



Water & Environmental Research Center

University of Alaska Fairbanks

WERC-Fact Sheet-05-02
August 26, 2005

2005 Project Partners

- ◆ Geo-Watersheds Scientific
- ◆ BP Exploration
- ◆ ConocoPhillips Alaska
- ◆ Bureau of Land Management, Alaska
- ◆ Department of Natural Resources
- ◆ The Nature Conservancy
- ◆ The Northern Alaska Environmental Center
- ◆ North Slope Borough
- ◆ National Weather Service

Introduction

Arctic lakes are used for a variety of resource development activities on the North Slope. Besides the annual use for ice roads and pads, lakes are also used for facility operations. These include potable water use, facility operations, such as mud plants, road watering during summer months, and other general facility operations. These uses are typically year round operations and exist for the life of the facility. Improving the understanding of lake hydrology and chemistry can help improve the design, permitting, and operations at lakes used for facility operations. Lake L9312, serving the Alpine facility was our first study lake to look at facility operations.

Physical and Chemical Characteristics of Alaskan North Slope Lakes, and Variations Due To Water Use: Lake L9312 Studies

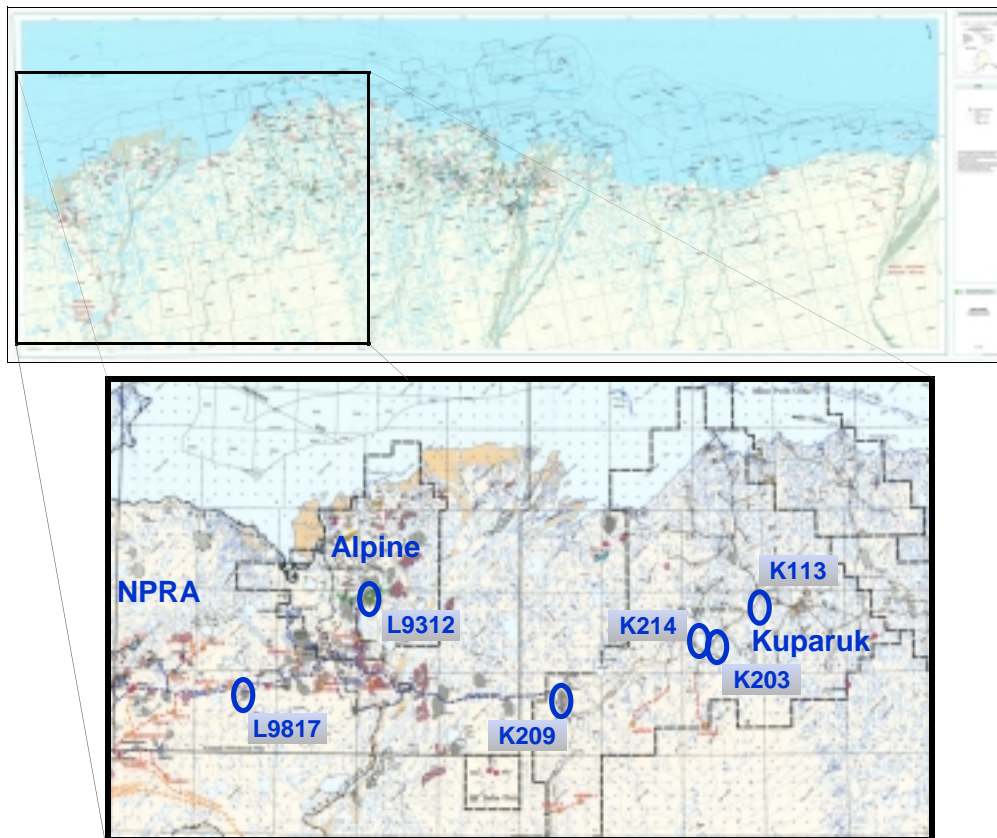


Figure 1. North Slope map indicating current study area (top) and map indicating six monitored lakes in 2004-05 (top image — BP Exploration, lower image — ConocoPhillips).

Project Information

In the Fall of 2002, the University of Alaska Fairbanks Water and Environmental Research Center, together with other project cooperators, initiated a study to obtain baseline information about the physical, and chemical characteristics of North Slope lakes in order to help assess some of the major questions related to lake water use. The project is entering a 3-year Phase-2 to continue improving the understanding of Arctic Lakes and water use. This project is funded in

part by a grant from the U.S. Department of Energy's Arctic Energy Office to the University of Alaska Fairbanks Arctic Energy Technology Development Laboratory (AETDL). Additional funding is provided by project cooperators in the form of financial and in-kind match. State and Federal resource agencies, industry representatives, and members of non-profit agencies provide input in stakeholder meetings.

- White, D.M., and Lilly, M.R.

Lake L9312 Monitoring Goals

Lake L9312 serves the Alpine Facility as it's main water supply lake. Lake L9313 also serves the facility as it's second water supply lake. Initial monitoring occurred during the winter of 2003/2004 with the installation of one research raft on the lake. This raft was redeployed for summer data collection. During the early winter of 2004/05, a second raft was installed to look at the variability of water chemistry across the lake. The second raft was also placed near the water intake piping leading to the pump house at the lake. During winter sampling trips, additional sites on the lake were sampled for field water chemistry parameters. One sampling location was established between the two rafts and an additional location was chosen near the pump station, which also served as a survey measurement point for monitoring winter water levels. Water quality information from Alpine Water Plant operations has also been used to help improve the understanding of annual lake water chemistry variations. This will also aid in evaluating potential changes in L9312 to climate changes and facility water use.

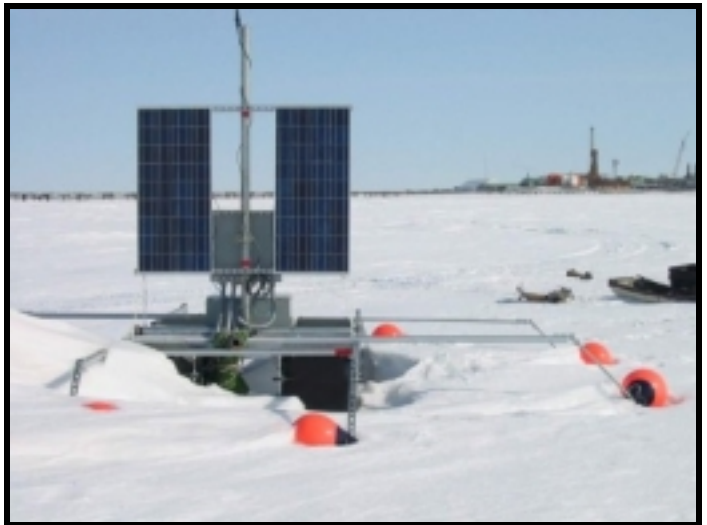


Figure 3. New 2004 raft installation on L9312 adjacent to the Alpine production facility. Monitoring at this lake will help understand water-use issues with year-round operations.

2004/2005 Monitoring Highlights

- ◆ Lake Dissolved Oxygen (DO) are near or over saturation below the lake ice throughout winter months
- ◆ Lake DO levels vary with depth, showing lower values near lake bottom sediments
- ◆ Lake conductivity values increase over winter due to solute exclusion from lake ice formation
- ◆ L9312 is recharged by snowmelt runoff from its watershed area, and backwater overflow from the nearby Colville River during spring snowmelt

Figure 4: Dissolved oxygen levels at Raft A over the 2005 winter period. Note vertical DO levels.

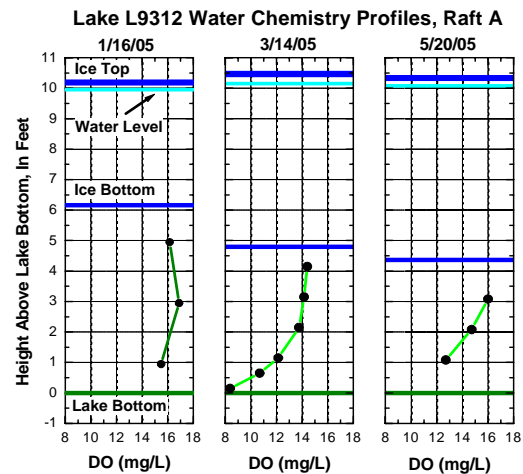


Figure 2. Pumphouse at lake L9312.



For More Information:

Please visit the following website for additional information:

www.uaf.edu/water/projects/northslope/lake_recharge/

Or contact:

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