2011 Nunavut Research Licence Renewal Application: Wayne Pollard

Scientific Research Licence #02 053 10R-M (multiyear)

Project Title: An investigation of the sensitivity of high Arctic permafrost to climate change

Principal investigator: Dr. Wayne Pollard, Professor, McGill University

2011 Research Team: Wayne Pollard, Michael Becker, Miles Ecclestone , Chris Omelon, Alfonso Davila, Dale Andersen and 2 student field assistants from McGill

2011 Fieldwork: March 25 –April 15 and June 25-July10.

2011 Field sites: Eureka area on the Fosheim Peninsula, Ellesmere Island (80º 00'N 85º95'W), Expedition Fiord area, Axel Heiberg Island (79º 25'N; 90º 45'W).

Funding source: Natural Science and Engineering Research Council (NSERC) and ArcticNet

Introduction.
This is a 5 year project that examines how climate change is affecting high Arctic permafrost conditions and high arctic landscapes. The main aims of this project are: (1) to monitor climate conditions for different landscape (e.g. tundra, mountains, coasts, wetlands ...) and assess local climate variability and how much the climate is changing, (2) to evaluate the nature and extent of ground ice in permafrost, (3) to determine the amount and rate of landscape change caused by warming and melting permafrost (thermokarst), and (4) to map these changes from for the period 2007-2011. The information collected in this study will improve our general understanding of how climate and permafrost interact which will allow for the better prediction of future changes. Through our case studies we are providing new information about climate, permafrost, ground ice and thermokarst.

Progress Report – 2010 Fieldwork.
Last year's field program had very limited success because of problems related to logistics. PCSP was unable to provide promised helicopter and twin otter support at the dates scheduled, as result we wasted a lot of time waiting for aircraft. In 2010 I was in the field from April 1-10 and July 1-5. April fieldwork involved geophysical mapping of ground ice in at Expedition Fiord and Eureka, collection of climate data and the collection of frozen sediments and ground ice for thaw sensitivity analyses. In July a small group of McGill researchers and students conducted additional dGPS, climate, stratigraphic and ground radar studies at Expedition Fiord on Axel Heiberg Island. We also conducted a short (3 day) survey of thaw sites at Eureka. My study of ice wedges in the Expedition Fiord area wrapped up this year, my data indicates that the pattern of ice wedge development is related to geology, ground ice content within permafrost and age of surface. In this study we used different survey tools like radar and electrical profiling to assess the subsurface conditions. A new study looking at the impact of climate change of ice wedges documented a marked deepening (10-14 cm) of ice wedge troughs and areas of new subsidence over the past 2 years.

2011 Field Program.
Climate change is the most significant environmental challenge facing the North. The aim of my 2011 field program is to continue data collection on how climate change will affect ice-

rich permafrost and in particular how rates of thermokarst may change. In 2011 I plan to continue to look at thaw vulnerability based on the analysis of surface conditions, ground ice contents and distribution, and summer temperature patterns. I also will investigate how massive ice distribution and ice-content profiles vary spatially and assess the role of microclimate on thaw processes Fieldwork will be undertaken at Expedition Fiord and at Eureka and will involve direct observation and analysis of the microclimate, active layer depth and temperatures, permafrost temperatures, and ground ice conditions. I will download data from 2 automatic weather stations for inclusion in numerical models that compute thaw patterns based on surface energy balance conditions. Additional instrumentation (radiometers, RH-temperature sensors and wind monitors) will be installed to obtain more accurate input parameters. Ground ice conditions will continue to be mapped from natural exposures and using geophysical surveys. Field work will include observations related to an ongoing study on the climatic variation in the Expedition Fiord area based on data from a network of automatic weather stations. These stations collect data for a range of topographic and geomorphic settings along an environmental gradient from the accumulation zone of the White Glacier to the mouth of Expedition Fiord (a 50km transect), including stations at the head and terminus of the White glacier, Colour Lake, sites in Expedition Valley and Finger Peninsula.

Significance:
This research has made significant inroads into the understanding of permafrost in the Eureka Sound Lowlands and Expedition fiord areas. It has provided new insights into the origin and age of permafrost systems, rates of change and the potential vulnerability of ice cored landforms. Our findings indicate a close relationship between ground ice and Holocene sea levels.

2011Γ ᓄᓇᕗᑦ ᑭᓕᓯᓂᐊᓂᒧᑦ ᖃᐅᔨᓴᕈᑎᒧᑦ ᐱᔪᓇᐅᑎᒧᑦ ᓄᑕᐅᓕᖁᑎᒃ: ᕗᐃᓐ ᐹᓗᑦ

2011 ᓄᓇᕗᑦ ᑭᓕᓯᓂᐊᓂᒧᑦ ᐱᔪᓇᐅᑎᒧᑦ ᓄᑕᐅᓕᓂᒧᑦ ᐱᔪᓇᐅᑎᒧᑦ ᑐᑭᓯᕋᐅᑦ: ᕗᐃᓐ ᐹᓗᑦ

ᐃᓕᓐᐊᑕ ᑕᐃᔭᐅᔪᓯᐊ: ᖃᐅᔨᓴᓗᑕ ᓱᓂᑕᐅᓴᕋᐃᑐᓂᖓᓂ ᖁᑎᒃᑑᑉ ᖁᐊᖑᐃᓇᓂᖓᓂᒃ ᓯᓚᐅᑉ ᐊᓯᔨᖕᓂᖓᓄᑦ
ᖃᐅᔨᓴᖅᑎᓗᐊᑕᖅ: ᑖᑕ ᕗᐃᓐ ᐹᓗᑦ, ᐃᓕᓴᐃᔨᒪᓐᒃ, ᒪᑭᐅᓪ ᓯᓚᑐᓴᖅᕕᒃᔪᐊᖓᓂ

2011Γ ᖃᐅᔨᓴᖅᑎᐅᓂᐊᖅᑐᑦ: ᕗᐃᓐ ᐹᓗᑦ, ᒪᐃᑯᓪ ᐱᑲ, ᒪᐃᐅᓪᓴ ᐃᑭᓕᔅᑐᓐ, ᑯᕆᔅ ᐅᒥᒫᓐ, ᐃᐅᓪᕚᓐᓱ ᑕᕖᓚ, ᑎᐅᓪ ᐊᓐᑐᓴᓐ ᒪᕈᒃᓗ ᑕᐸᓂ ᐃᓕᓂᐊᖅᑏᑦ ᐃᑲᔪᖅᑎᒃᓵᒃ ᒥᐅᓪᒥᑦ.

2011 Γ ᐅᐸᑲᑖᕐᑐᕗᑦ: ᔪᓇᑲᖅᐸᓯΓ ᕗᓴᐃᓐ ᓄᕗΓ, ᐃᐅᓪᓵΓᐊ ᖃᑭᑕᖓᓂ ᓄᓇᖑᐊᑎᒍᑦ (80º 00’N 85º95’W), ᐃᒃᐱᑎᓴᓐ ᓯᒃᔭᓇᒃᑐᖅ ᓄᓇᖑᐊᑎᒍᑦ (79º 25’N; 90º 45’W).

ᑭᓇᐅᔭᖃᖅᑎᓯᔪᑦ: ᐱᕈᑲᓂᕈᓇᕆᑐᓕᓇᓂᒧᑦ ᑭᓕᓯᓂᐊᖅᑏᑦ ᐊᒪᓗ ᐊᐅᓚᓯᓂᒧᑦ ᖃᐅᔨᓴᖅᑎᑯᑦ ᑲᑎᒪᔨᖏᑦ ᑲᓇᑕΓ ᐊᒃᑎᒃ ᓂᑦᑯᓗ

ᑭᓲᒪᖕᖓᑦ.
ᑕᓇ ᐱᓕᕆᐊᕗᑦ ᑲᔪᓯᔪᖅ ᐊᕿᒍᓂᒃ ᑕᓕᒪᓂᒃ ᖃᐅᔨᓴᖃᑦᕆᓗᑕ ᓯᓚᐅᑉ ᐊᓯᔨᕐᐊᓕᐊᓂᖓᓂᒃ ᓱᓂᔪᓂᒃ ᖁᑎᒃᑑᑉ ᖁᐊᖑᐃᓇᑐᖏᓂᒃ ᐊᒪᓗ ᖁᑎᒃᑑᑉ ᓄᓇᖓᓂᒃ. ᑐᕋᖓᓗᐊᑕᕗᑦ ᑕᕝᕙᓂ ᐱᓕᕆᐊᑎᓂ ᐅᑯᐊᖑᔪᑦ (1) ᐅᐊᓯᓗᑕ ᓯᓚᐅ ᐊᓯᔨᕐᐊᓕᐊᓂᖏᓂᒃ ᐊᔨᒋᖏᑐᓂ ᓄᓇᓂ (ᓲᕐᓗ ᓄᓇᖓ, ᖃᖃᐃᑦ, ᓯᒃᔭᐃᑦ,, ᐃᒪᕐᓱᖓᐃᑦ....) ᐊᒪᓗ ᑕᐸᓂ ᐊᔨᒋᖏᓂᖓ ᓯᓚᖓᑕ ᐊᒪᓗ ᖃᓄᑎᒋ ᐊᓯᔨᕐᓯᒪᓕᒫᖓᑦ ᓯᓚᖓ, (2) ᖃᐅᔨᓴᕐᓗᒍ ᖃᐅᔨᓴᕐᓗᒍ ᖃᓄᐃᓕᖓᓕᓂᕐᓇᔭᖓ ᓱᓂᑕᐅᓯᒪᖏᑑᑉ ᐊᒪᓗ ᖃᓄᑎᒋ ᓄᓇΓ ᖁᐊᖑᐃᓇᕐᑎᒋᔪᖅ ᐃᔪᑎᒋᒪᖖᖓᑦ, (3) ᖃᓄᑎᒋ ᓄᓇᖓ ᐊᓯᔨᕐᓯᒪᒪᖖᖓᑦ ᐅᖁᓯᕙᓕᐊᓂᕐᒧᑦ ᐊᒪᓗ ᐊᐅᐸᓕᐊᓂᖏᑦ ᖁᐊᖑᐃᓇᕐᑐᑦ, ᐊᒪᓗ (4) ᓄᓇᖑᐊᑎᒍ ᓇᓗᓇᐃᓗᒋᑦ ᐊᓯᔨᕐᑐᑦ ᑕᐃᒪᖓᓂᑦ 2007Γᑦ 2011ᒧᑦ. ᑐᓴᕈᑏᑦ ᓄᐊᑕᕗᑦ ᑕᕙᓂ ᖃᐅᔨᓴᕐᓂᑎᓂ ᐃᑲᔪᑎᖃᓂᐊᕐᑐᖅ ᑐᑭᓯᕙᓕᖁᓗᑕ ᐊᓯᔨᕐᓂᐊᓂ ᓯᓚᐅᑉ ᖁᐊᖑᐃᓇᕐᑐᓗ ᑕᐃᒪᐃᓂᖓᓄᑦ ᓯᕗᓂᐊᓂ ᖃᓄ ᐊᓯᔨᕐᓂᐊᒪᖖᖓᑕ ᐅᖃᐅᓯᕆᔪᓇᓂᓴᕆᐊᕋᑎᒍᑦ. ᖃᐅᔨᓴᕐᓂᕗᑦ ᐱᒋᖃᑎᓯᓂᐊᕐᑐᑦ ᓄᑖᕐᓂᒃ ᑐᓴᕈᑎᓂᒃ ᐱᔪᑎᓕᓂ ᓯᓚΓᒃ, ᖁᐊᖑᐃᓇᕐᑐᕐΓ ᓄᓇΓᓗ ᓯᑯᓂᒃ ᐊᒪᓗ ᖁᐊᖑᐃᓇᕐᑐᓂᒃ.

ᖃᓄᐃᓕᖓᓕᒪᖖᖓᑕ ᐅᓂᒃᑳᖓ - 2010Γ ᐱᓕᕆᐊᕕᓂᕐᐳᑦ.
ᐊᕋᓂ ᐱᓕᕆᐊᕆᓚᐅᑕᕗᑦ ᑕᐸᓂ ᐃᓱᓕᑦᕚᖅᑐᕐΓ ᑲᔪᓯᓂᖃᑎᐊᓚᐅᑐᖅ ᐊᑲᐅᖏᓕᐅᕈᑎᖃᓚᐅᕋᑕ ᖃᖓᑕᓲᑦ ᐱᓪᓗᕆᑦ. ᑭᓕᓯᓂᐊᑐᓕᓇᕗᑯᑦ ᐊᑐᐃᓇᕈᑎᓯᓚᐅᖏᒪᑕ ᐊᖏᕈᑎᕆᓚᐅᓯᒪᔭᕐΓᓂ ᖁᓕΓᒍᓕΓ ᐊᒪᓗ ᒪᕈᓕΓ ᑕᑯᓇᓂ ᐅᓪᓗᓂ ᐊᕿᓯᒪᓚᐅᑕᖏᓂ, ᑕᐃᒪᐃᓂᖓᓄ ᐅᑕᕿᔪᐊᓗᑐᐃᓇᐅᓚᐅᑐᒍᑦ ᖃᖓᑕᓱᕐΓᒃ. 2010ᖑᑎᓗᒍ ᑕᐸᓂᓚᐅᑐᖓ ᐊᐃᓇᓕ 1Γᑦ 10ᒧᑦ ᐊᒪᓗ ᔪᓚᐃ 1Γᑦ 5ᒧᑦ. ᐊᐃᓇᓕΓ ᐱᓕᕆᐊᖃᓚᐅᑐᖓ ᓄᓇᖑᐊᓄ ᓇᓗᓇᐃᕈᕆᑦ ᓄᓇΓ ᓯᑯᐃᑦ ᐃᒃᐱᑎᓴᓐ ᓯᔭᓇᒃᑐᕐΓ ᐊᒪᓗ ᔪᓇᑲΓ, ᓄᐊᑎᓗᖓ ᓯᓚᐅ ᖃᓄᐃᑎᓂᖏᑕ ᑎᑎᖃᓯᒪᓂᖏᓂ ᐊᒪᓗ ᓄᐊᑎᓗᖑ ᖁᐊᕕᓂᕐᓂᒃ ᒪᕋᓂᒃ ᐊᒪᓗ ᐊᐅᓂᑯᓂᒃ ᐊᐅᓴᕋᐃᓂᖏᑦ ᖃᐅᔨᓴᕐᓗᒋᑦ. ᔪᒪᐃᖑᑎᓗᖑ ᐅᓄᖏᑐᑦ ᒪᑭᐅᓪΓᖖᓗᑦ ᖃᐅᔨᓴᖅᑏᑦ ᐃᓕᓂᐊᕐᑎᓗ ᖃᖓᑕᕐᑎᑕᐅᓯᒪᔪᑯᑦ ᓇᓗᓇᐃᓯᓚᐅᑐᑦ, ᓯᓚᖓᓂᒃᓗ, ᓄᓇᖓᓂ ᖃᐅᔨᓴᕐᓂᖅ ᐊᒪᓗ ᓄᓇᖓᓂ ᖃᐅᔨᓴᓂᖅ ᐃᒃᐱᑎᓴᓐ ᓯᔭᓇᑐᕐΓ ᐊᑯᓪ Hᐊᐃᐳᒃ ᖃᑭᑕᖓᓂ. ᖃᐅᔨᓴᓚᐅᒥᔪᒍ ᐊᑯᓂᐅᖏᑐᖅ ᐅᓪᓗᓂ ᐱᖓᓱᓂᒃ ᐊᐅᓂᑯᓂᒃ ᔪᓇᑲΓ. ᖃᐅᔨᓴᕐᓂᕋ ᓯᑯᓂᒃ ᐊᐅᓂᑯᓂᒃ ᐃᒃᐱᑎᓴᓐ ᓯᔭᓇᑐᕐΓ ᐱᔭᓇᓂᐊᕐᑐᑦ ᑕᒪᑐᒪᓂ ᐊᕋᒍΓ, ᑎᑎᖃᓯᒪᔪᕐᑯᑎᑲ ᓇᓗᓇᐃᓯᔪᑦ ᐊᐅᒃᐸᓕᐊᓂᖏᑦ ᓯᑯᐃᑦ ᐊᒃᑐᐊᓂᓖᑦ ᓄᓇᖓᓂᒃ, ᓄᓇΓᓗ ᓯᑯᐃᑦ ᖁᐊᖑᐃᓇᕐᑐᕐΓᒃ ᐊᒪᓗ ᖃᓄ ᐊᑯᓂᐅᑎᒋᔪᕐΓ ᐊᐅᒃᐊᓕᐊᒪᖖᖓᑕ. ᑕᕙᓂ ᖃᐅᔨᓴᕐᓂᑎᓂ ᐊᑐᓚᐅᑐᒍᑦ ᖃᐅᔨᓴᕈᑎᓂᒃ ᓲᕐᓗ ᑕᐳᑖᑦ ᖃᐅᔨᓴᕈᑎᓂᒃ ᐊᒪᓗ ᐅᐊᔭᒧᕐᑐᓂ ᖃᐅᔨᓴᕈᑎᓂᒃ ᓄᓇᐅᑉ ᖃᖓᓂ. ᓄᑖᖅ ᖃᐅᔨᓴᕐᓂᓇᔭᕗᑦ ᕿᒥᕈᔪᑎᒋᔭᕗᑦ ᖃᓄ ᓱᓂᒪᖖᖓᑦ ᓯᓚᐅᑉ ᐊᓯᔨᓂᖏᓂᒃ ᓯᑯᐃᑦ ᑎᑎᖃᓯᒪᔪᕐᑯᑎᕗᑦ ᐊᐅᒪᓂᖓ ᐊᖏᓕᕙᓕᐊᔪᖅ 10ᓯᓐᑎΓᑕΓᑦ 14ᓯᓐᑎΓᑕᒧᑦ ᑕᒪᓇ ᓄᑖᑦ ᑕᐃᒪᓇᑎᒋ ᐊᐅᓂᓇᔭᖓ ᐊᕋᒍᔪᓂ ᒪᕈᓂᒃ.

2011 Γ ᑕᐸᓂ ᐱᓕᕆᐊᕆᓂᐊᕐᑕᕗᑦ.
ᓯᓚᐅᑉ ᐊᓯᔨᕐᓂᖓ ᐱᒪᕆᐅᓂᕐᐹᖑᔪᖅ ᐊᕙᑎΓ ᐊᓯᔨᕐᐸᓕᐊᓂᖏᓂ ᐅᐊᖕᓇᕐΓ. ᑐᕋᓇᔭᕗᑦ 2011Γ ᑕᐸᓂ ᐱᓕᕆᐊᕆᓂᐊᕐᑕᑎᓂ ᑲᔪᓯᔪᒪᓗᑕ ᑎᑎᕋᐸᓕᐊᔪᓂᑦ ᓯᓚᐅ ᐊᓯᔨᕐᓂᖏᓂᒃ ᑕᒪᓇ ᓲᓂᓂᐊᕐᒪᑦ

ᖁᐊᖑᐃᓇᕐᑐᓂᒃ ᑕᐃᒪᐃᑐᖃᑎᐊᕐᑐᕐᒥ ᐊᒪᓗ ᐱᓗᐊᑐᕐᒥ ᑕᒪᑯᐊ ᖁᐊᖑᐃᓇᕐᑐᑦ ᐊᓯᔾᔨᕐᑐᑐᐃᓇᓐᐊᖃᒪᑕ. 2011ᒥ ᐸᕐᓇᒃᓯᒪᔪᖓ ᖃᐅᔨᓴᑲᓂᕈᒪᓗᖓ ᐊᐅᒃᐸᓕᐊᔪᓂ ᑐᖓᕕᖃᓗᖓ ᖃᖓ ᑕᑯᓴᐅᔪᖅ ᖃᓄᐃᓕᖓᓕᒪᖔᑦ, ᓄᓇᒥᓗ ᓯᑯᐃᑦ ᐃᓗᓕᖏᓂᒃ ᐊᒪᓗ ᓯᐊᒪᒃᐸᓕᐊᓂᖓᓂᒃ, ᐊᒪᓗ ᐊᐅᔭᑯᑦ ᐅᖁᓂᓇᖃᑕᓕᑕᖓᓂᒃ. ᖃᐅᔨᓴᕐᓂᐊᑐᖓ ᐊᖏᔪᐊᓗᒃ ᐊᐅᒃᐸᓕᐊᔫᑉ ᓯᐊᒪᒃᐸᓕᐊᓂᖓᓂᒃ ᐊᒪᓗ ᓯᑯᖃᐅᓂᑯᕕᓃᑦ ᓯᑯᖃᕈᓂᕐᓂᖏᓂᒃ ᐊᒪᓗ ᖃᐅᔨᓴᕐᓗᒋᑦ ᖃᓄᐃᐊᓕᐊᒪᖔᑕ ᐃᔾᔪ ᑕᑯᓴᐅᖏᑐᑦ ᖃᓄᐃᓕᕙᓕᐊᒪᖔᑕ ᑕᐸᓂ ᖃᐅᔨᓴᕐᓂᓂᕙᖓ ᑲᔪᓯᓂᐊᕐᑐᑦ ᐃᒃᐱᑎᓴᓐ ᓯᔭᓈᒃᑐᕐᒥ ᐊᒪᓗ ᔪᓇᑲᒥ ᐊᒪᓗ ᑕᑯᓴᐅᔪᓂ ᖃᐅᔨᓴᕐᑐᖓ ᐊᒪᓗ ᓇᑐᓇᐃᑐᕆᑦ ᑕᑯᓴᐅᖏᑐᑦ ᐃᔾᔪ ᓱᓂᑕᐅᒪᓂᖏᑦ, ᐊᐅᐸᓕᐊᔪᓗ ᖃᓄᑎᒋᑦ ᖁᐊᖑᐃᓇᓂᖓ ᐃᑎᑎᒋᓕᒪᖔᑦ ᐊᒪᓗ ᓂᓚᓱᓂᖏᓂᒃ, ᖁᐊᖑᐃᓇᑐᓗ ᐅᓇᑐᓯᐅᒍᑦ ᖃᐅᔨᓴᕐᓗᒥᑦ, ᐊᒪᓗ ᓄᓇᐅᑉ ᖃᖓᓂᑐᑦ ᓯᑯᐃᑦ ᖃᓄᐃᑐᓕᒪᖔᑕ. ᖃᓇᑕᐅᔭᕐᒧᖃᐃᓂᐊᕐᑐᖓ ᒪᑭᐃᓂᑦ ᓯᓚᐅ ᖃᓄᐃᑐᓂᖓᓂᒃ ᓯᓚᓂᐊᕐᕕᓂᑦ ᖃᓄᐃᓕᖓᓕᒪᖔᑕ ᓇᓴᐅᑎᖏᑦ ᐊᑐᕐᓗᒋᑦ ᐊᐅᒪᖃᑕᕐᓂᖏᑦ ᑕᑯᓴᐅᔪᑦ ᖃᓄᐃᓕᖓᓕᒪᖔᑕ. ᐊᒪᓗ ᖃᐅᔨᓴᑲᓂᕈᑏᑦ (ᑕᐳᑖᑦ ᖃᐅᔨᓴᕈᑏᑦ, ᐅᓇᓂᖏᓄᑦ ᖃᐅᔨᓴᕈᑏᑦ ᐊᒪᓗ ᐊᓄᓇᒍᑦ ᖃᐅᔨᓴᕈᑏᑦ) ᐊᕿᓛᕐᑕᑲ ᑕᒪᕐᑕᖏᑎᐊᕐᑐᓂᒃ ᑐᓴᕈᑎᓂᒃ ᐱᖃᑕᕈᒪᓗᖓ. ᓄᓇᖓᓂᑐᑦ ᓯᑯᐃᑦ ᖃᓄᐃᓕᖓᓕᒪᖔᑕ ᑲᔪᓯᓂᐊᕐᑐᑦ ᓄᓇᖑᐊᑎᒍᑦ ᓴᓗᓇᐃᓗᕆᑦ ᓱᓂᑕᐅᓯᒪᖏᑐᓗ ᓄᓇᖓᑕ ᖃᓄᐃᑐᓂᖓ ᐊᒪᓗ ᕿᖑᒥᓚᐅᑎᑯᑦ ᓇᓗᓇᐃᓗᕆᑦ. ᑕᐸᓂ ᐱᓕᕆᐊᕗᑦ ᐃᓗᓕᖃᓂᐊᕐᒥᔪᖅ ᑕᑯᓴᐅᔪᓂ ᖃᐅᔨᓴᓂ ᑲᔪᓯᓂᐊᕐᑐᖅ ᓯᓚᒡ ᐊᑐᕐᑕᐅᓯᒪᓂᖓ ᐃᒃᐱᑎᓴᓐ ᓯᔭᓈᒃᑐᕐᒥ ᑐᖓᕕᖃᓗᑕ ᑎᑎᖃᓯᒪᔪᓂᒃ ᓯᓚᓂᐊᕐᕕᐅᔪᓂᑦ. ᑕᑯᐊ ᓯᓚᓂᐊᕐᕕᒋᑦ ᓄᐊᑎᕙᓕᐊᖃᑕᒪᑕ ᑎᑎᕋᐸᓕᐊᓗᑎᒃ ᖃᓄᐃᑎᓂᖏᓂᒃ ᐊᕙᑎᐅᑉ ᖃᓄᐃᑐᓕᓂᖓ ᐊᓯᔾᔨᕐᐸᓕᐊᒪᖔᑦ ᑕᐃᑲᓂ ᖃᑯᑕᖅ ᓯᕐᒥᒥ ᑰᒋᐊᕐᕕᖓᓂ ᐃᒃᐱᑎᓴᓐ ᓯᔭᓈᒃᑐᕐᒥ ᐊᒪᓗ ᑐᖃᕐᕕᐅᒥᔪᑦ ᑐᖃᕐᕕᓗᐊᑕᒎᑦ ᖃᑯᑕ ᓯᕐᒥᕐᒥ, ᐅᐊᑲᑕᖃᕐᑕᑎᓂᓗ ᐃᒃᐱᑎᓴᓐ ᓇᕐᓴᕐᒥ ᐊᒪᓗ ᑎᑭᒃ ᓄᕙᒥ.

ᐱᒪᓇᐅᓂᖓ:
ᑕᒪᓇ ᖃᐅᔨᓴᕐᓂᓇᔭᕗᑦ ᐱᒪᓇᐅᓗᓂ ᖃᐅᔨᔪᑎᕆᕙᓕᐊᔭᕗᑦ ᑕᒪᑯᓂᖓ ᖁᐊᖑᐃᓇᕐᑐᓂ ᔪᓇᑲ ᓇᑎᕐᓇᖓᓂ ᐊᒪᓗ ᐃᒃᐱᑎᓴᓐ ᓯᔭᓈᒃᑑᑉ ᓄᓇᖓᑕ ᒥᒃᓴᓂ. ᓄᑕᕐᓂ ᖃᐅᔨᔪᑎᑎᓂ ᖃᐅᔨᔪᑎᕆᓯᒪᓕᑕᕗᑦ ᐱᕆᐊᕐᓂᕕᓂᖏᓂᒃ ᐊᒪᓗ ᖃᓄᑎᒋ ᓄᑕᐅᖏᑎᕆᒪᖔᑕ ᖁᐊᖑᐃᓇᕐᑐᑦ, ᖃᓄᑎᒋ ᓱᑲᑎᒋᔪᕐᒥ ᐊᓯᔾᔨᕐᐸᓕᐊᒪᖔᑕ ᐊᒪᓗ ᐊᓯᔾᔨᕐᐊᓕᐊᑐᐃᓇᓐᐊᖃᓂᖏᓂᒃ ᓯᑯᖃᐃᓇᖃᑕᕐᑐᓂ ᓄᓇᓂ. ᑕᑯᐊ ᖃᐅᔨᔭᕗᑦ ᓇᓗᓇᐃᓯᔪᑦ ᐊᒃᑐᐊᓂᖃᓂᖏᓂᒃ ᓄᓇᖓᑕ ᓯᑯᖓᓂ ᐊᒪᓗ Hᐅᓗᓰᓐ ᑕᓇᐅᖓᓂᒃ.