

Rob and Mike,

Below is the 2004 letter from Rob Robbins with new date. Dive Plan and Dive information for L.Quetin follows and has been updated for this season. Josh Sprague may dive with us again next season so his 2004 information is included also. We will update his dive information and our other diver at a later date if they are part of our dive team for 2005.

Dr. Langdon Quetin
Marine Science Institute
Santa Barbara, CA 93106
United States

15 April 2005

Subject: **RESEARCH DIVING DOCUMENTATION**

Your proposal indicates that you intend to perform diving operations as part of your research activities during the upcoming austral summer season. Authorization to dive under the auspices of the USAP is made by the NSF/OPP Safety and Health Office, and requires a review of your project dive plans and the training and experience of each diver in your field team.

Diving in Antarctica is rigorous and potentially life threatening. Most dives are conducted under a ceiling and the extreme cold water impacts a diver's ability to handle emergency situations. Comfort with the use of dry suits and associated equipment is critical. Required experience level of USAP divers is:

- Certified minimum 1 year
- Minimum 50 dives
- Minimum 15 dry suit dives
- Recent diving experience (10 dry suit dives in last 12 months, at least one dive each 6-month period at or near the maximum certification depth).

A Lead Diver for your group should be indicated on the Project Dive Plan. This individual must possess the qualifications and experience necessary to oversee polar diving operations. The Lead Diver will be responsible for day to day operations of the project's diving. We recommend (but do not require) that the Lead Diver is someone other than the Principal Investigator of the grant. The Lead Diver will insure that the RPSC Scientific Diving Coordinator is kept informed of the project's status, and will insure that dive logs are provided in a timely manner.

All grantee supplied life support equipment must be maintained on an annual basis. Documentation of servicing will be required for regulators, gauges, BCDs, and dry suits.

The Dive Safety Officer at your home institution will be asked to verify the skills of each diver in your Antarctic dive team and that the divers have demonstrated proficiency in the use of dry suits. Groups coming from institutions without a formal Dive Safety Program may be asked to work with the Dive Safety Officer at a regional institution to insure compliance. All divers working from McMurdo will be required to do one or more check-out dives with the Scientific Diving Coordinator to demonstrate their skills and comfort levels. For operations outside of the McMurdo vicinity, a higher level of proficiency will be expected due to the reduced level of emergency dive accident response available.

Be advised that on-site authorization to temporarily suspend dive operations rests with the NSF/OPP Representative, the Station Manager, any on-site member of the NSF/OPP Scientific Diving Control Board, the Scientific Diving Coordinator or Marine Projects Coordinator if, in his or her opinion, dive safety is compromised. If the conditions warranting that temporary suspension are not eliminated, dive operations may be suspended for the remainder of the season.

Project Dive Plan

Principal Investigator: Dr. Langdon Quetin, Dr. Robin Ross		Project Number: B-028-P
Institution: University of California Santa Barbara Marine Science Institute		
Address: Marine Science Institute Santa Barbara, CA 93106 United States		
Phone: 001 8058932096	FAX: 001 8058932122	E-mail: langdon@icess.ucsb.edu
Proposed Divers:		Institution/Affiliation:
Dr. Langdon Quetin		UC Santa Barbara
David Huang		UC Santa Barbara
Joshua Sprague		UC Santa Barbara

Proposed Dive Operations. Provide an outline of your proposed dive operations. Include locations, maximum depths, estimated number of dives as well as a full description of your methods and objectives. Use additional pages as necessary.

PROJECT DIVE PLAN

DIVE LOCATIONS

Depending on conditions, dives may be through fast ice and in brash near Palmer Station, near-shore island sites within boating limits of Palmer Station, possible blue-water dives within boating limits of Palmer Station.

A. PROVIDE AN OUTLINE OF YOUR PROPOSED DIVE OPERATIONS. INCLUDE MAXIMUM DEPTHS, ESTIMATED NUMBER OF DIVES AS WELL AS A FULL DESCRIPTION OF YOUR METHODS AND OBJECTIVES.

Diving Dates: Approximately October 31 to January 1.

Dive Leaders: Langdon Quetin

Number of Dives: 15-20 dives Variability in weather and ice conditions and other objectives make this difficult to estimate with any accuracy.

General Operation: Dives will be conducted as outlined in University of California regulations and USAP regulations for research diving, and in coordination with Palmer Station management. A dive tender will always be present when diving from a zodiac or from shore. The dive tender will always be able to contact Palmer Station by VHF radio. Palmer Station will be notified at the beginning and end of a dive. Dive times will range from 30-60 min. Dives are planned according to the PADI tables. We do not expect to do more than two dives a day, and generally dive once a day. A DAN oxygen kit will always be at the dive site on the ice or in the zodiac.

Dive gear: Viking Pro dry suits, DUI polypro underwear, Sherwood Maximus regulators for primary, SCUBA PRO G250, D300, D350, D400 or Sherwood Maximus as

secondary, Zeagle buoyancy compensators, sheath knives, SCUBA Pro Jet or Gorilla fins, DUI weight harness or weight belt with some weight in the pockets of the Zeagle BC, UWATC dive computers.

Sampling gear: underwater video camera, small aquarium nets

Orientation at Palmer Station:

All divers will be informed about the dive compressor, oxygen sources and field kits, and protocols for dive emergencies prior to diving. All divers will complete at least one orientation dive at the Palmer dock or through an ice hole in no greater than 50 ft of water depth. On these dives we focus on our equipment and comfort, primarily checking buoyancy, warmth. All divers will be familiar with our equipment and procedures. Both will have completed our dive orientation program at UCSB and will be familiar with the dive gear they will be using, except for the dive underwear.

Dive Types:

No dives will be greater than 100 ft and generally less than 60 ft when diving on the bottom and less than 30 ft when diving in ice. The type of dive will depend on the ice and water conditions in the vicinity of Palmer Station. There are three possible types of dives.

Diving from shore or a zodiac in water depths less than 100 feet. These are typical subtidal dives near the bottom. The objectives for these types of dives range from surveying the dock or seawater system at Palmer Station, orientation dives in Hero Inlet or near DeLaca Island, surveying benthic sites that were quantitatively surveyed in 1989, including the Bahia Paraiso. Equipment used on these dives would be a Nikonos camera or a video camera in a Sting Ray housing.

Diving from fast ice. Ice conditions will determine our methods of ice diving. In fast ice we will use a tether line anchored to an ice screw at the primary dive opening, rather than to a zodiac as in Figure 1. The tether line is attached to a float and suspended through a triangular opening in the ice (approximately 4 ft on a side) large enough to accommodate two divers. A secondary opening will be located less than 60 ft distant and be of similar size to the primary one. The secondary opening will be reachable by divers while still on tether and be marked with a down line. The objectives on these dives will be to orient to the tether system and to collect, observe and photograph krill on the underside of the pack ice, and to collect sea ice samples.

Diving in pack ice. Diving in the pack ice is usually more productive for krill studies. The objectives will be the same as described for diving from fast ice. Diving in pack ice will follow the same protocol as fast ice diving except that the dives will be from a zodiac (Figure 1) (or from the new aluminum boat (Tin Can) used last season) or from shore near Palmer Station. We will dive only in loose pack ice with enough space between floes overhead for surfacing. These dives necessitate that we pay close attention to the air temperature, prevailing winds and the tidal cycle.

Tether Diving. The tether system we use is the same one we have been using since 1990 on winter cruises in the pack ice and at Palmer Station and is a modification of the tether system commonly used in blue water diving. Two divers at a time will dive using our tether system. Depth of the main line is 10-12 ft, and the tethers are 90 ft long (Figure 1). After some experimentation we have found this system works best for diving under ice if

the bottom depth exceeds 100 ft or visibility is limited. The length of the tether is short enough to allow the diver to reach the hole easily if there is a regulator free-flow, yet long enough for surveys. The general working depth of the divers is 0-15 ft with an occasional excursion to 50 ft to look at the vertical distribution of krill. Should the diver maximally extend the tether line vertically in the water column for whatever reason (has not happened yet), the deepest depth reached would be 100 ft. The system allows for maximum mobility without compromising contact with the surface tenders. If a dive tender finds it necessary to recall the divers he starts hauling in the tether system at a slow but steady rate, informing the divers to return to the zodiac. At the end of a dive, the divers return scientific gear to the tenders, inflate their BC so they are positively buoyant (rather than near neutral buoyancy), unhook from the tether, hand weight belts to the tender, hand tank/BC to the tender and board the zodiac.

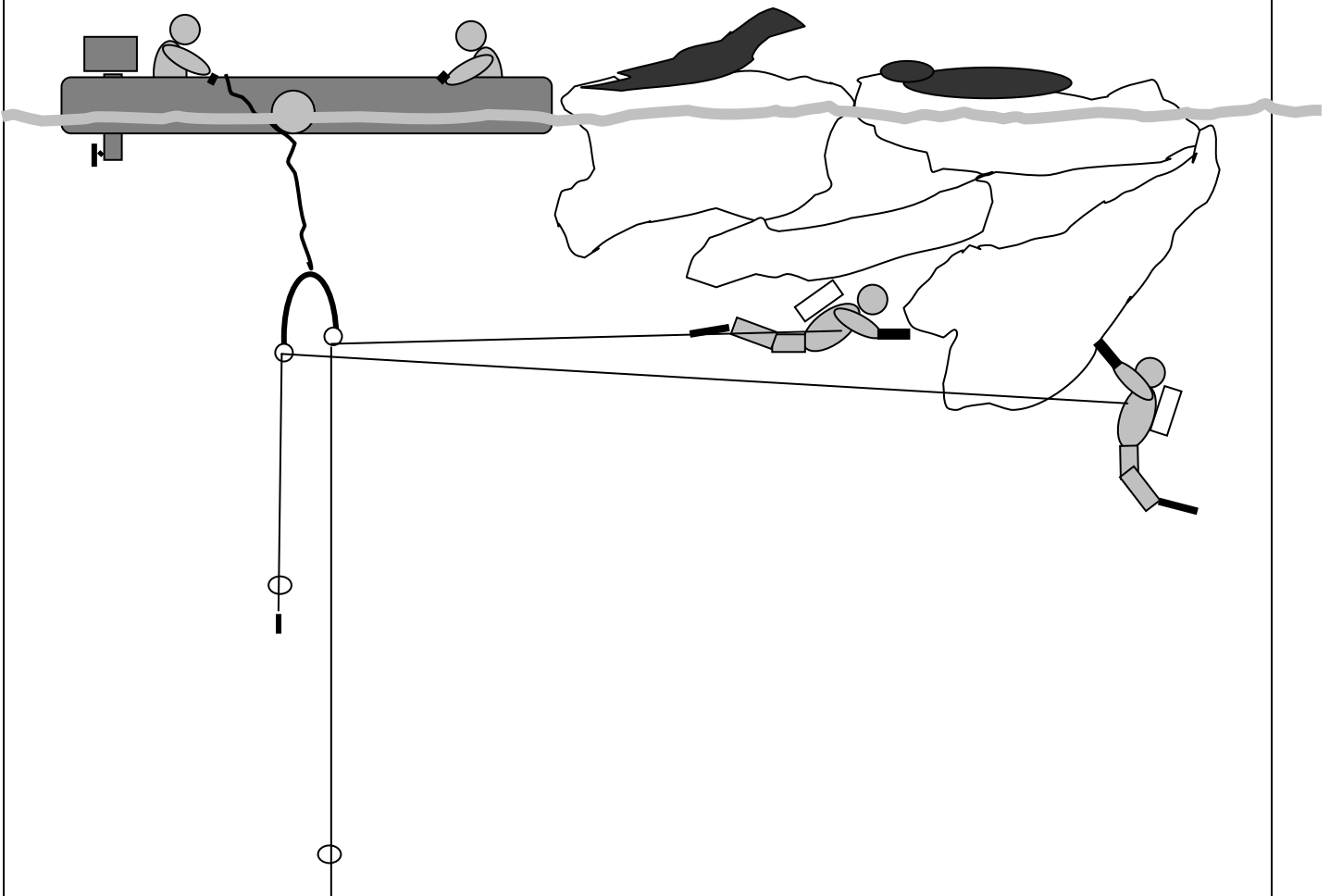


Figure 1. Diving with the tether system in pack ice.

B. MATERIAL REQUIREMENTS (including photographic and specialty equipment):

Chain saw, ice auger, DUI weight harnesses, soft and hard weights, SCUBA tanks, air compressor, underwater video cameras are requested in the SIP for B-028-P.

OTHER REMARKS:

This Dive Plan employs methods and on-site orientation already proven during past diving operations by B-028-P at Palmer Station. Langdon Quetin was the dive leader at Palmer Station last season. All divers are University of California certified under the supervision of University of California Diving Officer (Eric Hessel, UCSB Diving Officer).

Langdon B. Quetin

October 4, 2005

Principal Investigator

Date

Address:

Marine Science Institute
University of California
Santa Barbara, California 93106

Phone:

805-893-2096 (UCSB)

Email:

langdon@icess.ucsb.edu (UCSB, when not in the field)

Principal Investigator:

Name: Dr. Langdon Quetin

Date: October 4, 2005