and safety requirements are generally followed when working at other facilities. (e.g. the SME-annotated JHAs attached in the general comments section)

At the off-site location, work conditions may be different from what was expected. If necessary, the resources of the Laboratory will still be available to you, e.g., your supervisor, subject matter experts (SME), ES&H support staff, and the Lab Shift Superintendent (LSS).

Participants should familiarize themselves with ORNL guidance related to offsite work available at:

<http://sbms.ornl.gov/sbms/sbmsearch/subjarea/wppc/GuideOffsite.htm>

**Emergency Communication Requirements:**

A) When in the field, a person will have access to (and know how to operate) some means (ie., operable phone or radio and contact #) for getting timely emergency help.

B) When an individual is doing field work alone, he or she will have created the situation that someone will

- a) know where the field worker is;



- b) know when the fieldworker should return from the field; and
- c) take appropriate search actions if the fieldworker does not return in a timely fashion.

**First Aid and Injury Reporting:**

A first aid kit will be maintained in the field for basic first aid needs.

When working off-site, personnel must have the emergency services phone numbers for the location and the numbers for the site point of contact immediately available. When in remote locations, personnel should be aware of the route from the worksite to the nearest medical facility and/or method to summon emergency services to the site. While off-site, employees with an injury or illness report to the nearest medical facility for treatment.

- [See attachment for directions to nearest medical facilities to the Marcell Experimental Forest.](#)
- [Participants should also become familiar enough with these directions so that they can adequately describe where they are located in the event that an accident/injury is severe enough to require the assistance of emergency service providers to respond.](#)

An individual involved in a work-related injury or illness will immediately seek the appropriate level of medical care as required by the event. As soon as reasonably possible after the event inform the supervisor for proper follow-up and reporting.

Employees with an injury or illness while on-site at ORNL report to the Health Services Division between the hours of 7:30 AM and 4:30 PM. After hours medical assistance is available by calling 911 on a land-line or the Laboratory Shift Superintendent (LSS) office at 865-574-6606.

**Locations:**

Field Work  
Off-Site Work

**Attachments:**

[Driving Directions--Bog to Grand Rapids Hospital.pdf.pdf](#)

17.1 This work does require the project staff to prepare or modify engineering calculations, drawings or specifications that are to be traceable and on record? Engineering calculations, drawings or specifications must be traceable and on record if used for construction, fabrication, modification, installation, or acquisition of [engineered systems, structures, or components](#) and meet any of the following criteria:

- Have the potential to adversely affect the health and safety of staff, workers, the public, or the environment
- Failure could unacceptably impact program objectives
- Are currently recorded in the ORNL Engineering Files or Records
- Are or will be installed as an integral operating system in a new or existing UT-Battelle controlled facility

**Requirements:**

[Design](#)

**Hazard Notes:**

Engineered structures are present at the site (i.e. bog board walks, chamber structures, electrical and data infrastructure, gas lines, etc.).

**Control Notes:**

Research staff (i.e. RSS participants) is not responsible for the engineering designs and modifications of the structures associated with the SPRUCE project. All engineering designs, calculations, drawings, specifications, etc. have been and shall be conducted and maintained by the ORNL engineering department.

If there is an issue or concern identified by RSS participants at the site, relating to the engineered structures, research staff listed as participants will not attempt to correct these issues, but will refer back to Project Management to address the issue with ORNL engineering and/or the subcontractors onsite building and maintaining the structures.

**Locations:**

Field Work  
Off-Site Work

**Attachments:**

None.

Last **Does this operation involve any hazards or risks not previously identified above?** Questions to consider:

- What can go wrong (what keeps you up at night?)
- What measures or controls are in place to prevent that from happening?
- Consider how do (or which of) the most important controls depend on human actions or behavior. Where might an error or omission impair the effectiveness of an important control?
- Consider any change that has been made (process, equipment, etc) which could inadvertently increase risk in another area.
- Error precursors are conditions or attitudes that increase the chances of an error during the performance of a specific task by a particular individual. Are there precursors that, if reduced or eliminated, would make the controls more likely to be effective?

**Hazard Notes:**

Potential for methane emissions.

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Possible head injury from instrumentation positioned near the ground.

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The fact that much of the work for this project is in the field presents many hazards that are not included in the standard RSS question set.

Examples: Possible contact with curious black bears, biting & stinging insects, ticks, slips/trips/falls, etc.

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Many of the field tasks embedded in the JHA package require or suggest use of dust masks, and some lab related activities (e.g soil grinding, etc) may present the need or desire for dust mask usage by participants.

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Syringes with needles will be used to extract water samples from the bog.

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Cutting tools will be used within the field for general use purposes and in association with the PMS instrument.

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High visibility clothing may be required at certain times.

**Control Notes:**

High concentration methane emissions from stored, subsurface pockets of naturally generated methane represent a low probability, but possible combustion danger if released. The open nature of the field environment would adequately disperse such releases if they happen, but staff should avoid ignition sources that may potentially spark methane gas should adequate ambient levels occur.

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While working in and around environmental instrumentation installed in the bog, staff should be aware of elevated hard and sharp surfaces or corners that might represent a possible source of head injuries. These circumstances are not common, but should be considered while working at the bog surface level in their vicinity.

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**General Field Hazard Controls:**

A first aid kit will be maintained in the field for basic first aid needs. (*Refer to Question 16 for other minimum field communication requirements and injury reporting instructions.*)

Participants can also maintain and be trained on the use of an AED (automated external defibrillator) that will be kept at the field site and/or a centralized location.

In general, Participants that work outside and off the roads will wear appropriate clothing and additional PPE as discussed and prescribed in the USFS JHAs (**unless annotated otherwise in the JHAs and discussed in this RSS**).

Safety glasses with side shields shall be mandatory where the potential for eye injury exists (i.e. Dry/dusty conditions, low lying vegetation and/or tree limbs, etc.) and shall be left to the discretion of the individual in all other circumstances. Use tinted lenses/sunglasses as need to reduce glare/eyestrain in bright conditions.

Due to the conditions of the environment in which work will be conducted

(i.e. Bog) high top rubber work boots shall be utilized by research staff members conducting field work. When work involves the potential for damage to the foot or toes (i.e. working with heavy equipment that could be dropped onto the foot) a safety-toed boot is required.

Long pants shall be mandatory. Long sleeve shirts are optional and will be left to the discretion of the individual where the potential for insect bites, contact with poisonous plants, and cuts/scrapes exists.

Workers should remain alert while walking in the field since slippery and uneven surfaces could cause slips, trips and falls. Always be aware of where your co-workers are and other activities going on around you. Plan route carefully to avoid most uneven ground. Ensure you can see where you are putting your feet before walking. Avoid working in poor light conditions. Do not jump over or off anything. If there is a drop or ditch that has to be negotiated, lower yourself slowly or use existing bridges, steps, or paths etc. When walking down hill, walk across the slope and not down the steepest path, keeping your weight on the back foot as much as possible - if you slip you should try to fall backwards, not forwards! Take special care on slippery rocks.

Avoid contact and wait for the bears to remove themselves from the research site.

As discussed and supplemented in the JHAs, biting and stinging insects (ticks, mosquitos, etc.) may be encountered in the field. Participants can use insect repellents with DEET on their skin and clothes or Permethrin on their clothes only, following the product instructions. As field conditions warrant (seasonal), participants will inspect themselves for tick and mosquito bites after field activities and subsequent showering.

Poisonous snakes are unlikely to be present at the site. If snakes are encountered, minimize contact with them. Do not attempt to handle the snake unless absolutely necessary to remove from the work area. Use remote handling devices when possible to remove the snake.

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**Dust Mask Note:** Whether required or recommended for use, any dust mask used by RSS participants must be ORNL-issued and only used by participants properly trained on the limitations of their use. See SBMS <http://sbms.ornl.gov/sbms/SBMSearch/SubjArea/RP/RPprocedure8.cfm>

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Needles shall not be directly recapped using two-handed operations. Instead use safer alternative methods (i.e. foam block technique, etc.) to avoid the potential for puncture/ needle sticks. Ensure all needles are recapped prior to walking around on the bog walkways. All sharps will be disposed of in appropriate sharps containers.

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**Controls for Cutting Tool Usage:**

When using cutting tools with open blades participants must use these tools in a manner that keeps the

cutting blade moving in a direction away from fingers, hands, and the body during cuts. A user should not walk with or transport a cutting tool, that is not being actively used, unless the blade is concealed (cut resistant container or blade cover, etc.). Use of ORNL approved "safer" cutting tools (as found within the hyperlink below) are strongly recommended.

Cut resistant gloves should be considered for all activities where cutting tools of any type are used.

For detailed information on cutting tool ratings see, <http://safetyfirst.ornl.gov/cpp/tools.cfm>

For detailed information on cut resistant gloves see, <http://safetyfirst.ornl.gov/cpp/gloves.cfm>

Razor blades, scalpels and other fixed blade or manually retractable blade knives will be disposed of in an approved sharps container. Extreme caution must be employed when changing blades on fixed or manually retractable blade knives.

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It is recommended that during large game hunting seasons participants wear a high visibility vest (i.e. blaze orange, high visibility green, etc.) to reduce the potential for being mistaken as an animal. Remember that the Marcell experiment site is public land.

**Locations:**

Building 102GRAND, Room 01

Field Work

Off-Site Work

**Attachments:**

None.