National Science Foundation
Office of Polar Programs
4201 Wilson Boulevard
Arlington, Virginia 22230

ENVIRONMENTAL DOCUMENT CONCURRENCE

Activity: **Environmental Assessment of a Biocomplexity Study of the Response of Tundra Carbon Balance to Warming and Drying Across Multiple Time Scales, 2005-2008**

Tracking Number: **PGBA0501.FON**

I have read the attached document and concur with the findings and recommendation. I concur that the proposed activity can commence.

Karl A. Erb
Director, Office of Polar Programs
National Science Foundation

June 21, 2005
Date

National Science Foundation
Office of Polar Programs
4201 Wilson Boulevard
Arlington, Virginia 22230

ENVIRONMENTAL DOCUMENT AND DETERMINATION UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) AND EXECUTIVE ORDER 12114

Activity: **Environmental Assessment of a Biocomplexity Study of the Response of Tundra Carbon Balance to Warming and Drying Across Multiple Time Scales, 2005-2008**

FINDING OF NO SIGNIFICANT IMPACT

Tracking Number: **PGBA0501.FON**

6/20/05
Recommending Official Date

Thomas Pyle
Section Head, Arctic Science Section
Office of Polar Programs
National Science Foundation

6-20-05
Approving Official Date

Polly Penhale
Environmental Officer
Office of Polar Programs
National Science Foundation

Background:

The National Science Foundation prepared a draft Environmental Assessment (EA) of a Biocomplexity Study of the Response of Tundra Carbon Balance to Warming and Drying Across Multiple Time Scales, 2005-2008, and solicited public comments. The National Science Foundation has prepared this Finding of No Significant Impact (FONSI) based on the EA, in accordance with CEQ regulations §1500-1508 and 45 CFR 640. It was determined that the proposed activity would not result in a significant impact on the quality of the environment. Given the United States Arctic Program's mission to support polar research, the proposed action is expected to result in substantial benefits to science.

Summary of the Proposed Action and Alternatives:

This project will examine how biological and physical processes interact to control carbon uptake, storage and release in Arctic tundra ecosystems using an experimental approach to manipulate tundra moisture. Approximately 25% of the world's soil organic carbon reservoir is stored at high northern latitudes in permafrost and seasonally thawed soils in the Arctic, a region that is currently undergoing unprecedented warming and drying, as well as dramatic changes in human land use. The objective of this study is to quantify linkages between soil moisture and carbon uptake, storage and release over multiple spatial (microbial to landscape) and temporal (minutes to decades) scales. Understanding how changes in annual and inter-annual ecosystem productivity interact and potentially offset the balance and stability of the Arctic soil carbon reservoir is of utmost importance to global climate change science.

The project is focused on a soil moisture manipulation involving a 60-hectare tundra flooding/draining experiment near Barrow, Alaska on the Arctic Coastal Plain. The project is located within the Barrow Environmental Observatory (BEO). The BEO is 7,446 acres of land owned by the Ukpeagvik Inupiat Corporation (UIC) in a designated Conservation District that has been zoned as a scientific research district for long-term, experimental studies, such as this. Barrow is the preferred location for the logistics hub for this project because of the infrastructure for research and long research history.

Alternative sites were considered for the tundra manipulation project; however, no other site with infrastructure and environmental conditions comparable to BEO was available. While there is a vast expanse of tundra in the Arctic, it would take exceptional logistical support to access sites without existing infrastructure. This would increase the overall environmental impact of the project, requiring additional fuel, vehicles, and housing for researchers. Of primary importance was selecting a site in an area with a history of low visitation by and low density of Steller's eiders in years when they nest. Informal discussions with U.S. Fish and Wildlife Service (USFWS) personnel surveying for eiders in Barrow led to the selection of the preferred site at BEO. The specific research site was selected because of the research history, current location of the eddy flux tower, and the suitability of the chosen lakebed for the flooding/drying manipulation. Additionally, the site is located near a road, reducing the area of tundra impacted by installing an access route to the site. The site is near a power line that can be extended to the site to provide a low-pollution, high output power source.

Alternatives were also considered for research methods, electrical supply, equipment storage, and site access; these alternatives are detailed in the EA. For example, electricity could

be supplied to the site via solar, wind, or diesel generators. However, solar and wind generators used at the site historically have had a high failure rate, reducing data quality and continuity from the site. Diesel generators will be used to support set-up of the site, however, they are not a long-term option because of the noise, carbon exhaust and potential for hydrocarbon spills. Although they will be positioned downwind of the study site, diesel generators have the potential to alter measurements of the small fluxes in CO_2 and CH_4 crucial for the project. Consequently, the preferred alternative for electricity production is extension of an existing power line from a nearby road.

The 'no action' alternative would result in the project not taking place, which would prevent the collection of valuable information on the potential impacts of global climate change on the tundra environment and resulting change in carbon cycling between the tundra and the atmosphere.

Summary of Environmental Consequences:

The site selected for this project has been used for environmental research for over 50 years (Norton, 2001) and contains an eddy flux tower for measuring gas fluxes from the tundra used by investigators in this project; it is a previously disturbed site. The flooding and drying treatment are intended to impact a limited area. Dikes will be built with impermeable plastic sheeting placed in the ground with no permanent stabilizing structure (each approximately 200-m long). At the conclusion of the experiment, the aboveground portion of the dikes will be removed; effects will be confined to a $4km^2$ area around the dry lakebed. Instrument trams and boardwalks will be elevated to reduce alteration of the surface hydrology. Aboveground portions of these structures will be removable. The instrument tram will greatly reduce foot traffic across the manipulation site, allowing measurements to be collected without impacting the tundra vegetation. This is a new technology being deployed for the first time in the arctic specifically to reduce environmental impacts while providing high quality data. Two small, portable buildings will be used on the site. The buildings will be pulled into place while the tundra is frozen and covered with snow to reduce impact to the tundra vegetation. These buildings will allow project personnel to remain on-site and reduce daily trips across the tundra to the road. A tower – 8m high, with nine guy wires up to 8m from the base – will hold the communications equipment for this project. A communications tower will have a flashing light to increase visibility for helicopters. Guy wires for all towers will be equipped with orange piping on the lower end of the wires to prevent humans and animals from colliding with them. Towers will also have spinning, reflective bird deterrents to reduce bird collisions with towers or wires. About 3000 m (10,000 ft) of plastic matted trail will be laid onto the tundra to protect it from foot traffic. The trail path has been planned on the highest, driest ground available to reduce impact to tundra. The trail material will not impact surface hydrology, will minimize impact to surface vegetation and hence minimize alteration of permafrost and soil stability.

For the first year of the project, two 10kW diesel generators will be used while the full instrument package is tested and brought online. The generators will operate continuously (24/7) from project initiation through fall 2005. They will run alternately with each generator being shut off for service and refueling every two weeks. They will be installed fully fueled with a 350-gallon double-walled auxiliary fuel tank. The generators and fuel tank will be kept in a containment structure sufficient for the fuel capacity. The generator system will be located next

to the matted trail approximately ½ mile from Cakeeater road where the investigators on site can visually inspect the generators daily for leaks or malfunctions. To resupply the generators with fuel, each month a helicopter will sling-load 55-gallon drums of fuel to the site ½ mile from Cakeeater Road. The fuel drums will also be stored in a containment structure sufficient for 110% of the fuel capacity. If eiders are nesting in the area, the project team will re-evaluate the use of helicopters and consult with USFWS to determine the best course of action for refueling. The generators, fuel tank, fuel cache and containment vessels will be removed from the site with minimal impact to the tundra vegetation (either by helicopter or over snow-covered tundra) when they are no longer needed to power the project.

In spring 2006 year-round power for the project will be supplied by installing 8000m of overhead power line from the existing line parallel to Cakeeater Road. Several short sections of power line will be connected to the line powering the towers, instruments and temporary buildings installed in 2005. Collision avoidance devices, as specified by USFWS, will be installed on the power lines to reduce the chances of birds flying into the overhead lines. Barrow Utilities and Electric Cooperative Inc. (BUECI) will install the power lines in accordance with industry standards for work in permafrost tundra. The holes for the poles will be drilled in winter 2005/2006 and installation will be completed in spring 2006. This infrastructure is meant to support research at this site for the long-term. When power to this quadrant of the BEO is no longer needed to support science, the line can be removed and the poles can be cut at ground level.

USFWS requested the project to make a number of mitigation efforts, which will be implemented as requested. Collision avoidance markers will be installed on the overhead power lines to reduce bird strikes. The power line will be searched daily for any bird mortalities due to strikes. The project will conduct surveys for nesting pairs of eiders in all years of the project. In years of the project when eiders nest in the area, nests will be marked, monitored, and traffic near the nest will be reduced to avoid disturbance to the nest. Survey and nest avoidance requirements are described in detail in the Biological Opinion of the USFWS, and will be carried out by trained personnel on behalf of the project. While human activity is likely to deter eiders from nesting in the immediate 4 km^2 study area, the site was chosen because it is not an area of concern for use by nesting Steller's eiders based on past observations reported by USFWS.

Public Participation:

The National Science Foundation prepared a draft Environmental Assessment of a Biocomplexity Study of the Response of Tundra Carbon Balance to Warming and Drying Across Multiple Time Scales, 2005-2008, and solicited public comments over a 30-day period (Federal Register: May 2, 2005, Vol. 70, No. 83, Page 22718-22719). Several written comments were received.

The National Science Foundation has received a Biological Opinion finding of non-jeopardy through the Section 7 Consultation with U.S. Fish and Wildlife Service required by the Endangered Species Act regarding the two threatened species that may be encountered or displaced by the project, Steller's eiders and spectacled eiders. A permit has been acquired by the project from the U.S. Army Corps of Engineers (US ACOE) for the manipulation of wetland tundra. Appropriate permissions from local authorities were sought and received.

Copies of the FONSI and the Environmental Assessment titled, Environmental Assessment of a Biocomplexity Study of the Response of Tundra Carbon Balance to Warming and Drying Across Multiple Time Scales, 2005-2008, are available upon request from: Dr. Polly A. Penhale, National Science Foundation, Office of Polar Programs, 4201 Wilson Blvd., Suite 755, Arlington, VA 22230. Telephone: (703) 292-8033 or at the agency's website at: http://www.nsf.gov/od/opp/arctic/arc_envir/tundra_ea.pdf and http://www.nsf.gov/od/opp/arctic/arc_envir/tundra_fonsi.pdf. The National Science Foundation invites interested members of the public to provide written comments on this FONSI during the 30-day review period.

Conclusions:

The potential impacts of the project were considered thoroughly during project planning and are anticipated to have no significant impact on the environment with the implementation of the associated mitigating measures defined in environmental assessment, US FWS Biological Opinion, and the US ACOE permit. Based on the analyses in the Environmental Assessment, the implementation of the preferred alternative is not a major federal action that would have a significant effect on the human environment, within the meaning of the National Environmental Policy Act (NEPA) of 1969 or Executive Order 12114. An environmental impact statement is not required and thus will not be prepared, and the approved actions may be implemented at the end of the 30-day FONSI review period.