

30 June 2010

Joyce Voight
Realty Specialist
Central Yukon Field Office
1150 University Avenue
Fairbanks, AK 99709

Dear Joyce:

Re: Amendment to MBL Permit FF-085682

We would like to amend the existing LTER research permit (MBL Permit FF-085682) for the area near Toolik Lake by adding two new sites. The work to be done at these two sites represents a continuation and extension of our long term research on carbon, energy, and water budgets of tundra landscapes, both on land and in freshwater lakes and streams. As part of similar requests to BLM in the past we have provided the following information:

1. Purpose: to measure carbon dioxide, methane, energy, and water vapor exchange between the tundra surface and the atmosphere, and between the surface of Toolik Lake and the atmosphere, using eddy covariance and other micrometeorological methods.
2. Location and area of sites: The measurements are made by deploying two small micrometeorological towers (less than 10 ft tall) that support an array of instruments and data loggers. The area of disturbance associated with each tower and instruments is less than 100 square feet. The area sampled by the instruments is a function of (1) wind speed, (2) wind direction, and (3) the height of the instruments above the ground or water surface. Considering all these factors, the locations and set up of the towers are such that most or all of the time they will be sampling an area of one acre or less, centered on each tower.
 - a. The first tower is located in wet sedge tundra vegetation, several hundred feet inland from the south shore of Toolik Lake at **N68.6248, W149.5991** (see map). We have looked in the Toolik GIS data base and confirmed that this location is acceptably distant from existing or past research plots that might interfere with the tower measurements.
 - b. The second tower is placed on a raft floating on Toolik Lake at **N68.6311, W149.6060** (see map). There are no nearby research plots or measurements that might interfere with measurements at this tower site.
3. Site disturbance: Minimal site disturbance is a high priority in order to make accurate measurements that are properly representative of the tundra and lake ecosystems being studied.
 - a. The first tower is deployed directly on the tundra, with instruments sampling the air at a height of 4-6 feet. A small pallet (4x6 feet) is placed on the ground nearby to support an air pump, gas analysis instruments, and data loggers. To avoid damage to the tundra caused by trampling, a boardwalk must be constructed. The

boardwalk is constructed as a spur from the existing network of boardwalks at Toolik Lake, as shown in the accompanying map.

- b. The second tower is placed on a raft floating on Toolik Lake (see map). To keep the raft properly oriented it is anchored at each corner.
 - c. Instruments at both towers require a direct electric power connection to Toolik Field Station. These power lines are laid directly on the ground or on the bottom of the lake and are of appropriate construction for safe operation under water. For the first tower this requires laying out a 1200 foot power line across (beneath) Toolik Lake, entering the water near the existing Field Station water intake pump and exiting on the south shore of the lake (see map). For the second tower the power line is 1500 feet long; it enters the lake near the sauna and extends NW to near the middle of the lake, where it is connected to the raft (see map).
4. Experiments: Because the objective of the research is to measure carbon dioxide and methane exchange under minimally disturbed conditions, there are NO EXPERIMENTAL MANIPULATIONS of the tundra or the lake that are part of this research.
 5. Duration: The towers will be operated during the summer only (May-Sept for the tundra tower; late June-Sept for the lake tower) and the equipment will be removed and stored during the winters. Funding for the current LTER project ends December 1, 2010; we have received word that NSF expects to renew funding through the summer of 2016 (as NSF grant # 1026843). We thus plan to continue tower operations each summer through 2016.

Please let me know if there are any other questions I can answer. Also, please send payment information (we can pay over the phone by MBL credit card in the same way that we paid for the Jim Tang amendment, or we can pay by check in response to an invoice).

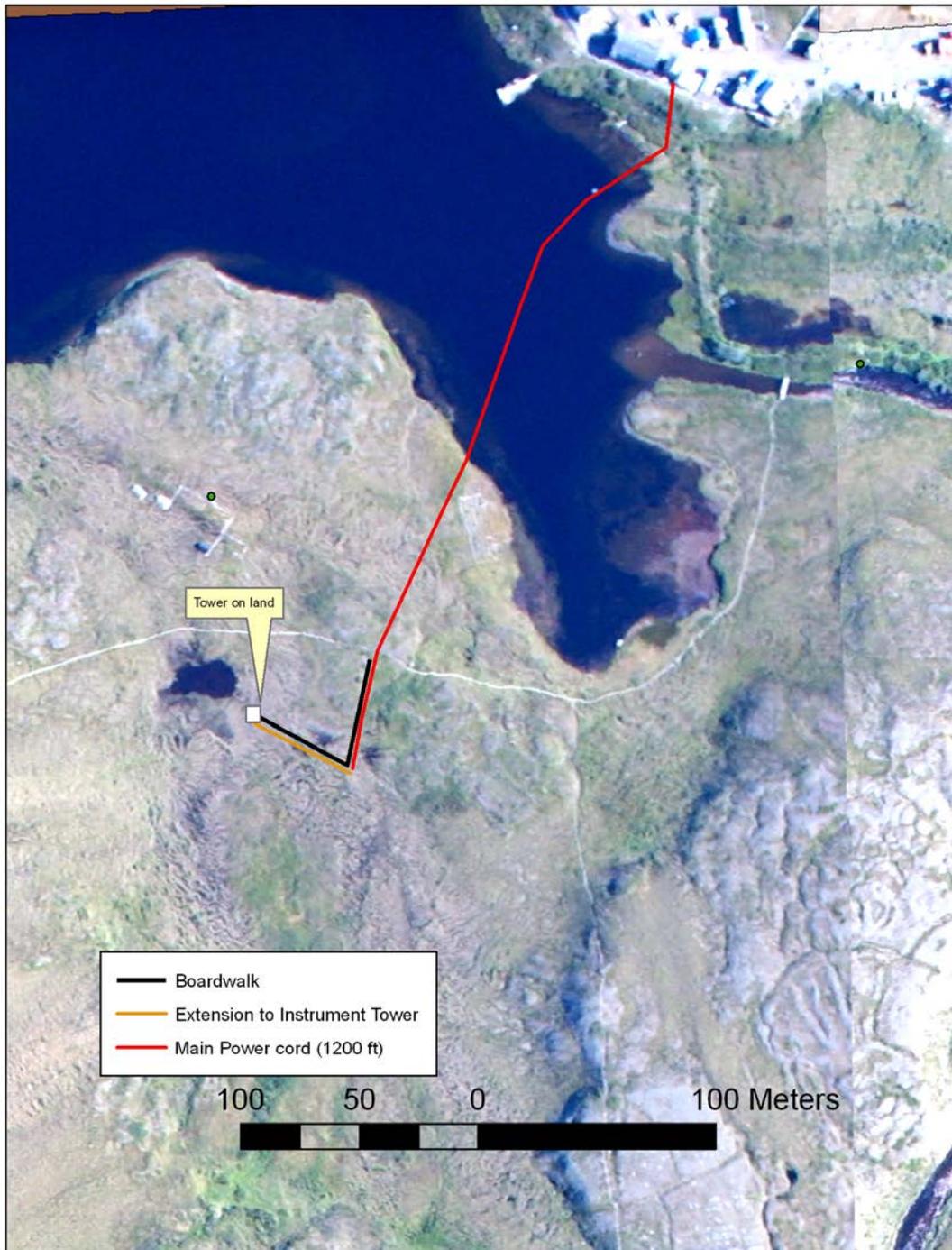
Thank you for your help.

Sincerely yours,

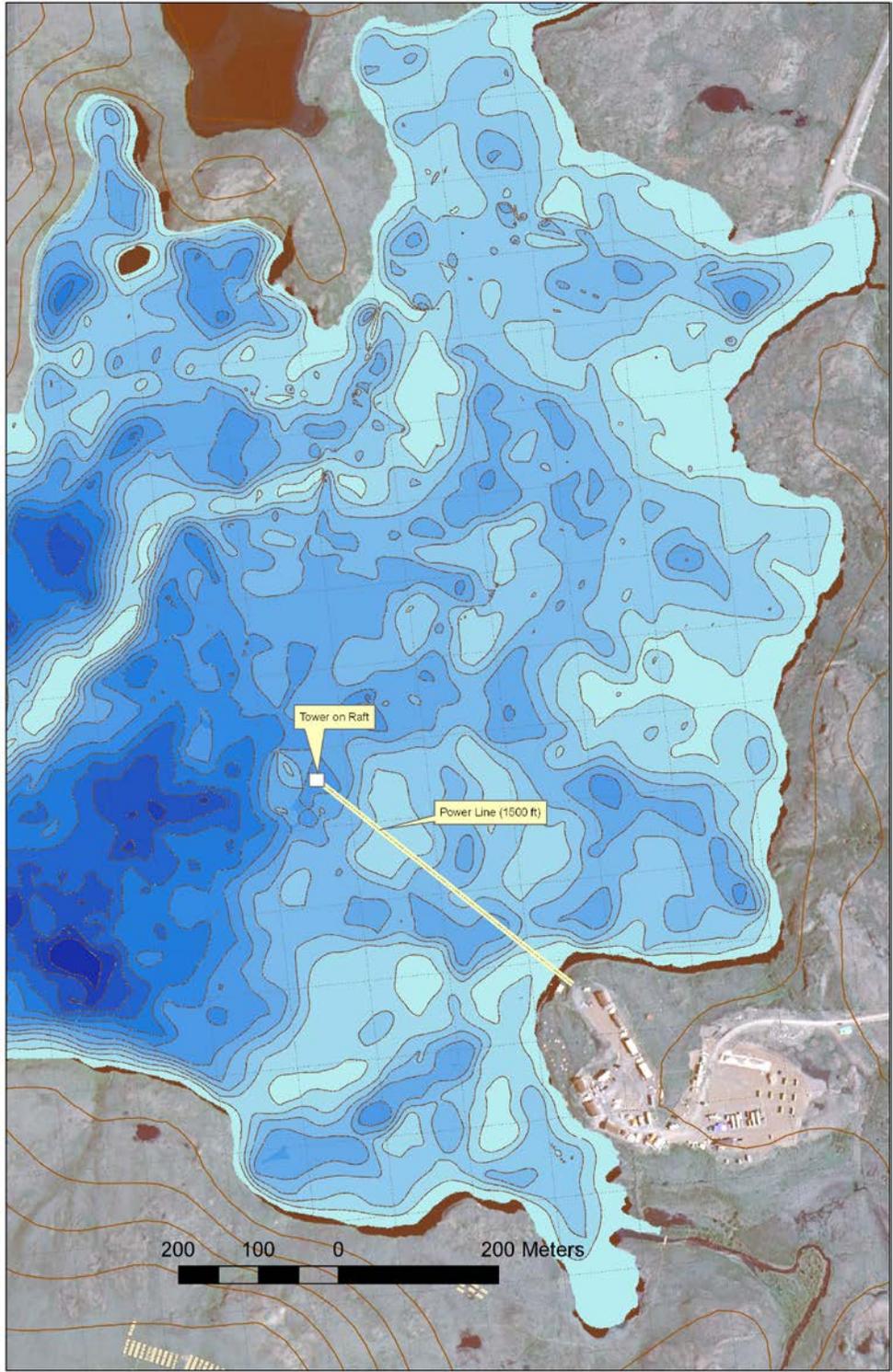


Gaius R. Shaver, Principal Investigator, Arctic LTER project

P.S. See below for location maps.



Map #1. Location of tower on tundra, boardwalk, and power line



Map #2. Location of tower on raft in Toolik Lake, and connecting power line