

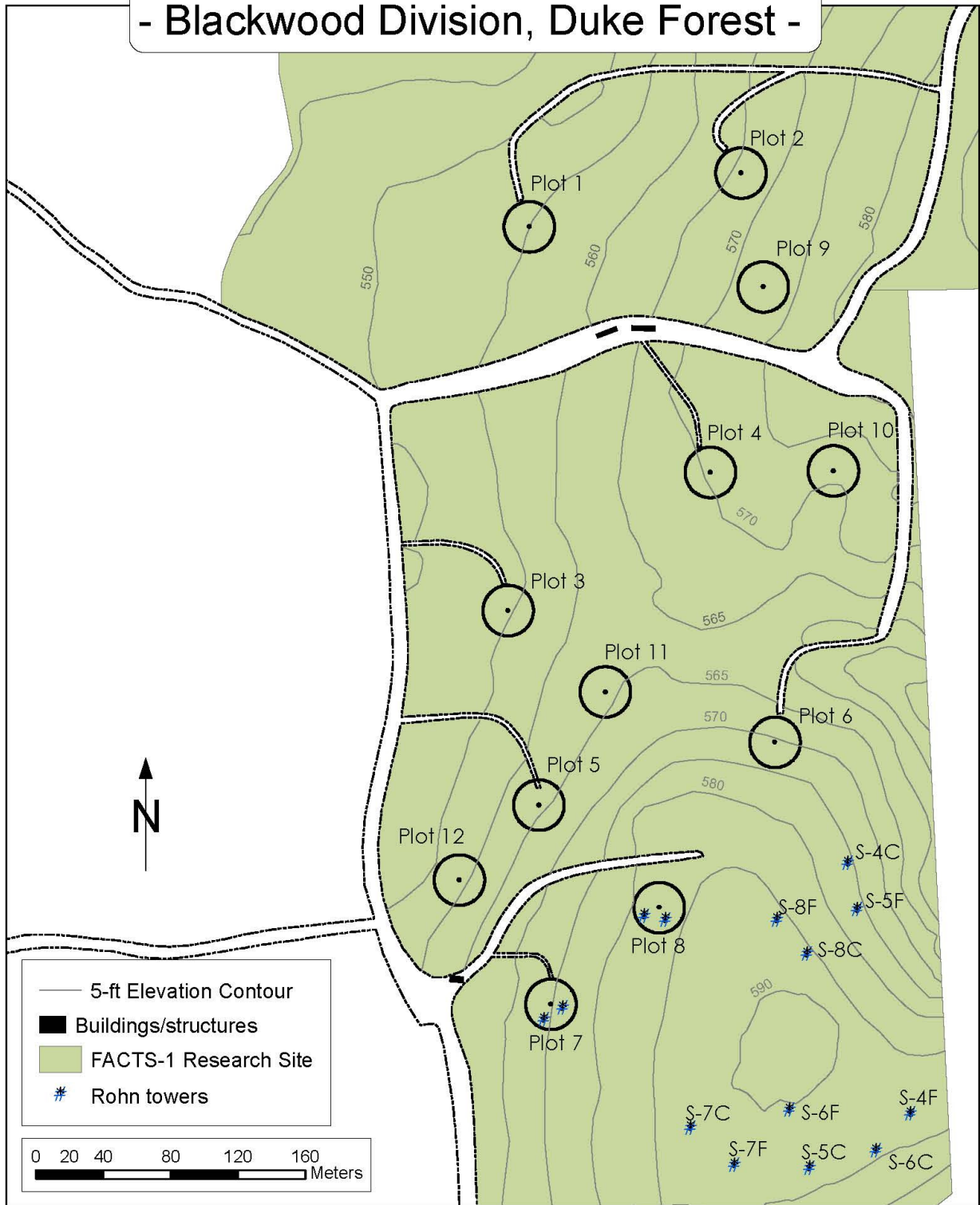


# FACTS-1 Facility Orientation and Protocols

FREE AIR CARBON DIOXIDE ENRICHMENT (**FACE**) FACILITY  
AT DUKE UNIVERSITY

FOREST ATMOSPHERE CARBON TRANSFER AND STORAGE  
(**FACTS-1**) EXPERIMENT

# FACTS-I Research Site - Blackwood Division, Duke Forest -



Welcome to the Department of Energy FACE Facility at Duke University. This document provides an overview of the FACE Facility, guidelines for appropriate and safe conduct, and information to help you get your research up and running quickly and efficiently.

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## Facility Overview

### Site Description

The FACE Facility at Duke University is located in the Blackwood Division of Duke Forest, in Chapel Hill, NC. Owned by Duke University, the Blackwood division is a large tract of land that functions as a natural laboratory for many different environmental research projects. The facility spans approximately 57 acres of loblolly pine forest within the Blackwood division and is mainly comprised of structures and utilities associated with the Forest Atmosphere Carbon Transfer and Storage (FACTS-1) experiment. This experiment is conducted in 12 separate 30m diameter plots. This layout is comprised of 4 treatment (instrumented, CO<sub>2</sub> Enriched) plots; 3 Control (Instrumented, Ambient) plots; and 5 (Non-instrumented, Ambient) plots. Plots 1-7 contain a central walk-up tower, 16 peripheral towers, and temperature-controlled 8' x 10' sheds containing instruments used to monitor and control the FACE system. Each of the 7 instrumented plots are linked by a fiber optic network to a central control computer in the main office, and are equipped with wireless data capabilities. All 12 of the plots are accessible by gravel roads and/or footpaths.

### Brief History of the Duke Forest FACE Experiment

The current Free Air Carbon dioxide Enrichment (FACE) system in North Carolina evolved from prototypes designed by Brookhaven National Laboratory in the mid-1980's. Following several years of use in low stature crop and meadow ecosystems, a FACE system specifically designed for use in tall canopies was constructed and tested in the Blackwood division of Duke Forest from 1992 to 1994. The success of this prototype led to the Forest Atmosphere Carbon Transfer and Storage (FACTS-1) experiment, a fully replicated study consisting of 3 additional fumigated plots (Plots 2, 3 and 4) and 3 dedicated control plots (Plots 1, 5 and 6). This expanded study has been running continually since August 1996. In addition to research related to the FACE system, many other research initiatives have made use of the towers, sheds, and other unique resources available at the facility.

In 2003 DOE's distributed network of FACE experiments was designated a User Facility, helping to pave the way for more extensive and diverse research activities. This new User Facility consists of the Duke Forest and three others: The "Oak Ridge Experiment on CO<sub>2</sub> Enrichment of Sweetgum", "Aspen FACE," and the "Nevada Desert FACE Facility."

## Operations

Brookhaven National Laboratory (BNL) and Duke University jointly manage the FACE Facility. Brookhaven National Laboratory provides oversight of daily operations and routine maintenance. The operations staff are responsible for ensuring the safe and appropriate use of the facility by all users, and for maintenance and other tasks associated with the continuous operation of the FACTS-1 experiment. The operations staff are generally present at the site between 8:00AM and 5:00PM on weekdays, and will often be present or available outside of these hours and on weekends, consistent with the continuous nature of the facility. While operations and research activities generally occur independently, operations staff can provide support for aspects of research planning and implementation that pertain to safety and effective use of facility resources.



## General Guidelines and Information

### Registration and Access

Prospective researchers are required to submit a detailed plan that describes the scientific relevance of the project, the time frame and personnel involved, and the specific activities that will be performed at the facility (visit <http://face.env.duke.edu> for more information on research plans). Once plans are approved by the science committee, arrangements will be made with operations staff to orient and train new users and install instruments in the field. Changes to any details provided in the original plan must be approved by the science committee and brought to the attention of the operations staff.

The gate at the entrance to the site is generally open during normal business hours (9-5, M-F) and often at other times. Most researchers will want to acquire a gate key from the Office of Duke Forest (call (919) 613-8013). The gate is routinely locked each evening and on weekends. Anyone remaining in the Blackwood Division after sunset, on weekends, or outside of normal business hours is expected to have a key in their possession. Access to the control trailer and the sheds at the instrumented plots can be arranged with operations staff during orientation, if needed. The Duke Forest Office must approve any activities taking place in the areas of the Blackwood Division surrounding the FACE Facility.

*Beginning May 2004, all users and visitors are required to **sign in and out** at the kiosk in front of the main trailer any time they are on site. This measure has been added to provide DOE with general facility use data and to enhance communication and safety at the site.*

## Speed Limit/Roads

It is very important that posted speed limits are observed at the site and that vehicles do not drive off the road or along its edges. Speed limits are in place to protect you and your research projects. Dust created by vehicle turbulence has been shown to travel far enough to contaminate experiments in the FACE plots. In addition to regular vehicle, foot, and bicycle traffic on the roads, the facility receives daily deliveries of liquid CO<sub>2</sub> by tractor-trailers. The gravel roads at the site have limited visibility and no shoulders so oncoming vehicles will not have room to pass the CO<sub>2</sub> delivery trucks. Please take appropriate action to allow trucks to pass. Also, note that Duke Forest is home to a large population of deer that often graze near the road and may behave erratically when confronted with an oncoming vehicle.

## Use of Site Facilities and Resources

In addition to the scientific equipment in the field, the facility provides basic amenities such as restroom facilities, drinking and well water, and electricity. Some general office resources that may be used with permission from the operations staff include telephone, fax, scanner and copier. Internet access may be made available to users on a limited basis but bandwidth is limited and priority is given to operations related uses. All instrumented plot control sheds (1-7) have wireless data capability that may be accessed for data transfer purposes. A basic set of hand tools is also available in the back room of the main trailer. Users may borrow the tools for use in the trailer or the field, but are expected to sign them out and return any borrowed tools at the end of each day.

## Working in the Experimental Plots

Access/Vehicles: As shown on the site map, graveled spur roads allow vehicle access to the north side of each plot. In order to minimize peripheral impact on the plots, users are asked to use these roads only sparingly for vehicle access unless transporting heavy equipment. Users are encouraged to park in the open areas by the control trailers and the prototype trailer by Plot 7. Please do not block the access roads when parking near the plots and do not park directly in front of the trailers unless you are transferring equipment.

Foot Traffic in the Plots: Each experimental plot is divided into sectors for different types of research (see Appendix A). Foot traffic within the plots should be limited to the raised boardwalks as much as possible to minimize the impact on the soils and vegetation being studied. Walking off the boardwalks into the experimental area to access your experiment should be done carefully so as not to step on flags, tubes,

labels, plants, or other material. Foot traffic around the periphery of the plot outside of the large black plenum is acceptable as long as impact is minimized.

Using Materials/Equipment in the Plots: No equipment, material, or enclosures shall be mounted or affixed to existing structures or otherwise placed in or around the plots without specific approval from the operations staff. Research equipment requiring power must also be approved to ensure that electric current demands do not interfere with the operation of existing systems or pose a hazard to those in the field. No existing material (branches, soil cores, needles, etc.) should be taken from within the plots or within 8 meters of the plots unless explicitly approved in the research plan.

Towers and Man-lifts: Plots 1-7 have a central walk-up tower and 16 peripheral towers used to support vent pipes for CO<sub>2</sub> enrichment. No equipment or material shall be affixed to any tower without specific approval from the operations staff. Users needing to access the central walk-up towers for their experiments must sign a liability waiver before use (see list additional safety documents in Appendix E). Equipment or sampling tubes may be placed on the 16 peripheral towers in each plot with prior approval by the operations staff. ***Only operations staff members are allowed to climb the peripheral towers. Access to central walk-up towers will ONLY be granted to users whose research interests REQUIRE tower usage. Members of the general public or visitors WILL NOT be granted access to central towers except by special permission from the operations staff.***

The vertical man-lifts located on the boardwalks in plots 1-6 can be used for canopy access. Researchers wishing to use these lifts must obtain specific, annual training, which can be provided by the operations staff. As shared equipment used by many investigators, these lifts are sometimes in great demand. Potential users should discuss their needs with the operations staff and reserve specific times to use each lift.

Working with Other Researchers: The FACTS-1 research facility supports a diverse research community and users will often be working in close proximity to other investigators. In order to accommodate many different projects, experimental material placed in the field must be labeled so the project it relates to is readily identifiable. Locations where samples have been taken and other locations of interest are labeled using flags or ribbon color coded for specific experiments. A current list of colors being used and the projects they are related to can be found in Appendix B. Please respect the marking and labeling system and do not damage or remove tags, or label your experiment with colors designated for another project.



## Safety

**Safety of all personnel at the FACTS-1 research facility is the top priority.** In addition to the general safety notes and guidelines listed below, certain activities and materials require additional permission and orientation. These include use of towers, man-lifts, chemicals, and compressed gases. See Appendix E for additional information on these subjects. Anyone found disregarding safety guidelines or otherwise working in an unsafe manner, may be asked to immediately discontinue their research at the site.

### General Safety Issues

Injuries: Any injury, near-injury, or hazardous condition must be reported to the operations staff. A first aid kit is available on the wall of the restroom in the control trailer for minor injuries. For injuries or conditions that cannot be addressed on site, arrange for transport to a hospital or other medical facility, as appropriate, or call 911 for response by emergency medical personnel. In the event of a site power outage, a back-up phone that does not require power is located on the wall above the copier in the main trailer.

Personal Protective Equipment: People working at the FACE Facility are responsible for providing the appropriate protective equipment for their activities. A stock of some of the more commonly needed items, such as hard hats, eye protection, latex gloves, and leather gloves are available in the middle room of the control trailer. These items can be borrowed at any time, if available. The use of personal protective equipment is specifically required for any activities where there is a greater than average chance of inflicting harm on yourself or others. Examples of such activities are working with power tools or compressed air. One important rule specific to work at the FACE Facility is that users must wear hard hats whenever another user is working above them, regardless of whether you are working together. Please inform operations staff if any of our stocked protective equipment is missing, faulty, or inadequate.

Radios: The FACTS-1 facility has a total of 9 hand-held, two-way radios. Users working in the field are encouraged to sign out a radio, if available. During periods of high demand, there should be one radio per plot that users are working in. Users operating man-lifts or working on towers have priority for the radios at all times. Radios are stored in the main trailer. Users should write their name, according to the radio number, on the dry-erase board near the door when the unit is taken and erase their name when the radio is replaced at the end of each day.



Severe Weather: Any user working at heights should return to ground level immediately in the event of a thunderstorm or other severe weather event. Due to falling limbs and other potential hazards during severe events, users in the field should return to the control area or seek shelter in the equipment sheds or personal vehicles. Users are encouraged to check the local weather forecast prior to performing field work.

Working with a Partner: Any user working more than 1 meter off the ground must be in contact directly or by radio with a designated person on the ground at the site. In some cases operations staff will be able to act as the designated contact by request. Any users employing fall protection harnesses must have another person monitoring them and checking on their situation at least every five minutes while they are working at height. While users are strongly discouraged from working alone at the facility, research agendas and logistics may occasionally require it. In these situations, users are expected to have notified another person of their planned activities and to contact that person once they have left the site.

Ticks, Snakes, Poison Ivy, Misc. Critters: The FACE Facility is home to a wide variety of insects and other creatures. Most are harmless to humans or inflict only mild irritation. A few can cause more serious harm, and users should be able to identify them. A partial list of common hazardous plants and animals at the site can be found in Appendix C.

Heat: The combination of high humidity and temperature during the summer months in North Carolina can create outdoor conditions that range from oppressive to dangerous. Users should dress appropriately for their work and not sacrifice protection for comfort. It is important to acclimate slowly to field work in warm conditions, know your personal limits, and recognize the symptoms of heat related problems with yourself and others. Regular hydration is a key factor in preventing heat related emergencies. Drinking water is provided in the middle room of the main trailer.



## Data Considerations and Other Notes

### Data

Labeling: Experimental plots should be labeled “Plots 1-12”, consistent with their designation on the site map, for all gathered and manipulated data from these plots. Time stamped data records collected by the operations staff at the FACE Facility follow Eastern Standard Time (GMT-0500) throughout the year. They are not adjusted for daylight savings time. To avoid confusion, it is recommended that others collecting time stamped data follow this convention as well.

Control and Meteorological Data: The operations staff collect and maintain a database of several basic meteorological values from instruments around the site. These include wind speed, wind direction, solar radiation, rainfall, temperature, and atmospheric pressure. Extensive data relating to the control of CO<sub>2</sub> in the plots and the performance of the system are also collected. All data sets collected by the operations staff are available by written request to Keith Lewin ([lewin@bnl.gov](mailto:lewin@bnl.gov)).

### Visitors and Tours

The FACE facility regularly hosts visits by groups of students and others interested in the work being done at the facility. Operations staff can provide a general orientation to the site and descriptions of the engineered aspects of the facility. Guidance for groups more interested in biological aspects of research at the site can also be arranged. Visits by larger groups require the notification of operations staff 48 hours before the visit. An e-mail containing the date/time of the tour, the number and names of participants, the tour leader, and purpose of the tour sent to Robert Nettles ([nettles@bnl.gov](mailto:nettles@bnl.gov)) and David Cooley ([cooley@bnl.gov](mailto:cooley@bnl.gov)) will satisfy notification and sign-in requirements. Individuals or smaller groups are welcome to visit the site during normal operating hours so long as they are accompanied by users who have completed the orientation process. All visitors must check in at the main office upon arrival. If tour participants are to climb the central towers, each participant must sign a disclaimer. These forms are available from the operations staff. A group specific form is available for larger tours and may be supplied prior to arrival on site.

## **Disclaimer**

**The information and policies described in this document are subject to change at any time. Users are expected to review the on-line version of this document periodically to keep up with procedural changes that may affect their experiment or use of the facility. Users operating in violation of these procedures, or allowing their associates to do so, will be asked to terminate their activities at the site.**

Please print the last page of this document that indicates you are familiar with the site procedures and protocols, sign and date the document and deliver it to the operations staff. This will be the paper record certifying that you have completed the FACE Facility orientation and are approved to begin or resume work at the site. This document will be updated annually, or as needed, and orientation will need to be renewed at the beginning of each growing season before work begins. A copy of this document is available on the Duke FACE website (<http://face.env.duke.edu/main.cfm>) for review.

## Contact Information

### **Principal Investigators:**

#### ***Operations Team Leader***

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Building 490D	631-344-2060 (fax)
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#### ***Science Team Leader***

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Box 90328	919-684-8741 (fax)
Duke University	
Durham, NC 27708	

### **FACE Facility Operations Staff:**

Robert Nettles	<a href="mailto:nettles@bnl.gov">nettles@bnl.gov</a>
David Cooley	<a href="mailto:dcooley@bnl.gov">dcooley@bnl.gov</a>
FACE Facility	919-932-1415 (office)
600 Eubanks Rd.	919-932-1406 (fax)
Chapel Hill, NC 27516	919-357-6709 (cell)

### **Office of the Duke Forest:**

Judd Edeburn	<a href="mailto:judeburn@duke.edu">judeburn@duke.edu</a>
A116 LSRC	919-613-8013 (office)
Duke University	919-684-7841 (fax)
Durham, NC 27708	

## Appendix A - Plot Descriptions

Each of plots 1-6 in the FACTS-1 Experiment are divided into the following 3 "sectors."

Physiology: The physiology sector consists of the area above ground that is accessible from the central tower or from man-lifts positioned on the wooden boardwalks within the plots. All investigations that require canopy access will be assigned to the physiology sector. All studies requiring frequent access to sample vegetation are expected to be conducted in this sector, using the boardwalks to minimize damage to the soil surface and understory vegetation. Minor amounts of vegetation (e.g., plant tissues for N analysis) may be removed from within the volume of this sector. A buffer zone of 1m from each edge of any boardwalk is reserved for the physiology sector. This provides the necessary footprint for deploying outrigger legs used to support the vertical man-lifts.

Vegetation: Half of the useable surface area within an experimental plot is dedicated to vegetation studies. The vegetation sector consists of 4 pie-shaped units, as shown in the diagram on Page 13. All studies focusing on the long-term growth, population density, diversity and function of above ground portions of the vegetation will be conducted in these sectors. It is expected that repetitive access (e.g., to make a data collection) to this sector should not be more frequent than monthly intervals. It is also expected that no living vegetation will be removed from this sector, and only approved soil disturbances are allowed.

Soil: Like the vegetation sector, the soil sector in each plot consists of 4 pie-shaped units. All studies that require disturbance and access to the below ground portion of the forest ecosystem will be conducted in these areas, including emplacement of soil lysimeters and gas wells, and removal of cores for soil analysis and root extraction. All soil cores should be backfilled with similar soil materials gathered well outside the FACE plots. Repetitive access to the area within the soil sector should not be more frequent than biweekly intervals.

The vegetation and soil sectors are recognized by a 3-component numbering scheme, shown on the field signs. The first number is the plot number the second character (either V or S) designates whether it is a "Vegetation" or "Soil" sector, and the third number (1-4) designates the subplot--beginning consecutively with plot #1 in the northeast quadrant and progressing clockwise (e.g., 3v2 is subplot 2 (southeast) of the vegetation sector in plot 3).

CO<sub>2</sub> control is not documented, and therefore assumed to be sub-optimal within a 2m radius of the vertical vent pipes at the periphery of the instrumented plots. It is recommended, but not required, that this 2m buffer zone be observed when implementing new studies.

**Plot Fertilization:** Previous research at the FACTS-1 facility suggests that soil N availability controls the productivity response of this ecosystem to elevated CO<sub>2</sub>. *Beginning March 2005*, each of the 12 FACE plots will be bisected by an impermeable barrier extending 70 cm below the soil surface and randomly selected halves will be fertilized with 10 g/m<sup>2</sup>/yr of Ammonium Nitrate. Fertilizer is applied four times per year (March/April/June/August) for a combined total of 10 g/m<sup>2</sup>/yr N.

Each of the FACE plots is divided into 4 quadrants, with the NE corner being quadrant 1 and progressing in a clockwise fashion. Plot fertilization splits are as follows:

Plot	Quadrant			
	Control		Fertilized	
1	1	4	2	3
2	3	4	1	2
3	1	4	2	3
4	1	2	3	4
5	3	4	1	2
6	3	4	1	2
7	3	4	1	2
8	2	3	1	4
9	1	2	3	4
10	1	2	3	4
11	1	4	2	3
12	3	4	1	2



## **Appendix B - Markers/Labels**

To minimize confusion, the principal investigators and the operations staff must approve the use of field markers within the FACTS-1 plots. Specific colors of "flagging" will be reserved for specific studies. Currently, the following colors are in use:

Blue and White rope, flags & tape: Administrative aspects and sector boundaries (Oren, Lewin, et al.) Also used by Hoffmocker for soil nitrogen studies.

Orange tape & flags: Studies for tree growth (Delucia, Thomas, Pippen)

Orange Glo flags and White/Orange Polka Dot tape (Whalen)

Dark Red tape and flags: Soil Lysimeters (Richter, Jackson)

Pink tape: Studies of canopy phenology and needle demography (Ellsworth)

Lime Glo green flags: Fungi Investigations (R. Vilgalys)

Yellow flags & tape: Biodiversity (Clark, Mohan)

Pink flags: Studies of root growth (Matamala, Jackson)

White flags: Soil cores and forest floor samples (Schlesinger, Finzi, Lichter)

Dark Green flags: Insect studies (M. Davis, S. Pritchard)

White with Blue Dots tape: Molecular physiology (Jackson)

Orange Glo flags (TEMPORARY): Soil cores (Billings)

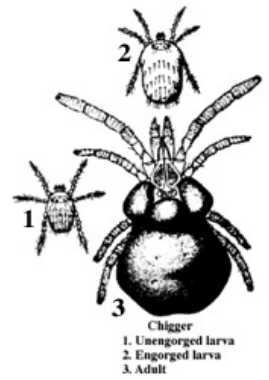
Lavender flags: Soil cores for nitrogen cycle (Finzi)

Red with White stripe flags: Soil cores (Treseder)

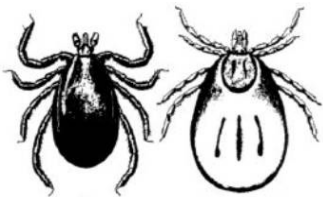


## Appendix C - Nuisance Insects, Plants, and Animals

**Chiggers:** Chiggers are microscopic red bugs that can be found in just about any part of the forest. These parasites bite through thin parts of the skin, often around hair follicles, and inject a potent enzyme that allows them to feed on skin tissue. This enzyme causes irritation and itching several days later that will last for 1-2 weeks. Aside from irritation, chiggers are harmless and do not carry disease. Some preventive measures against chiggers include minimizing skin exposure and spraying DEET around socks and pants waistlines.



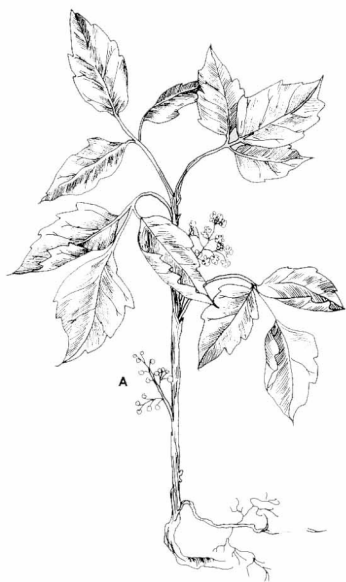
**Ticks:** If you do field work during the warmer months you will almost certainly have a tick crawl onto you regardless of how well you prepare. Ticks are generally harmless but carry diseases that can cause serious illness or infection if they go unnoticed or are removed incorrectly after they have attached themselves to your skin. After field work, be careful to check your body thoroughly for ticks and take appropriate steps to remove them if found.



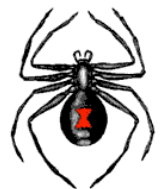
**Snakes:** It is uncommon to encounter a snake at the site during most times of the year and most snakes you would encounter are not poisonous. An exception is the Copperhead snake which is very poisonous. Be mindful of where you are stepping, especially during the late spring, and report any sightings to operations staff.



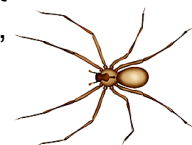
**Poison Ivy:** A perennial deciduous vine that can be found in abundance throughout the year. The plant is a trifoliolate (groupings of three leaves on a stem) with a distinctive “notch” on one side of the leaf. Oils secreted by the leaves, stems, and root can cause mild to severe skin irritation depending on individual sensitivity. While direct dermal contact is the main route of infection, oils can also rub off onto clothing and equipment without losing potency. The best treatment is to wash thoroughly with soap and water as soon as possible. If irritation is severe or allergic reaction is triggered it may be necessary to seek medical attention.



**Spiders:** There are a great quantity and variety of spiders in Duke forest. While most are harmless, some may bite but few are poisonous. The Black Widow and the Brown Recluse spiders are very poisonous spiders that prefer dark isolated areas such as rotting stumps, old wood piles, and undersides of sheds and trailers. It is unlikely that you will encounter one of these spiders, but if you suspect you have seen one or have been bitten,



contact the operations staff immediately.



## APPENDIX D - Phone List

<u>FACTS-1 Phone list:</u>	<u>Office</u>	<u>Home</u>	<u>Other</u>	<u>E-Mail</u>
<b><u>Operators:</u></b>				
Nettles, Robert	932-1415	(919) 672-8603	Cell: 919-357-6709	<a href="mailto:nettles@bnl.gov">nettles@bnl.gov</a>
Cooley, David	932-1415	(919) 360-8616	Cell: 919-357-6709	<a href="mailto:dcooley@bnl.gov">dcooley@bnl.gov</a>
<b><u>Principle Investigators</u></b>				
Lewin, Keith ( <b>Operations</b> )	(631) 344-3458	(631) 369-2504	Cell: 631-834-3932	<a href="mailto:lewin@bnl.gov">lewin@bnl.gov</a>
Oren, Ram ( <b>Science</b> )	613-8032	477-3712	Lab: 613-8044	<a href="mailto:ramoren@duke.edu">ramoren@duke.edu</a>
<b><u>BNL Crew</u></b>				
Nagy, John	(631) 344-2667	(631) 821-2652		<a href="mailto:nagy@bnl.gov">nagy@bnl.gov</a>
Lamberti, Claire	(631) 344-3051			
Zuhoski, Sharon	(631) 344-3359		Fax: (631) 344-2060	<a href="mailto:zuhoski@bnl.gov">zuhoski@bnl.gov</a>
<b><u>Duke Forest Crew:</u></b>				
Edeburn, Judd	613-8014	467-4332	Cell: (919) 880-4418	<a href="mailto:judebum@duke.edu">judebum@duke.edu</a>
Broadwell, Richard	613-8115			<a href="mailto:rmb7@duke.edu">rmb7@duke.edu</a>
Bobbie Reeves	613-8013		Fax: 684-8741	<a href="mailto:reeve006@duke.edu">reeve006@duke.edu</a>
Maintenance Shop	489-7211			
<b><u>CORE Data Team:</u></b>				
Pippen, Jeffrey	660-7278	383-8040	Lab: 660-7407	<a href="mailto:jspippen@duke.edu">jspippen@duke.edu</a>
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Delucia, Evan	(217) 333-6177	(217) 367-8739	Cell: (217) 369-3284	<a href="mailto:delucia@uiuc.edu">delucia@uiuc.edu</a>
Aldea, Mihai	(217) 244-3167			<a href="mailto:aldea@uiuc.edu">aldea@uiuc.edu</a>
Moore, Dave	(217) 244-3167		Cell: (217) 649-1705	<a href="mailto:dmoore1@students.uiuc.edu">dmoore1@students.uiuc.edu</a>
Ellsworth, David	(734) 615-8817			<a href="mailto:ellswor@umich.edu">ellswor@umich.edu</a>
Finzi, Adrien		(617) 983-2094	Lab: (617) 353-2453	<a href="mailto:afinzi@bio.bu.edu">afinzi@bio.bu.edu</a>
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<b><u>US Forest Service:</u></b>			
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Kress, Lance	549-4057		<a href="mailto:lkress@fs.fed.us">lkress@fs.fed.us</a>
Maier, Chris	549-4072		
McInnis, Daniel	277-1662		
<b><u>Miscellaneous:</u></b>			
ACR Supply	Carrboro: 929-2099	Durham: 286-2228	
Airgas Delivery (Ed Spaulding)	(804) 271-2520	Cell: (804) 400-3604	Customer # SDV13
Winter Mountain Bottled Water	687-0545		Customer #19923

## **Appendix E:** **Additional Safety Training and Documentation**

Certain activities and equipment at the FACE facility require special permission, training, or orientation:

1. UL40/48 Man-lifts: These 6 man-lifts are located in Plots 1-6 and are used to access the forest canopy for sampling and analysis. Anybody wishing to use the man-lifts must be trained by the operations staff and recertified annually.
2. TL33 Articulated Arm Man-lift: This lift is battery operated and can be set up along any road at the FACE facility for sampling trees up to 33 feet. Use of this lift requires special training and permission from the operations staff.
3. Central Towers, Access: Anybody wishing to climb the central walk-up towers in plots 1-7 must sign a liability waiver prior to climbing.
4. Central Towers, Using or Mounting Equipment: Equipment, sensors, and cables mounted on the tower must be securely fastened and located in a manner that permits safe passage from one tower level to the next. All equipment use, mounting hardware, and placement must be approved by the operations staff prior to installation.
5. Compressed Gasses: Anybody bringing compressed gasses onto the site or using existing compressed gas cylinders must be certified to do so by their host agency and be oriented to facility-specific use and safety procedures by a member of the operations staff.
6. Chemicals: Any chemicals needed for research activities at the facility must be specifically pre-approved by the operations staff prior to bringing the substance to the site. All chemicals must be properly labeled according to OSHA standards and be accompanied by a material safety data sheet (MSDS) and other appropriate documentation.

**Facility Orientation / Protocols Disclaimer**

I have read and understand the FACE Facility Orientation and Protocols document for the FACTS-I Research Facility. I agree to adhere to the policies and guidelines contained therein.

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Signature

**FACTS-I Tower Liability Waiver**

**- RELEASE AND ASSUMPTION OF RISK-**

I, \_\_\_\_\_ INTEND TO CLIMB THE STAIRS OF ONE OR MORE OF THE CENTRAL TOWERS AT THE FACTS-I RESEARCH SITE IN THE DUKE FOREST. I UNDERSTAND THERE MAY BE CERTAIN DANGERS AND EXPOSURE TO PHYSICAL INJURIES IN PURSUING THIS ACTIVITY, AND I HEREBY VOLUNTARILY ASSUME ALL RISK TO MYSELF AND MY PROPERTY ARISING FROM THIS ACTIVITY. I ASSUME SUCH RISKS REGARDLESS OF THEIR CAUSES. IN CONSIDERATION OF MY PARTICIPATION IN THIS ACTIVITY, I WILL NOT HOLD THE DUKE FOREST, DUKE UNIVERSITY, BROOKHAVEN NATIONAL LABORATORY, THE UNITED STATES DEPARTMENT OF ENERGY, THE UNITED STATES GOVERNMENT, THEIR TRUSTEES, OFFICERS, AGENTS OR EMPLOYEES, IN BOTH INDIVIDUAL AND REPRESENTATIVE CAPACITIES, LIABLE IN DAMAGES FOR ANY INJURIES I MIGHT SUSTAIN WHILE ENGAGING IN THIS ACTIVITY. I RELEASE, DISCHARGE AND HOLD FOREVER HARMLESS THE AFOREMENTIONED PARTIES FROM ANY AND ALL LIABILITIES, CLAIMS, DAMAGES, OR LOSSES STEMMING FROM INJURY TO PERSON OR PROPERTY THAT ARISES FROM, OR IN ANY WAY RELATES TO MY PARTICIPATION IN THIS ACTIVITY.

I have carefully read this Release and Assumption of Risk and fully understand its contents. I voluntarily sign it and realize that this will bind me, my heirs, and my personal representative.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Signature of Parent or Guardian (if under 18)

**Aerial Lift Operator Checklist**

**Operator Name:** \_\_\_\_\_

**TRAINED BY:** \_\_\_\_\_

**TRAINER SIGNATURE:** \_\_\_\_\_

**Lift Type:** 1) \_\_\_\_\_  
2) \_\_\_\_\_

**Training Date:** \_\_\_\_\_  
**Training Date:** \_\_\_\_\_