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FACTS II (Aspen FACE) Facility and Harshaw Forest Experimental Farm Facility Site-Specific Health and Safety Plan

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FACTS II (Aspen FACE) Facility and Harshaw Forest Experimental Farm Facility Site-Specific Health and Safety Plan

Project Name: Forest Atmosphere Carbon Transfer and Storage (FACTS-II)
The Aspen Free-air CO₂ and O₃ Enrichment (FACE) Project.

Project Number:

Site: Harshaw Forest Experimental Farm (HFEF) USDA Forest Service Harshaw, WI

Lead Organizations: USDA Forest Service North Central Research Station
Michigan Technological University
Brookhaven National Laboratory

Proposed Dates of Project: **Beginning Date:** May 1998
Ending Date: October 15, 2005, as approved by DOE/USDA FS NCS/MTU

SSHASP Effective Until: October 15, 2005 (if needed)

Author: David F. Karnosky
Signature _____ **Date** _____

CONCURRENCES:

MTU/FACE/MI Health and Safety Representative: Wendy Jones **Signature:** _____ **Date:** _____

USFS/WI Project Coordinator: Mark Kubiske **Signature:** _____ **Date:** _____

APPROVALS:

MTU Principle Investigator/Director: David Karnosky
Signature: _____ **Date:** _____

USDA FS Project Coordinator/Mark Kubiske
Signature: _____ **Date:** _____

USDA FS EH&S Representative: Bill Danfield
Signature: _____ **Date:** _____

MTU EH&S Representative: Wendy Jones

Signature: _____ Date: _____

Section A General Project Information

Investigative Objective/Activity Description: The long-term goal of the Aspen FACE project covered by this site-specific health and safety plan (SSHASP) is to examine the interacting effects of elevated carbon dioxide (CO₂) and ozone (O₃), alone and in combination, on the productivity, sustainability, competitive interactions, and carbon and nitrogen fluxes in a regenerating northern hardwoods ecosystem under field conditions over its life history. The FACTS-II (Aspen FACE) system is designed to test the responses of aspen (*Populus tremuloides* Michx.), paper birch (*Betula papyrifera* Marsh.), and sugar maple (*Acer saccharum* Marsh.) during development from seedlings to mature trees. The primary objectives of the Aspen FACE field study are to understand the effects on the various aboveground and belowground ecosystem components, including photosynthesis/gas exchange, canopy architecture and leaf phenology, leaf surface characteristics and cellular antioxidants, water relations, insects and disease occurrence, root growth and turnover, soil carbon fluxes, soil biota and chemistry, and leaf litter in this regenerating northern hardwood ecosystem growing under elevated CO₂ and O₃. Plant and biomass samples will be collected and analyzed to provide data on the effects of elevated CO₂ and O₃ on the responses of an intact regenerating northern hardwood ecosystem. The samples will be collected by personnel following the work practices stated in their institutional health and safety plan.

Sampling and Construction Tasks: The specific objectives and/or construction tasks will include, but not be limited to, the following:

1. Develop a reliable CO₂ plus O₃ delivery system.
2. Examine the interaction effects of elevated CO₂ and O₃, alone and in combination, on aspen, sugar maple, and paper birch via examining:
 - a. growth, survival, productivity, and sustainability;
 - b. carbon and nitrogen allocation and sequestration;
 - c. competitive interactions among species and genotypes;
 - d. stress tolerance as regulated by foliar defense compounds; and
 - e. response to insects, diseases, and other stresses.
3. Examine ecosystem processes such as litter decomposition, mineral weathering, and carbon and nutrient cycling.
4. Parameterize and validate an ecophysiological process model of growth and development to scale individual tree responses to stand level and develop ecosystem to region scale models.

Section A General Project Information (continued)

Project Personnel and Responsibilities:

Name	Department or Company	Position	Responsibility	Training and Medical Surveillance Requirements ^a
David Karnosky	MTU	Principal Investigator (PI) Aspen FACE Project Director	Overall implementation of the project	OSHA Hazard Communication, GERT, Hanta Virus Awareness video
Mark Kubiske	USDA FS NCRS	Science Aspen FACE Project	Oversee implementation and coordinate research projects at site.	OSHA Hazard Communication, GERT, Hanta Virus Awareness video
Jaak Sober	MTU	Project Operator/Scientist	Oversees site operations and maintenance	OSHA Hazard Communication, GERT, Hanta Virus Awareness video
Wendy Jones	MTU	Principal Safety Coordinator/ Data Analyst	Oversee and implement site safety and management.	OSHA Hazard Communication, GERT, Hanta Virus Awareness video
Rodney Eternicka	USDA FS NCRS	Safety Coordinator/Site Maintenance	Oversees site maintenance	OSHA Hazard Communication, GERT, Hanta Virus Awareness video, First Aid/CPR
Bill Danfield	USDA FS NCRS	Safety Coordinator/Site Maintenance	Oversees site maintenance	OSHA Hazard Communication, GERT, First Aid/CPR Hanta Virus Awareness video

^aThe responsibilities and training requirements listed in this table are those associated with health and safety. Other responsibilities may be outlined in the referenced project plans.

Section A General Project Information (continued)

Project HASP Summary

Project Background Review: Complete Not Available Preliminary Further Study Required

29 CFR §1910.120 Regulated Site: Yes No

Level(s) of Protection: A B C X D Anti-C Modified

Special Hazards or Construction Requirements: Confined Spaces(s) Excavation(s) Drilling Operations
 Hot Work Permit Lockout/Tagout Unexploded Ordinance
 Radiological
 Other: NONE

Overall Hazard Estimate: High Moderate Low

Document Modification: Any changes to this Site-Specific Health and Safety Plan (SSHASP) shall be approved by all signatories to the Plan including the concurrence signatures. This does not include the signatories on the declaration of understanding page of the SSHASP. No changes in the health and safety procedures will be implemented in the field until the full approval process of the change document has been completed. Any changes will be discussed with all field crew members and the discussion documented on the tailgate safety briefing form and/or SSHASP technical field change form.

A review of this SSHASP will be performed annually by the designated health and safety and project representatives or prior to the restart of operations (if necessary) on a SSHASP Review Form. (see Attachment B)

Additional Documentation

Attached: Diagram of Site layout
Diagram of Carbon Dioxide Plumbing
Diagram of Oxygen-Ozone Plumbing
Diagram of Underground Power Requirements
Diagram of Fiber Optic Requirements
Harshaw Farm (HFEF) Chemical Inventory

Other Referenced Documents: Material Safety Data Sheet

Section B Site/Material Characteristics

Material/Waste Type(s): Liquid Solid *IN* Drums Tanks Soil
 Gas Sludge Surface water Groundwater
X Other: Aboveground copper and stainless steel pipes

Characteristics: Ignitable Corrosive Toxic Reactive Radioactive

Facility: Type: FIELD SITE

Size: Aspen FACE facility consists of 12 rings of 30-m diameter in a full factorial experiment with controls, elevated CO₂, elevated O₃, and elevated CO₂ and O₃. Addition of CO₂, and/or O₃ is done from aspen budbreak to budset each year and these gases are added during the daylight hours. Atmosphere CO₂ is added at 200 ppm over ambient at a set point of 560 ppm. O₃ is administered during appropriate weather conditions at the rate of approximately 1.5 times ambient.

Terrain: FLAT

Open Indoors Closed? Yes No When CO₂ and O₃ exposures are outside O₃ generation is inside a building

Site Description and History:

The Aspen FACE site (32 ha) is located in northern Wisconsin near Rhinelander, Wisconsin (longitude 45.6 °, latitude 89.5 °), on the Harshaw Forest Experimental Farm of the USDA Forest Service. The legal description of the site is SW 80, section 21, T37N, R7E, Cassian Township, Oneida County, Wisconsin, USA. The site is old agricultural land that was farmed for potatoes and small grains for more than 50 years. The Forest Service purchased the Farm in 1972 for use as a short-rotation intensive culture and mixed-genetics forest research facility. About 80 percent of the 32-ha Aspen FACE site was planted with different hybrid poplar clones and some larch from 1976 to 1990. The remaining area reverted to old-field vegetation. Most poplar and larch plantings were cleared from the site in 1996 and 1997, all stumps in the ring areas were pulled, and the rings were disked and planted with rye covercrop in the summer of 1996. Aspen clones, paper birch seedlings, sugar maple seedlings were planted in the ring areas in early June 1997.

Oxygen storage tank and distribution system. Liquid oxygen, stored in the 6000 gallon vertical tank, goes through vaporizing equipment to produce oxygen gas. The gaseous oxygen is then used to generate ozone in a generator location in the Ozonator building. Ozone produced by the generator is distributed to six treatment plots on the site through the stainless steel plumbing system (see enclosed map). The gas in this line is approximately 6% ozone and 94% oxygen and is maintained at less than 14 psi.

Carbon dioxide (CO₂) storage tank and distribution system. Liquid carbon dioxide stored in the 54 ton horizontal tanks also goes through vaporizing equipment to produce CO₂ gas. This CO₂ gas is distributed to six treatment plots on the site through the copper pipe system (see enclosed map). The gas in the line is 100% CO₂ and is maintained at 240 psi until it reaches the regulating system at the treatment plots.

Other Materials. There are a variety of herbicides, insecticides, and fungicides stored in the small chemical storage shed south of the office and trailer. An updated list of these products has been included for your information. All pesticides and insecticides are stored in this shed unless in immediate use.

There are a number of common household cleaning products for everyday cleaning requirements in the trailer (living quarters) and the office (work area). The shop contains common engine maintenance products such as motor oils, lubricants, and anti-freeze. The utility shed contains a flammable liquids cabinet where small engine and tractor fuel is stored.

In the office, there are small containers of other compounds including alcohol for cleaning electronic and other equipment and catalysts required for some instruments. The catalysts include activated charcoal, magnesium perchlorate, and soda lime.

Investigation Derived Waste (IDW):

Waste generated from this field study will consist of sanitary waste (food containers, papers) and construction materials (wire, lumber, etc.) IDW may also include, but not be limited to: personal protective equipment (PPE), sampling equipment, and soil. All wastes generated will be uncontaminated and will be handled as sanitary wastes (i.e., sent to an appropriate sanitary waste disposal facility). Sanitary waste will be contained in plastic bags, dumpsters, or drums and disposed of in an approved sanitary landfill.

Section C Hazard Analysis

NOTE: The evaluation of the principal hazards for each site and the work operations are identified in the operational planning document(s) such as the field instructions and preliminary hazard assessment form. Due to the lack of radiological, chemical, or biological contamination or hazards and physical hazards, the overall hazard is low.

Chemical Hazards:

Potential Contamination: Chemical contaminants are not anticipated to be encountered from operations at Aspen FACE.

Materials that may be on site for conduct of operations are liquid carbon dioxide, liquid oxygen, diesel fuel, gasoline (including benzene component), lubricants, motor oil, soda lime, desiccants, and paints. The primary chemical exposure of concern are potential carbon dioxide and ozone exposure from an unexpected release of gas from the liquid CO₂ and O₃ storage tank/vaporization or O₃ generation and delivery system.

NOTES: Chemical exposure and hazard information on the significant potential occupational health hazards is listed at the end of this section. The symptoms will vary depending upon the dose and duration of the exposure, and upon individual sensitivity.

Radiological Hazards:

None

Physical Hazards:

Ozone: Extreme exertion under conditions of elevated ozone can cause shortness of breath, coughing, or difficulty in breathing. Ozone levels are high near vertical vent pipes so that care should be taken to stay 10-15 ft. from vertical vent pipes in ozone and O₃ + CO₂ rings during ozone fumigations.

Adverse Weather/Heat and Cold Injury: Heat stress during the summer months is always a major health and safety concern. Personnel should drink plenty of fluids and take breaks in cool shaded areas.

Cold injury and hypothermia are concerns during the winter months, especially in times of wet weather. Other adverse weather conditions such as wind and blowing dust, rain, and snow can cause workers to be distracted, irritable, and error prone.

Tornados and thunderstorms with lightning present significant potentials for damage and harm. The distance to lighting storms can be estimated by counting the seconds from the "flash to bang" with five seconds equaling one mile. Operations will stop if lightning is within five miles of the site. Employees are encouraged to seek shelter in the main building before the onset of thunderstorms.

The site supervisor and/or site safety officer (SSO) will monitor and observe site conditions and determine if work activities are to be altered or stopped. They will alert local personnel to threatening conditions by sounding a horn.

Personnel are required to provide a sufficient amount of water for that day's operation and are encouraged to wear sunglass-style safety glasses, and to use sunscreen (sun protection factor [SPF] of 15 or greater) or protective work clothing to prevent sunburn when working outdoors.

Noise: The noise levels at the site are not expected to equal or exceed 85 decibels (dB[A]). Hearing protection will be required should operations change such that noise levels exceed 85 dB[A] or when normal speech is impeded between two individuals approximately 3 feet apart. Noise level will exceed 85 dB in the area where the CO₂ tank are, when refilling is taking place.

Motor vehicles and heavy equipment such as large trucks, booms and backhoes have the potential for pinch and crush hazards. Personnel are to stay in the line of sight of the equipment operator at all times. Heavy equipment shall be equipped with a functioning back-up alarm or a spotter will be required when traveling in reverse. Personnel are to stay in the line of sight of the equipment operator at all times and wait for the operator to shut down prior to approaching heavy equipment.

Inspection of all mechanical equipment shall be done before the equipment is placed in service. All guards and safety devices for chain or belt drives shall be in place when the equipment is in use. The site supervisor or operator will inspect heavy equipment prior to use, each day the equipment will be used, and document this inspection. The individual conducting the inspection should look for frayed cables, leaking or abraded hoses, missing lock pins, and indications of an unsafe or potentially unsafe condition. All inspections shall be documented.

Material handling will be accomplished using safe lifting procedures. Forklifts, mechanical lifts and/or carts will be utilized whenever possible.

Section C Hazard Analysis (continued)

Surface characteristics such as uneven ground, debris, and open trenches or soil boring holes can cause slip, trip, and fall hazards. Such areas will be identified and clearly marked or barricaded during project activities.

Fall protection, including belt harnesses, shall be worn when performing work at an elevation of 6 feet or higher, such as work on the lift boom, center pole, or elevated walkways in the rings.

Traffic Hazards: The site has many interconnecting roads and the roads are tree lined with limited visibility. Maximum speed should be 15 mph and extreme caution should be used before entering intersections.

High pressure hoses shall have safety chains attached to prevent injury to personnel or property should hoses inadvertently disconnect. Hoses, when in use, will be inspected daily for serviceability. Hoses on the ground will be protected against being driven over by vehicle/heavy equipment traffic.

Exposed electrical conductors present the danger of electrical shock and burns to site personnel and pose a fire risk which can damage equipment and/or property. Damaged electrical equipment shall be repaired properly or removed from service. Ground Fault Circuit Interrupters (GFCIs) will be required whenever using 120 volt AC portable electrical equipment to provide worker protection in the event of equipment ground fault. Electrical cords/cables will be routed out of traffic areas (including foot traffic) or buried or enclosed in protective coverings.

Nighttime work. Supplemental area lighting will be provided. Experiments that are light sensitive shall be exempt from supplemental lighting provided they can be conducted safely.

Biological Hazards:

An variety of insects may be encountered in Aspen FACE areas and should be avoided unless they are the subjects of scientific activity. Avoid crevices, shrubs (except when these shrubs are a subject of scientific activity) and other areas these insects may inhabit. Individuals with allergies to wasps or bees must notify the site supervisor and SSO of their condition prior to working on the site. Wood and deer ticks, mosquitoes, biting flies, gnats, chiggers, and fleas are on the site. Insect repellent with some percent permethrin or DEET will reduce the chance of insect attack.

Rodents may harbor disease-causing pathogens such as ticks, Hanta virus and plague. Personnel are to avoid all contact with rodents and rodent excreta unless these rodents are a subject of scientific study. Notify the site supervisor of any rodents/excreta found in the indoor work areas.

Wild animals such as deer, wolves, and bears on the road to site, can be significant hazards while driving, especially in the mornings and evenings when lighting is poor. Feeding, "harassing", or otherwise disturbing wildlife, is prohibited.

Explosion/Fire Hazards:

Refueling activities present a significant fire/explosion hazard in the presence of static electricity. The principal hazard posed by static electricity is that of a spark from a built-up electrical charge which can cause combustion or explosion of vapors or gases. It is necessary to bond together flammable liquid dispensing and receiving containers with bonding cables before pouring or pumping. Only Factory Mutual Research, Underwriters Laboratories, or U.S. Department of Transportation (DOT) approved safety cans will be used to transport and store small amounts of gasoline. Safety cans will be secured to the vehicle during transport. Site personnel are to ensure that equipment used to transfer liquids is approved for the material being transferred. Equipment should be given a short period of time to cool down before refueling, if applicable.

Other Hazards:

Good housekeeping shall be practiced at all times to eliminate slip, trip, and fall hazards. This will include site cleanup, plant and brush removal, and other improvements as necessary to improve the safety of the site activities. Sanitary trash shall be containerized to avoid attracting vermin. Supplies/materials should be kept in a central location out of the way of traffic areas.

Reagents and preserved sample bottles will be kept sealed except when in actual use.

An unsafe condition shall be reported to the site supervisor or SSO immediately and shall be corrected. If the unsafe condition is with equipment, equipment shall be repaired or removed from service.

If the unsafe condition can not be corrected, work should be immediately suspended and the EH&S Office should be contacted for additional information or guidance.

Section C Hazard Analysis (continued)

Chemical Exposure and Hazard Information (pages 8 to 10)

Substance [CAS]	IP ^a (eV)	Odor Type & Threshold (ppm)	Route ^b	Symptoms of Exposure	Treatment	TWA ^c	STEL ^d	Source ^e	IDLH (NIOSH) ^f
Carbon Dioxide, liquefied and gaseous [7664-93-9]	NA	none	Inh Con	Dizziness or difficulty breathing; increased respiration rate; cold contact, burns, cause freezing injury	Breath: Move to fresh air; Skin: Flush affected area with water. Do not rub affected area.	ACGIH TLV 5,000 ppm (9,000mg/m ³) NIOSH 5,000 ppm (9,000mg/m ³) NIOSH/OSHA 5,000 ppm (9,000mg/m ³)			
Nitrogen, Compressed [7727-37-9]	NA	Simple Asphyxiant	Inh	Simple asphyxiant. Dizziness, nausea, vomiting, loss of consciousness and death.	Breath: Move to fresh air; respiratory support Skin: Flush with water Eye: Irrigate immediately with warm water	NA	NA	NA	NA
Compressed calibration gas (997 ppm carbon dioxide in nitrogen)	NA	None	Inh	Simple asphyxiant. Dizziness, nausea, vomiting, loss of consciousness and death.	Breath: Move to fresh air; respiratory support	NA	NA	NA	NA
Gasoline [8006-61-9]	NA	gasoline 0.3	Inh Ing Con Abs	Intoxication, headaches, blurred vision, dizziness, nausea; eye, nose, and throat irritation. Carcinogenic (benzene).	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	300 ppm	500 ppm	TLV	Ca [ND]
Benzene, as a component of gasoline [71-43-2]	9.24	Sweet/solvent 34-119	Inh Abs Ing Con	Irritates eyes, skin, nose, respiratory system; giddiness; headache, nausea; dermatitis; bone marrow depression. Carcinogenic.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	1 ppm 0.5 ppm (skin) Ca - See 29 CFR 1910.1028	5 ppm 2.5 ppm	PEL TLV	Ca [500 ppm]
Petroleum Hydrocarbon (ex. Lubricants, oils, grease, diesel) (see specific compound and/or product specific MSDS) Drierite (calcium sulfate used as a desiccant) [7778-18-9]	Varies NA	varies by compound None	Inh Ing Con Abs Inh Ing Con Abs	Irritates skin, eyes, nose and throat; headache, dizziness, dermatitis; some components of gasoline and diesel exhaust are carcinogenic Irritates eyes, nose, skin and respiratory tract. May cause obstruction in stomach upon ingestion.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention Breath: Move to fresh air Eye: Irrigate immediately Skin: Soap wash immediately Swallow: Give large amounts of water. Immediate medical attention	varies by compound CaSO ₄ 15 mg/m ³ total dust 5 mg/m ³ respirable fraction 10 mg/m ³ total dust	varies by compound NA	NA PEL TLV	varies by compound NA
Paints, spray Varies by formulation. See product specific MSDS for details.	Varies	Paint, solvent	Inh Con	Irritation/burning sensation to eyes, respiratory irritant, nervous system depression, prolonged/repeated contact may cause dermatitis. Over	Breath: Move to fresh air Eye: Irrigate immediately Skin: Soap wash immediately Obtain medical attention in all cases	Varies by formulation. See product specific MSDS for details.	Varies by formulation. See product specific MSDS for		Varies by formulation. See product specific MSDS for details.

Substance [CAS]	IP ^a (eV)	Odor Type & Threshold (ppm)	Route ^b	Symptoms of Exposure	Treatment	TWA ^c	STEL ^d	Source ^e	IDLH (NIOSH) ^f
				exposure may cause nausea, dizziness, irritation, burning sensation, headache or unconsciousness.	of overexposure.		details.		
Paint, Latex exterior Varies by formulation. See product specific MSDS for details.	Varies	Paint	NA	NA	NA	NA	NA	NA	NA
Miscellaneous household cleaners (Windex, 409, etc.)	NA	Varies by formulation	Con	Potential skin and eye irritants	Eye: Irrigate immediately Skin: Soap wash immediately	NA	NA	NA	NA
Propane [74-98-6]	11.07	Natural Gas 16,000-20,000	Inh Con	Dizziness, disorientation, excitation, frostbite to eyes and skin	Breath: respiratory support Eye: frostbite Skin: frostbite	1000ppm 2500 ppm (NIC)	NA	PEL TLV	2100 ppm [LEL]
Solvent: Aliphatic Hydrocarbon	NA	None listed	Inh Con Abs	Irritated skin, eyes, nose and throat; headache, dizziness, dermatitis	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Remove to fresh air, respiratory support as necessary Swallow: Immediate medical attention, do not induce vomiting	NA	NA	NA	NA
Ozone [10028-15-6]	NA	Odor: Unpleasant, sulfur-like 0.1ppm	Inh Con Abs	Coughing fits, irritation of eyes and/or skin, dryness of the nose and throat. It is extremely irritating to the upper and lower respiratory tract.	Breath: Remove to fresh air, respiratory support (perform artificial respiration) as necessary. Eye: Irrigate immediately, at least 15 minutes Skin: Water flush immediately Obtain medical attention in all cases of overexposure	0.1 ppm TLV-TWA, light work; 0.08 ppm, medium work; 0.05 ppm, heavy work; Heavy, moderate, or light workloads =2 hr*, 0.20ppm (ACGIH 1999)	NA	TLV PEL	NA
Liquid Oxygen [7782-44-7]	NA	NA	NA	Dizziness, drowsiness, frostbite to eyes and skin.	Breath: respiratory support Eye: frostbite Skin: frostbite	NA	NA	NA	NA

^aIP = Ionization potential (electron volts).

^bRoute: Inh = Inhalation; Abs = Skin absorption; Ing = Ingestion; Con = Skin and/or eye contact.

^cTWA = Time-weighted average. The TWA concentration for a normal work day (usually 8 or 10 hours) and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day without adverse effect.

^dSTEL = Short-term exposure limit. A 15-minute TWA exposure that should not be exceeded at any time during a workday, even if the TWA is not exceeded.

^eSource: PEL = Permissible Exposure Limit (OSHA - 29 CFR 1910.1000, Table Z); TLV = Threshold Limit Value (ACGIH); NIOSH = National Institute for Occupational Safety and Health; WEEL = Workplace Environmental Exposure Level (AIHA).

^fIDLH (NIOSH) = Immediately dangerous to life or health (NIOSH). Represents the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.

ppm = Parts per million

mg/m³ = Milligrams per cubic meter

skin = Danger of cutaneous absorption

ND = No evidence could be found for the existence of an IDLH (National Institute for Occupational Safety and Health Pocket Guide to Chemical Hazards, Pub. No. 94-116, June 1994)

C = Ceiling limit value which should not be exceeded at any time.

Ca = Carcinogen.

NA = Not applicable or not available.

LEL = Lower explosive limits.

NIC = Notice of intended change (ACGIH).

References:

Guide to Occupational Exposure Values - 1997. Compiled by the American Conference of Governmental Industrial Hygienists (ACGIH).

Lewis, Richard J., Sr., 1992, Sax's Dangerous Properties of Industrial Materials, 8th ed., Van Nostrand Reinhold, New York.

Micromedex Tomes Plus (R) System, 1995, Micromedex, Inc.

Pocket Guide to Chemical Hazards, Pub. No. 94-116, June 1994, National Institute for Occupational Safety and Health (NIOSH).

Odor Threshold for Chemicals with Established Occupational Health Standards, American Industrial Hygiene Association (AIHA), 1989.

Section D Site Control

Personal Protection Equipment (PPE) Required:

A B C D Anti-C Modified

[May be different for various tasks, if so specify by task from Section A, Sampling and Construction Tasks]

Note: *Minimum Level D equipment is hardhat, safety-toe boots, safety glasses, and substantial work clothing in areas where safety is an issue. All hardhats, glasses, boots, etc. must meet ANSI standards.*

Modified (Action Levels/Modifications):

Level-D PPE will be worn by site personnel for initial characterization activities. Hardhat required in the presence of an overhead hazard, when heavy equipment or boom is in operation, when the overhead walkways are in use, and where the use of a hardhat is required by posting.

Hearing protection shall be worn within 30 feet of operating generators or when noise surveys indicate levels are greater than 85 dB.

Additional Personal Protective Equipment Information:

Ozone Mask /Particulate Respirator masks will be available at the site office. These should be used while working in ozone rings during ozone fumigations.

Individuals will use only the ozone respirator masks provided by the site supervisor and/or SSO.

Personnel are encouraged to wear light clothing during times of potential heat stress. Personnel are encouraged to wear sunglass-style safety glasses and to use sunscreen (sun protection factor [SPF] of 15 or greater) or protective work clothing to prevent sunburn when working outdoors.

Personnel will wear appropriate cold and/or wet weather clothing as required.

Additional Safety Equipment:

A minimum of one 10-pound, class ABC fire extinguisher and one first aid kit shall be in the office on site, accessible, and readily available.

All safety equipment will be visually inspected at least weekly for serviceability. The inspections will be documented in the project records.

A sufficient quantity of drinking water shall be on site.

Latrine facilities are available at the site.

Surveillance Equipment Summary:

- TLD
- Oxygen/Combustible Gas Indicator
- PID: lamp energy _____ eV
- Sound Level Meter
- Particulates: specify _____
- O₃ badges

- Radiation: specify _____
- Toxic Gas: specify _____
- Detector Tubes: specify _____
- Heat Stress Monitor: Area or Personal
- Other: specify _____

Section D Site Control (continued)

Site Surveillance/Monitoring (pages 11 to 11)

Instrument	Surveillance Frequency	Monitoring Location and Tasks	Calibration
Bacharach catalog #KF81973-20 portable CO ₂ meter with a range of 0 to 50,000 ppm with a resolution of 100 ppm. Accuracy of +/- 50 ppm. The meter alarms (audible and visible) after 5000 ppm up to and above 10,000 ppm.	Prior to entry	All CO ₂ or CO ₂ + O ₃ sheds	Annual calibration using vendor provided calibration kit
Kidde Carbon Monoxide Alarm, model KN-COB-B	During entire operation of propane heater	Garage	NA
Praxair O ₃ Generators (2)	Daily	O ₃ Generation Shed	Annual Calibration

NOTES:

1. Personnel performing safety inspections and conducting monitoring for chemical and physical exposures shall be qualified through education, training, experience or any combination of these and with authorization from their respective company.
2. All monitoring equipment will maintained in accordance with manufactures' written instructions. Factory maintenance and calibration will be accomplished per the manufactures' specifications. Field calibrations and source checks will be accomplished per the manufactures' written instructions and/or company operating procedures. All maintenance and calibrations will be formally documented and included in the project files.

Action Levels

Parameter	Value	Action
CO ₂	>5000 ppm	Ventilate area and confirm safe prior to entry
CO	70 ppm	Turn off propane heater, vacate area and allow to ventilate before re-entry
O ₃	>0.1 ppm (100 ppb) over 8 hrs	Ventilate area and confirm safe prior to entry

Section E Site Operations/Decontamination

Site Entry and Control Procedures:

Work Zones: The project director will be advised of work schedules for all personnel in advance of their working on site. Personnel are advised to work in pairs to the extent possible. Personnel are recommended to carry the cordless phone or radios at all times when working on the plots.

Initial Hotline Location: NA

Initial Command Post Location: Site vehicles, site trailer, and operating area

Work Schedule: Work is currently scheduled to be conducted during daylight hours only. However, if it becomes necessary to work at night, supplemental area lighting will be provided. Experiments which are light sensitive shall be exempt provided they can be conducted safely. Additional task-specific lighting shall be provided as required for work operations.

A cycle of work and rest periods will be established by the Project Director as appropriate. Consideration will be given to any condition that may affect the workers and their safety performance. Conditions that may affect the workers include workload, evening and night work, and adverse weather conditions such as heat, cold, wind, precipitation, thunderstorms or tornadoes.

Team Size: 1 or more

Pre-field Briefing Date: Will vary by experiment.

Decontamination Procedures: Not applicable to ASPEN FACE/Harshaw Forest Experimental Farm Operations

Special Facilities Required: Potable water for personnel decon (hand/face washing) and eye wash.

Section F Emergency Procedures

EMERGENCY ACTIONS:

Fire: Fight small (incipient) fires with a portable fire extinguisher and call 9911 or Rhinelander fire department 9-362-5455 to notify them of the fire. Do not hang up or sign off until told to do so by the operator. If fire is too large, evacuate the area.

Explosion: Evacuate the area and notify emergency services by telephone at 9911 or Rhinelander fire department 9-362-5455. Do not hang up or sign off until told to do so by the operator. Assist injured. Notify emergency services and fire department.

Weather: Retreat to sheltered facilities in inclement weather, danger of tornado or high winds. Leave all areas in field and go to lowest level possible away from windows, glassware, or equipment during danger of tornado.

Injury: Stabilize individual, apply first aid if necessary. Notify emergency services by telephone at 9911. Do not hang up or sign off until told to do so by the operator. Prior to start of operations, a minimum number individuals will be identified as designated first aiders. Designated first aiders shall hold current certification in First Aid.

Use surgical gloves for first aid and a micro shield for mouth-to-mouth resuscitation. Double bag all used PPE in sealable plastic bags and dispose of as medical regulated waste.

Spill: Absorbent materials should be kept on site for small inadvertent spills. Notify site supervisor immediately of all spills.

Section F Emergency Procedures (continued)

EMERGENCY RESPONSE ORGANIZATIONS

Police: 9911 or Harshaw Police Department 9-369-6212 or Rhinelander Police Department 9-365-5300.

Fire: 9911 or Harshaw Fire Department 9-282-5769 or Rhinelander Fire department 9-365-5400.

Medical: 9911 or Other Emergency Information

Primary Hospital/Infirmiry

Name: Rhinelander Regional Medical Group
Emergency Telephone: 9-361-4700
Non-emergency Telephone: 9-369-7700
Address: 1020 Kabel Avenue, Rhinelander
Specific Directions: Kemp St (east) to Arbutus St (south) to Ocala St.(east) to Kabel

Alternate Hospital/Infirmiry

Name: * Saint Mary's Hospital
Emergency Telephone: 9-369-6700
Non-emergency Telephone: 9-369-6600
Address: 1044 Kabel Avenue, Rhinelander
Specific Directions:

Other Emergency Information

Rhinelande Ambulance 9-369-6700

Oneida County Ambulance 9-369-6600

Forest Science Laboratory 9-962-7474

Section F Emergency Procedures (continued)

EMERGENCY NOTIFICATION

In the event of an emergency (serious injury, serious illness, fatality, serious property damage, serious spill, etc.) notify the following personnel at once in the following order:

Contractor Project Coordinator

Name: Mark Kubiske
Office Phone: 715-362-1108
Cellular: --
Home Phone: 715-362-7627

(Contractor Project Manager to assess the severity of incident and notify FACE Project Manager)

Project Director

Name: David Karnosky
Office Phone: 906-487-2898
Cellular: 906-483-2898
Home Phone: 906-523-4746

(USDA FS NCS Project Manager to notify Safety Manager and RP H&S representative)

Health and Safety Representative

Name: Wendy Jones
Office Phone: 715-282-7240
Cell Phone : 715-482-4885
Home Phone: 906-483-3725

(Aspen FACE H&S Representative to advise USDA NCRS FS Project and Subproject Managers on proper course of action and coordinate notification of other governmental agencies, as necessary)

Other:

Name: Jaak Sober, Project Operator
Office Phone: 715-282-7240
24 hr emergency 715-282-7530
Cell Phone: 715-482-4890

Name: Bill Danfield, Health & Safety Coordinator USFS
Office Phone: 715-362-1133
Cell Phone: 715-360-9941
Home Phone:

Name: Rodney Eternicka, Health & Safety Coordinator USFS
Office Phone: 715-362-1138
Cell Phone: 715-360-9940
Home Phone:

Name:
Office Phone:
Cell Phone:
Home Phone:

Section F Emergency Procedures (continued)

Accident/Injury/Near-Miss Checklist:

Name of Person(s): _____
Date of Incident: _____ Time: _____
Exact location of incident: _____
Project Title: _____ Number: _____
Supervisor : _____
Printed Name _____ Signature _____

Site Supervisor's Accident/Injury/Near-Miss Checklist		
Step	Action/Requirement	Date/Time (24-hr clock)
1	Perform first aid/CPR, as appropriate, and get injured/ill to medical care immediately, if required.	
2	Isolate and protect scene of accident (nonautomotive). If automotive accident, clear personnel and vehicles from roadway and/or place warning devices.	
3	Report incident by phone to Lead Organization MTU Project Manager and USDA NCRS FS Project Manager immediately after situation is under control. (Note: Other appropriate individuals will be notified by these two individuals.)	
4	Complete appropriate form(s) as required by Employer.	
5	Perform Accident/Incident Investigation as soon as possible, and complete accident investigation report.	
6	Submit accident investigation report to MTU and USDA NCRS FS via required reporting mechanisms (ORPS, etc.).	
7	Turn this form in to Aspen FACE H&S Manager/USDA NCRS FS. Send copy of form your institute's EH&S office	

NOTE: All workers are required to report all injuries, illnesses, accidents, and near misses.

Section H Signatures

DECLARATION OF UNDERSTANDING Site Health and Safety Plan Acknowledgment

Project : FACTS II (Aspen FACE)

I have read and understand this site-specific health and safety plan (SSHASP), and agree to abide by the procedures and limitations specified here and in the Aspen FACE Health and Safety Plan (HASP). Personnel unable to read this document must have their supervisor explain the contents of this document prior to working on the site. Individuals who have questions on information found in this plan should discuss their questions with their supervisor for clarification.

Name	Signature	Employer	Employee Number	Date
1)				
2)				
3)				
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