



PICO

Bulletin

Editor: John Kelley

Technical Editor: D.Dahl

PICO BASED AT UAF



*Luis Proenza,
Vice Chancellor
for Research*

I am delighted to welcome the POLAR ICE CORING OFFICE (PICO) to the University of Alaska Fairbanks (UAF). Although it is most often thought of as providing drilling services, PICO really represents a much wider range of talent, skills, and services available to the polar research community. In effect, PICO is a group of dedicated engineering and research support specialists available to assist scientific field parties in the Arctic, Antarctic, or high altitude ice covered areas.

In their new home at UAF, PICO will have access to and will interact with a broad range of polar science and engineering faculty and staff. This work melds well with that of UAF's major scientific thrusts, and we look forward to mutually positive complementary relationships.

Both UAF and the State of Alaska have made a substantial commitment to PICO as part of our efforts to develop leadership in polar research and technology. Alaska's industrial base has a long history of successful operations in the arctic regions, and UAF has the scientific personnel to couple technical expertise to science programs. We believe this "partnership" will provide a U.S. competitive advantage in polar technologies.

EARLY DAYS OF PICO

The Polar Ice Coring Office began as part of the Ross Ice Shelf Project (RISP) at the University of Nebraska-Lincoln (UNL). The RISP management office was located at UNL from 1971-79. In 1974, the National Science Foundation (NSF) shifted responsibility for logistics of NSF projects in Greenland and shallow ice drilling from the Army's Cold Regions Research and Engineering Laboratory (CRREL) to RISP. A new division of RISP, PICO, was formed to accomplish these two tasks. In 1979, as RISP wound down, PICO became a separate contract at UNL and progressed through two five-year contracts.

PICO's ice drilling operation consists of designing, building and operating ice drilling equipment in support of NSF-sponsored projects. PICO has provided drilling support in Antarctica, Greenland, Peru and China.

The Greenland logistics operation, based on the Sondrestrom Air Base on Greenland's west coast, provides support for up to 25 NSF-sponsored projects each summer season. During 1979-81 logistical support was provided for the Greenland Ice Sheet Program (GISP) which retrieved a core to the bottom of the ice sheet at DEW line station DYE 3 in central Greenland. In 1989 we will provide logistical support for GISP II where PICO drilling crews will retrieve an ice core to bedrock from the summit of the ice cap (~3500 m).

In 1988, NSF requested proposals from other institutions interested in managing the PICO contract. As a result of this process the University of Alaska Fairbanks was awarded the contract and assumed responsibility on November 1, 1988.



*Jay Sonderup, Assistant
Director*

1989 DRILLING PROGRAM

The 1989 GISP II drilling program will produce several hundred meters of ice core for use by scientific investigators. It will also initiate the first U.S. attempt to drill through a major ice sheet since 1968. Although the actual penetration of the Greenland ice cap will begin in 1990, a major test of some of the drilling equipment will be conducted during the 1989 season.

One version of the deep drill is currently undergoing fabrication and assembly in the UAF Geophysical Institute machine shop under the supervision of Larry Kozycki. The deep drill was designed by Bruce Koci and Walt Hancock. It is a cable-suspended, rotary drill driven by a down-hole electric motor. The drill produces a core 5.2 in (132 mm) in diameter and 8 ft (2.4 m) in length. After completion, it will be shipped to the CRREL at Hanover, N.H., for preliminary tests in an artificial ice well and then sent to Greenland for field tests.

The primary effort this season, besides testing the general design and engineering concept, will be to examine the effects of the hole fluid on various drill components. The fluid is used in deep holes to counteract the hydrostatic pressure of the ice, thus preventing hole closure.

The drilling team, organized by Jay Sonderup and Herb Ueda, consists of a permanent technical staff and seasonal UAF student assistance for the summer field programs.



*Herb Ueda, Technical
Services Manager*

PICO SUPPORTS SCIENTIFIC RESEARCH PROGRAMS IN GREENLAND

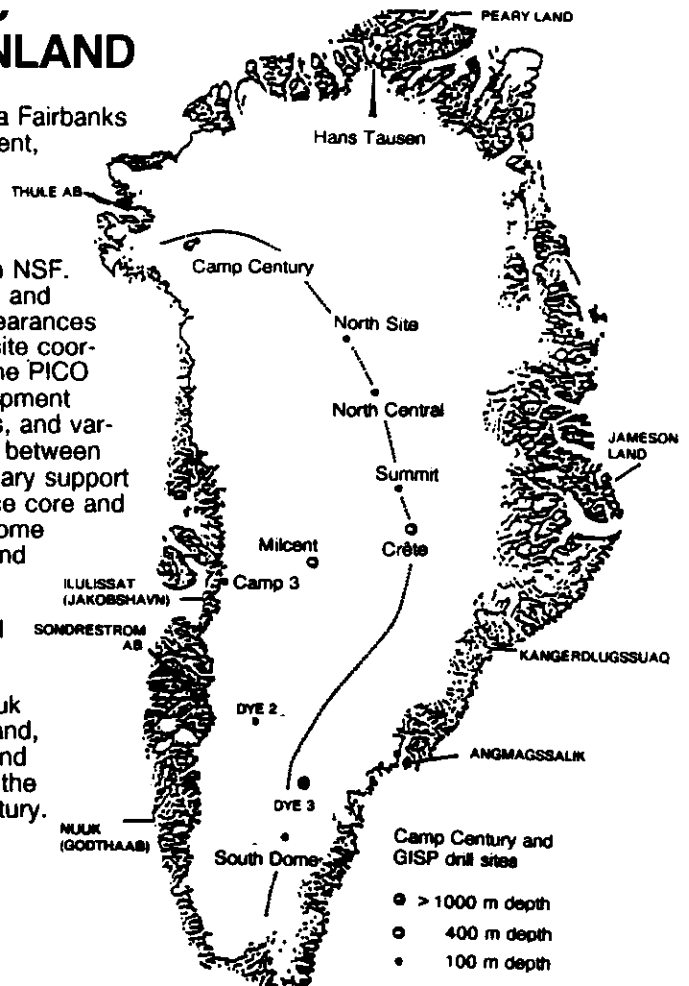
The Polar Ice Coring Office (PICO) of the University of Alaska Fairbanks (UAF) provides administrative support, field operations management, and coordination of logistical requirements for NSF-sponsored projects under contract with the National Science Foundation. PICO's primary responsibility is to support NSF Division of Polar Programs (DPP) glaciology projects and, secondarily, to support other DPP projects and those sponsored by other divisions within NSF.

PICO provides: arrangements for transportation of personnel and equipment between the U.S. and Greenland, including military clearances for personnel, access to air base facilities in Greenland, and on-site coordination of field activities originating at Sondrestrom Air Base. The PICO field office controls and maintains an inventory of field camp equipment that includes: oversnow vehicles, shelter/tents, radios, generators, and various types of fuels, and provides liaison between NSF, the scientists and civilian and military support subcontractors. PICO also provides: ice core and hot water drilling services, the loan of some drilling equipment to scientific parties, and borehole logging services for NSF-DPP glaciological and geophysical projects.

The map of Greenland shows coastal sites of NSF-sponsored research, including Sondrestrom Air Base, Thule Air Base, Ilulissat (Jakobshavn) and Nuuk (Godthaab) on the west coast; Peary Land, Kangerdlugssuaq fjord and Jameson Land on the north and east coasts. Sites on the ice sheet include Dye 3 and Camp Century.



Kent Swanson, Senior Logistics Manager



PICO IN ANTARCTICA

Every year since the beginning of PICO, NSF-sponsored projects which require ice drilling were supported in Antarctica. Whether retrieving core with our electro-mechanical drills or providing access holes with hot-water drills, PICO goes where tasked by NSF.

During the 1988-89 United States Antarctic Program (USAP) season, PICO provided support to four science projects: 1) Drilling two ice cores (179 and 150 m) for Dr. Paul Mayewski of the University of New Hampshire; 2) Drilling four holes (30 to 100 m) using a hot water drill for Drs. Will Harrison and Keith Echelmeyer of the University of Alaska Fairbanks; 3) Drilling 211 holes 17 m deep with a hot water drill for Dr. Charles Bentley of the University of Wisconsin; and 4) drilling 348 holes 17 m deep with a hot water drill in support of Drs. George Thompson and Uri-Ten Brink of Stanford University. All projects were successful and completed the busiest Antarctic season ever for PICO.

The 1989-90 USAP field season promises to be less ambitious with two projects to support. The first project is in support of Dr. Lonnie Thompson of Ohio State University, Dr. David Peel of the British Antarctic Survey and Dr. Charles Raymond of the University of Washington. This project will consist of drilling two 200- to 300-m cores at two locations on the Antarctic Peninsula. Two PICO personnel will be involved.

For the second project PICO will drill one 200-m ice core and several short cores at Byrd Station for Dr. Chester Langway of the State University of New York-Buffalo. Two PICO personnel will participate in this project.

NATIVE STUDENT PARTICIPATION IN PICO

Arrangements are being made to enlist the aid of an Alaska Eskimo or Indian student to assist in PICO field programs. The search for a qualified Native science or engineering student will be made through the NSF-supported ACCESS program at the UAF. The ACCESS program was established to promote Native Alaskan students to pursue successfully careers in science, math and engineering.

1989 SCHEDULE OF EVENTS

- Test of (wet) drill for use in fluid-filled hole at CRREL, May 1-12.
- Field test of "wet drill" at GISP II site in Greenland, June-August.
- Ice core drilling at summit of Greenland ice cap for Dr. Ellen Mosley-Thompson, Ohio State University, May 24-June 18.
- "Determination of the mechanisms of rapid flow on Jakobshavns Glacier, Greenland, by borehole measurements" by Drs. Keith Echelmeyer and William Harrison, University of Alaska Fairbanks, June 10-August 15.
- "Greenland Ice Sheet Program II" managed by the Science Management Office at the University of New Hampshire, May 23-August.
- "Processes Influencing Chemical Species Concentrations in Ice Cores from Dye 3, Greenland" conducted by Dr. Clifford Davidson, Carnegie-Mellon University, through August.
- "Vertebrate Paleontology and Geology of the Triassic-Jurassic Boundary in East Greenland" conducted by Dr. Farish Jenkins, Jr., Harvard University, June 29-August.
- "Crustal Reflection Profiling Across Oldest Archean Crust and Crustal Structures in West Greenland" conducted by Dr. Scott Smithson, University of Wyoming, September 1-24.
- Ice core drilling on the Antarctic Peninsula for Dr. Lonnie Thompson, Ohio State University, November 1989-January 1990.
- Ice core drilling at Byrd Station Antarctica for Dr. Chet Langway, SUNY-Buffalo, November.

POLAR RESEARCH BOARD MEETING

Presentations will be made on the PICO program by L. Proenza, J. J. Kelley and J. Sonderup at the May 4 meeting of the Polar Research Board in Washington.

GREENLAND SUPPORT

The PICO operation in Greenland is possible only through the support of many organizations.

The U.S. Air Force Space Command allows PICO access to the air bases in Greenland. Support at Sondrestrom AFB is provided by the 4700th Operations Support Squadron and the 1015th Air Base Squadron. The 1012th Air Base Group provides support at Thule AFB.

Flight support between the U.S. and Greenland and on the ice cap is a complement of the 109th Tactical Airlift Group out of Schenectady, New York. GreenlandAir, Inc. also provides air support between communities in Greenland and to the ice cap.

The Alaska Air Command at Eielson AFB and the U.S. Army at Ft. Wainwright supply support at home in Fairbanks.

Felec Services, Inc., Greenland Contractors, Danish Arctic Contractors, The Royal Greenland Trade Department, Statoil, The Danish Meteorological Service, Gronlandsbanken and Scandinavian Airlines all provide valuable services in support of PICO in Greenland.

TEST OF NEWTON'S INVERSE-SQUARE LAW IN THE GREENLAND ICE CAP

PICO program scientists participated in an expedition to the Greenland ice cap to test deviations from Newton's inverse square law. B. Lyle Hanson and John R. Kelly associated with the PICO project at the University of Nebraska, Lincoln, joined a larger group of physicists and geophysicists from several institutions in the U.S. and abroad to make the best gravity measurement ever. The team lowered a delicate gravity meter (gravimeter) about a mile into a previously drilled borehole in the ice and recorded the pull of gravity at various levels. The results were compared with those predicted by Newton's equations. The team reported in *Physical Review Letters* (62:9, 1989) that an anomalous gravity gradient was observed. However, the gradient may be due to unexpected geological features in the rock below the ice and not a violation of Newton's laws.

The principal reason for the choice of a 1.25 mile deep borehole in the Greenland ice cap is that the uniformity of the ice eliminates one of the major sources of uncertainty arising from earlier studies, namely the heterogeneity of rocks through which a shaft in rock passes.

PARTICIPATION IN SRA

The Society of Research Administrators (SRA), founded in 1967, is a professional association devoted to improving the efficiency and effectiveness of research administration. SRA members include administrators in colleges and universities, industry, non-profit research organizations, hospitals and medical centers and government agencies as well as other professionals whose work involves research support activities. Members come from the United States, Canada and other countries around the world.

The PICO staff is looking forward to active participation in this organization. B. Crandall, fiscal officer, will be attending the annual Western Region meeting in Santa Fe in May.



PICO administrators (left to right): John Kelley, Kent Swanson, Bonnie Crandall, Jay Sonderup, Dorothy Dahl and Herb Ueda

LETTERS:

The Ross Ice Shelf Project (RISP) was established at the University of Nebraska through support from the National Science Foundation in early 1970. RISP's goal was to penetrate the Ross Ice Shelf by drilling, while at the same time recovering, ice cores.

Drilling through glacier ice and retrieving ice cores requires sophisticated technology. To handle this aspect of RISP, J. H. Zumberge and the co-principal investigator of RISP, R. H. Rutford, set up the Polar Ice Coring Office at the University of Nebraska in Lincoln. Karl Kuivinen was named the first director of PICO and continued in that role until PICO was relocated at the University of Alaska.

Under Kuivinen, PICO handled not only the core drilling operations but also all logistic support for RISP. Eventually, PICO became involved in the Greenland Ice Sheet Program (GISP) under the direction of Dr. Chester Langway. All NSF-sponsored ice-coring activities in Greenland and Antarctica now depend on PICO for their ice-coring operations and logistic support.

Those of us who founded PICO are proud of its reputation in ice-coring operations and ice-sheet logistics. In order to continue its support of glaciology, PICO must continue as a well-managed and strongly-supported organization in its new home. Once established at the University of Alaska, PICO will be involved heavily in the next phase of glacial ice coring. We look forward to continued success of PICO, and wish those who are responsible for its health good luck and deep drilling.

James H. Zumberge (Los Angeles)

NOTES:

- **NEW MANAGERS** – Cathleen Cavin will join the PICO staff as Field Operations Manager and will leave for Greenland in late April. Ms. Cavin will join Kent Swanson, Senior Logistics Manager, at the PICO office in Sondrestrom, Greenland. Ms. Cavin has more than ten years experience in science and logistics support services in the Arctic (NARL) and Antarctic (McMurdo and Palmer stations). Also joining the PICO staff is Jay Klinck as the Camp Manager for the GISP II camp. He has 15 years experience in remote site operations, including service as station supervisor at DYE 1 & 3 DEW line sites in Greenland and at the USAP stations at SIPLE and Palmer in Antarctica.
- **ADVISORY BOARD** – The PICO program established a University of Alaska Advisory Board to provide local advisory services and review. The board consists of faculty and professional staff from the Geophysical Institute, School of Engineering and Institute of Marine Science.

We gratefully acknowledge the editorial services of Helen Stockholm

NEW DIRECTOR FOR PICO



John J. Kelley,
Director

Dr. John J. Kelley was appointed Director of PICO in March 1989. Dr. Kelley is a professor in the School of Fisheries & Ocean Sciences, Institute of Marine Science. His research on trace gases in the polar ocean, ice and terrestrial environments covers a span of more than 25 years. He also served as a program manager (meteorology, oceanography) in the Division of Polar Programs (DPP), National Science Foundation, in the early 1970s and Scientific Liaison Officer while on sabbatical leave for the Governor's Office during the period of the Outer Continental Shelf Environmental Assessment Program (OCSEAP). Dr. Kelley also served as Director of the USN/ONR Naval Arctic Research Laboratory (NARL) at Barrow, Alaska. He has served for the past eight years as chairman of the North Slope Borough Science Advisory Committee. He also managed the logistic services for the U.S. Department of Energy multi-disciplinary arctic ecological research program (R4D). Dr. Kelley currently serves as President of the American Meteorological Society chapter and Sigma Xi/Alaska.

FROM: PICO
203 O'Neill Building
University of Alaska Fairbanks
Fairbanks, Alaska 99775
Telephone: 907-474-5585
Telefax: 907-474-5582