

## SECTION 4: NON-TECHNICAL PROJECT PROPOSAL DESCRIPTION

### **Project Title**

The fate and toxicity of Arctic soil pollutants: how humans poison Arctic soils and how Arctic soils poison humans.

### **Researcher's Name and Affiliation**

Dr. Steven Siciliano, Professor, Department of Soil Science, University of Saskatchewan

### **Project Location**

The project will take place at Alexandra Fiord, Ellesmere Island, NT with the primary research site located in a polar desert on the adjacent Dome, which is a mound of dolomitic and granitic rock rising to a plateau at approximately 540 m above sea level.

### **Timeframe**

Fieldwork will commence from July 7<sup>th</sup>, 2012 – August 25<sup>th</sup>, 2012.

### **Project Description**

To determine how humans poison Arctic soils, we must first establish soil components critical for polar desert sustainability. Polar deserts cover a vast area of the islands in the Canadian Arctic but very little is known about the soil ecosystems of these deserts. I hypothesize that within the sorted circles present in Polar Deserts, there is a deep, productive soil horizon, called a Bhy. I hypothesize that these Bhy soils are a critical component of the Arctic deserts and are essential to the long term survival on these ecosystems.

### **Purpose**

Our principal hypothesis is that Bhy soil is critical for polar desert sustainability because (1) they are biogeochemical hotspots, having elevated temperature and moisture and labile C and N, and thus (2) they are likely a major source of nutrients (N and P) for vascular plants, which are critical to ecosystem function.

### **Goals & objectives**

Our objectives are to (1) characterize the distribution of Bhy soils in a polar deserts, (2) characterize the N cycling occurring within the Bhy soils, (3) characterize root distribution through the soil profile and it's link to Bhy soils and (4) examine the link between plant sunlight dependent activity and nitrous oxide release.

### **Method of transportation**

Aircraft will be used to transport personnel and research equipment to the base camp at Alexandra Fjord. Helicopter will be used to delivery and remove research equipment and camping gear to the adjacent Dome at the beginning and end of the field work.

### **Any structures that will be erected (permanent / temporary)**

Up to 5 small tents for sleeping and 1 medium sized tent for cooking will be erected at the study site on the Dome for the duration of the work. All tents and research equipment will be removed from the site at the end of the field work.

### **Methodology**

We will collect both surface and subsurface soil samples and take gas measurement above and belowground.

### **Data**

In the short term this data will allow us to fulfill our stated objectives. In the long term this data will provide needed information for identifying and characterizing the toxicological sensitivity of the Bhy soils, how hydrocarbons bound to soil are transferred to humans and improvement of environmental protection standards in Canada's Arctic.

**Reporting**

We will make our research results available to the NRI and we intend to publish our research results in top-tier scientific journals.