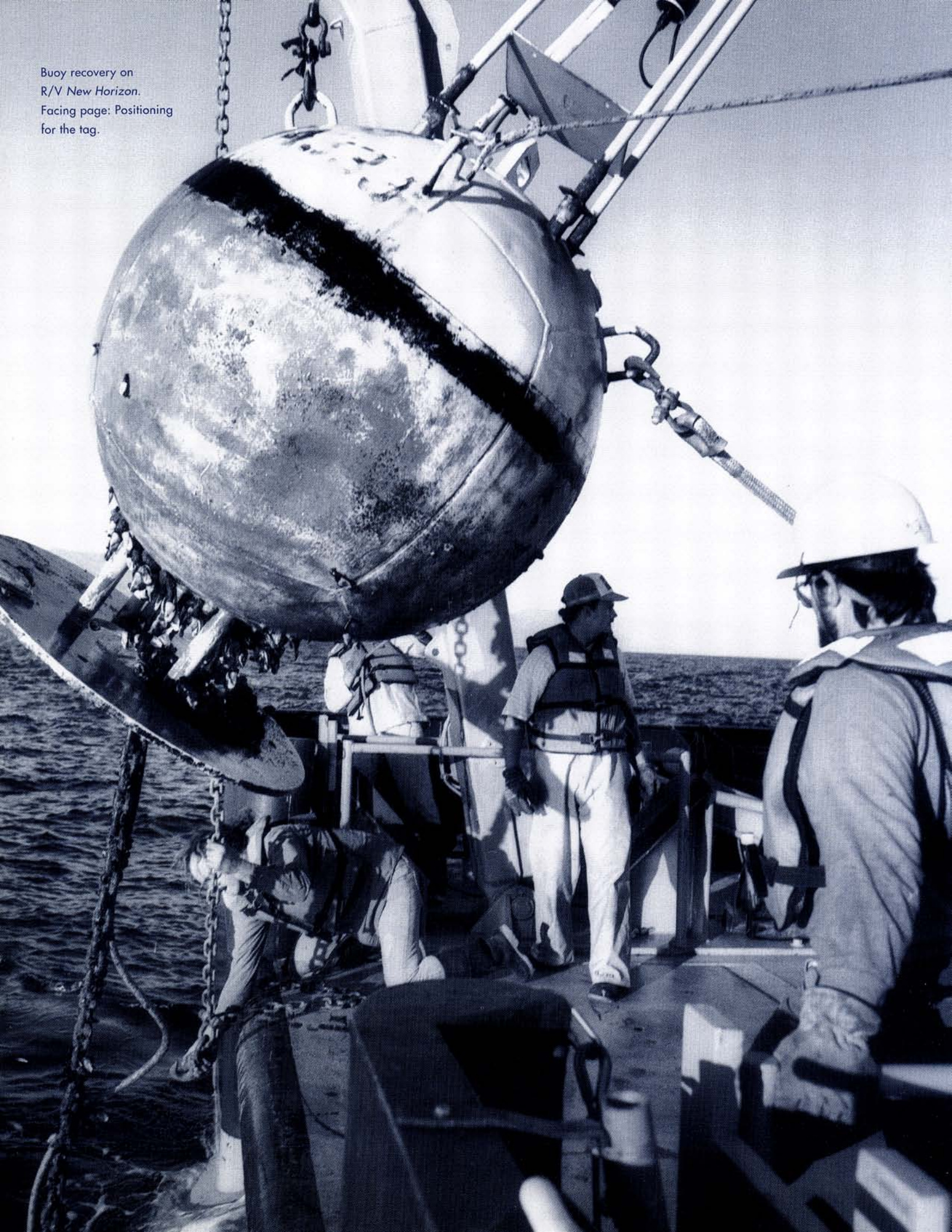


Buoy recovery on R/V *New Horizon*. Facing page: Positioning for the tag.

First Encounters in the California Current

An August morning fog along the slopes of Point Loma spills onto San Diego Bay at the Nimitz Marine Facility dock as an ocean research ship warms its huge twin diesel engines. Fueled and at the ready, Scripps's 170-foot R/V *New Horizon* is about to sail into 35-knot winds and 15-foot waves as part of scientists' effort to learn more about the behavior of the coastal ocean. And some on board will be experiencing the California Current for the first time.

Being loaded aboard are two 14-foot-tall, 800-pound buoys, an abundance of current meters and electronics, and two large cargo vans: a portable engineering lab and a six-person sleeping cabin. The scientific party is from Scripps's Center for Coastal Studies (CCS). They are on a mission to survey and interpret

BY CHUCK COLGAN

Kathleen Edwards, 23
Hometown: Philadelphia, Pennsylvania
B.S. Environmental Science, Wesleyan University
Enrolled Scripps 1994, Physical Oceanography

A semester-long course on Australia's Great Barrier Reef during her junior year led Kathleen to Scripps where she could combine a love for challenging intellectual pursuits, hands-on work, and the outdoors. "Coastal oceanography strikes me as an area of study directly applicable to human and environmental health." This is Kathleen's first cruise, and she is eager to learn research ship operations. Her only concern, "falling asleep on a late watch and messing up the experiment."

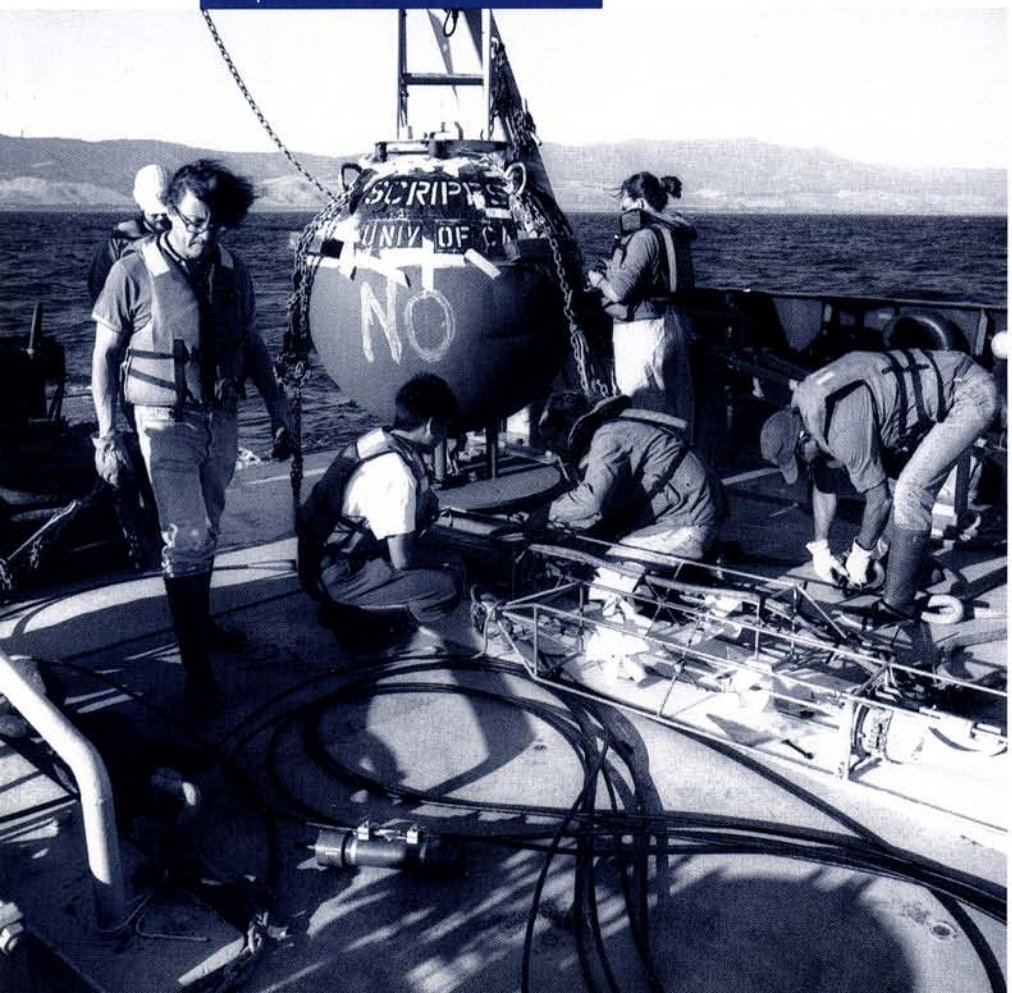
the physical forces that drive nearshore ocean currents, much like meteorologists study the evolution of weather conditions to make forecasts. Currently, oceanographers cannot predict details of nearshore ocean circulation because of insufficient measurements–what is needed is more data.

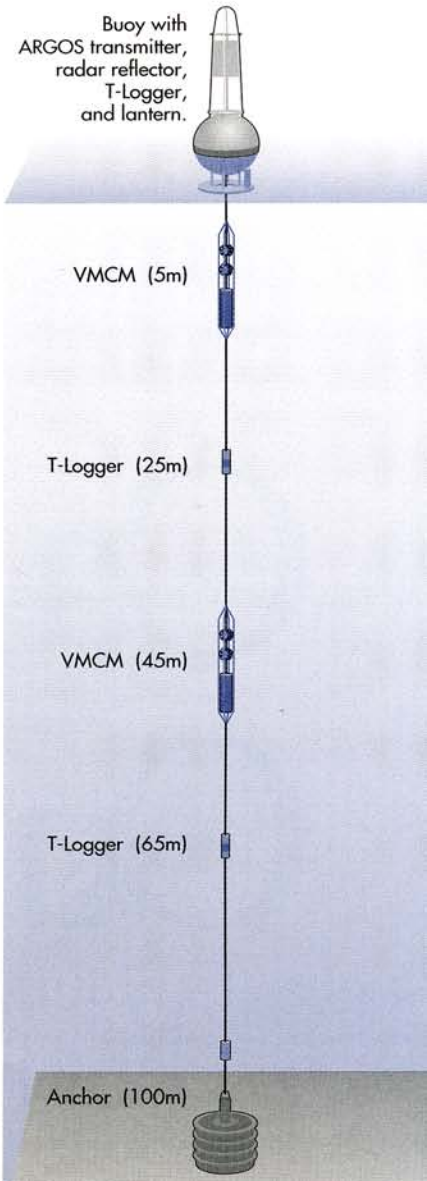
Expedition scientists will collect ocean environmental data that should prove valuable for mariners, commercial fishermen, and those who face the prospect of fighting ocean oil spills. The cruise's major objective is to service a network of underwater instruments moored at strategic locations near and within the Santa Barbara Channel, a major commercial shipping lane and ocean fishing area that is crowded with oil platforms, natural gas depots, and other industrial facilities.

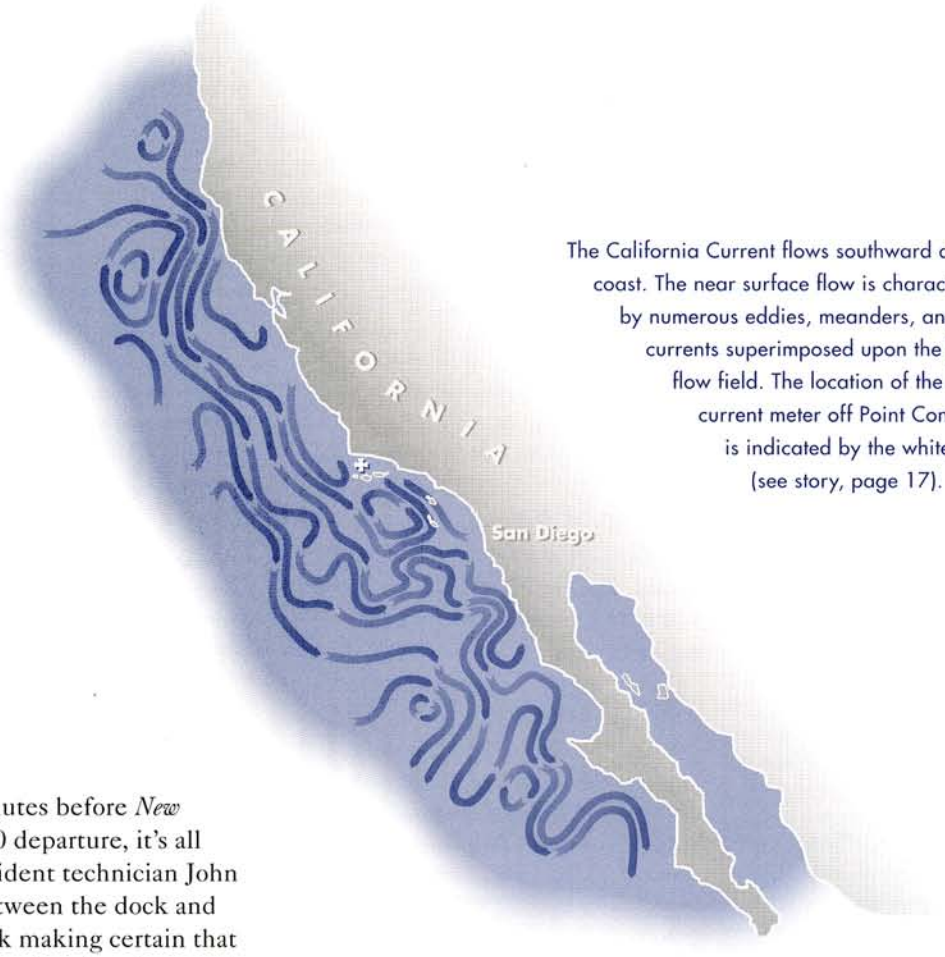
The expedition is part of a multi-million-dollar, five-year study funded by the U.S. Department of the Interior.

Signing aboard for the eight-day cruise are the usual consignment of ship's crew under the command of Captain Curtis Johnson, a CCS team of engineers and technicians led by Professors Clinton Winant and Myrl Hendershott, and nine Scripps graduate students. For them the trip is a sort of final exam–of both their abilities and their stamina–for a course in physical oceanography. Mostly sea puppies, they are about to experience a Scripps seagoing tradition in the turbulent waters off Point Conception, where the mighty California Current curves toward southern California.

Instruments are readied for deployment in the Santa Barbara Channel. Illustration at right shows a typical mooring arrangement.







The California Current flows southward along the coast. The near surface flow is characterized by numerous eddies, meanders, and counter currents superimposed upon the broad flow field. The location of the lost current meter off Point Conception is indicated by the white cross (see story, page 17).

In the minutes before *New Horizon*'s 0800 departure, it's all business. Resident technician John Boaz darts between the dock and the ship's deck making certain that everything is on board and secured; he is the liaison between the ship officers and the scientific party. First mate Murray Stein oversees deck activities, alternating between solving storage problems and giving orders for departure. Most of the CCS group have already spent hours at the dock, loading crates with the forklift, lugging boxes up the gangway, and generally filling every available nook and cranny of ship space.

Two extended passenger vans pull up next to the ship: the students arrive. As they come aboard and the mate signs them in, their mood is jovial as they group together, eagerly watching for what to do next, sharing a sense of adventure into the relatively unknown.

The ship departs. The crew fades into their routine with a seafaring expertise that ensures both efficiency and safety. CCS engineers and technicians busy themselves with the thousands of tasks required to do science. And the students break into small groups (ones and twos) to explore their new surroundings, find bunks (mostly in the sleeping van), set up computers, and ask questions about everything. The sea rolls smoothly along under the ship as it passes San Clemente Island.

At a laboratory meeting, the scientific group is divided into two shifts alternating six hours on duty and six hours off duty, each consist-

John E. Gilson, 24
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John grew up by Lake Michigan where, through his father, he became intrigued with the forces that drive water and winds, leading John to study ocean physics at Scripps. "The educational experience has been great. The professors I've come in contact with have been top notch. And, just as this cruise shows, the opportunities at Scripps are never-ending." Of this cruise, John, a sailor with prior research ship experience says, "What's there to be afraid of?"

ing of an equal proportion of engineers, technicians, and students. Those on duty begin the round-the-clock data collection: operating instruments towed alongside the ship, casting temperature probes from the stern, and monitoring the ship's oceanic and atmospheric sensors.

During the day, *New Horizon* stops to lower a CTD instrument to a depth of 250 feet, measuring the seawater's conductivity, temperature, and depth (CTD)–parameters that tell a great deal about the physics and chemistry of the ocean. Later, a four-foot-long, manta ray shaped vehicle called the 'fish' is launched and towed for a few hours. Mounted on it are two acoustic Doppler current profilers, sophisticated systems that measure the velocity of the water with sound. A satellite-tracked surface drifter is deployed, which will send back data for weeks as it travels many miles. Each activity meets a scientific objective and serves as a training session for the students.

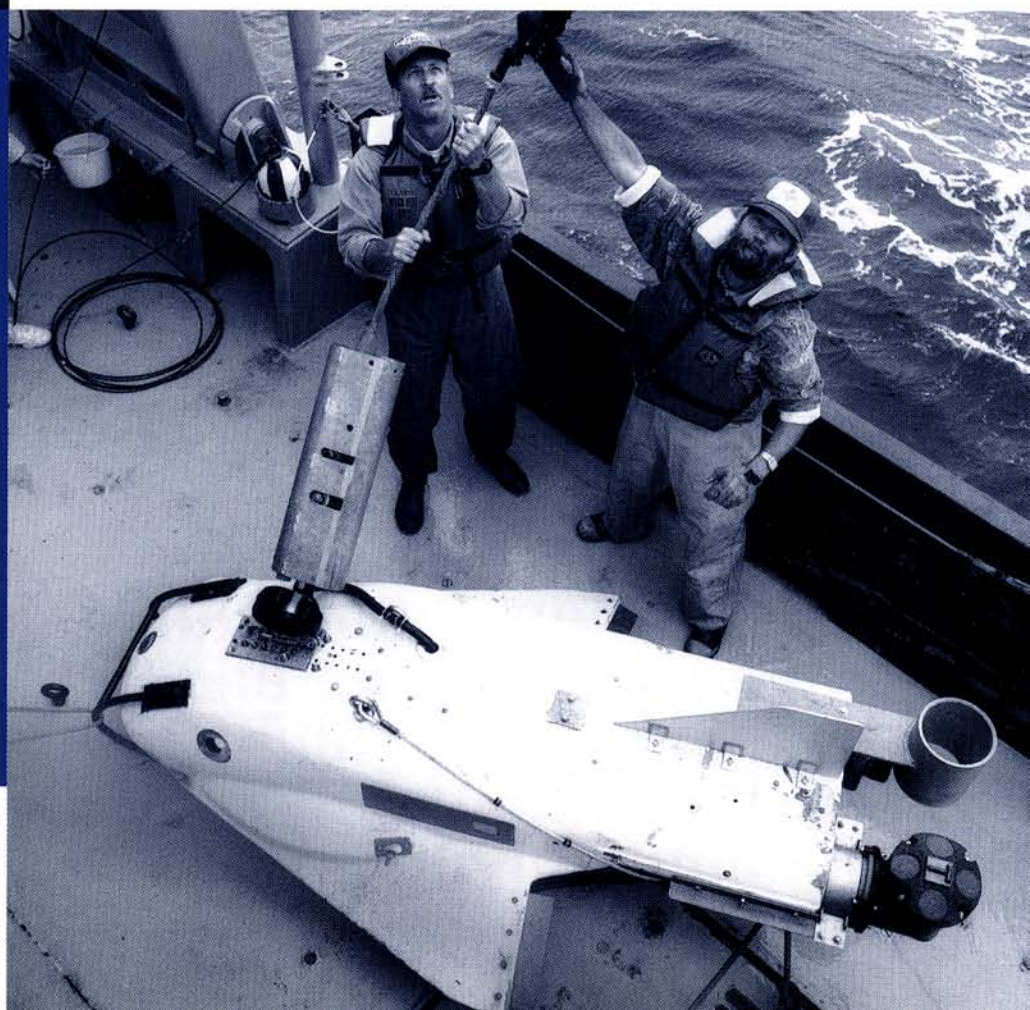
By the end of the long first day, all have eaten a tasty and plentiful evening meal in *New Horizon*'s comfortable galley. Most of the scientists are positioned at computers that abound on lab workbenches. They test electronics, run data-handling programs, check navigational plans, and play the alien-killing game Doom™. A few sit in the ship's library, watching TV as the ship passes by Los Angeles where the San Diego Chargers win their last preseason game against the Rams. It's pretty much just as former Scripps Director Roger Revelle said, "Oceanography is fun."

And then, late in the night, *New Horizon* enters the northern region of the Santa Barbara Channel, off

A current profiling 'fish' is hoisted for launch by resident technician John Boaz (at left) and development engineer Charles Coughran.

Noah Knowles, 25
Hometown: Mattoon, Illinois
B.S. Engineering Physics,
University of Illinois,
Urbana-Champaign
Enrolled Scripps 1993,
Physical Oceanography

An acknowledged, life-long electronics and computer fanatic, Noah tried graduate school in physics, but found the research too abstract and intangible. He turned to the earth sciences, which "appeal to my idealistic environmentalist side. Atmospheric and oceanographic sciences seem to jibe best with my computer modeling and nonlinear dynamics background." On this, his first cruise, Noah jokes about any fears, "You mean besides the ship sinking and all of us drowning? How about getting really seasick?"



UC San Diego undergraduate student Gabrio Verratti secures electrical connections on a buoy.

Kari Richards, 26
Hometown: Chicago, Illinois
B.S. Chemistry, UC Santa Barbara
Enrolled Scripps 1993, Physical Oceanography

Growing up in a family that fostered interests in nature, Kari learned to love the outdoors and the way science applies to the environment. She finds Scripps "full of energy, enthusiasm, and a sense of community. I like being responsible for my own learning–reading papers, giving talks–which is definitely the emphasis here." Of this cruise, Kari's only worry was, "I won't be able to figure out how to operate the towed profiler if something goes wrong."

Pt. Conception, and the world changes. The sea heaves, the ship rocks and rolls, and things slide around. It's not rough by sea-dog standards, but walking about the ship is difficult, and most opt for a light breakfast.

Out on deck, daybreak reveals San Miguel Island and a large, bright yellow CCS buoy tossing in the roiling white caps. The plan is to deploy a new instrument mooring alongside the existing one, and then retrieve the old mooring to recover its six months of recorded data. Its instruments then will be refurbished and outfitted with new batteries for redeployment at another site.

Donning knee-high rubber boots, rain pants, and coats, the scientific party on watch ventures out onto the aft deck. Seawater washes across the fantail constantly, with occasional waves crashing above the railing, sending water and spray high overhead. During an impromptu meeting on the heaving deck, the decision is made to postpone the mooring deployment until the seas calm. Instead, the recovery will be attempted. The ship is positioned with its stern backed up to the buoy.

Experienced hands guide long aluminum poles with snap hooks on their ends toward the buoy's steel handles while students tend tag lines. Several times, backsplash between the ship and the rolling waves pushes the buoy away, but at last it is snagged. A line is run up through a block on the ship's 16-foot-tall A-frame, and the buoy is winched out of the water. Cheers go up from those off duty as it is wrestled onto the deck.

Hanging below the buoy is a

Scott Rumsey, 23
Hometown: Glen Ellen, California
B.S. Biology, UC Los Angeles
Enrolled Scripps 1993, Biological Oceanography

Scott essentially grew up outdoors where his curiosity about biological systems drew him toward ecology. He came to Scripps "to acquire a diverse set of skills and aptitudes for my scientific tool belt, which in turn should enable me to become an innovative and competitive researcher and educator." Of this cruise, Scott anticipates, "I expect to become proficient in the use of certain oceanographic tools, especially the CTD, which is absolutely required in biological oceanography."

325-foot-long mooring line to which are attached two current meters, several pressure sensors, data-loggers, and battery packs. Several hundred feet of wire is pulled onto the winch and one current meter is aboard, when a sudden heave snaps the line, sending the remaining instruments and the railroad-wheel anchor to the bottom–lost to the sea.

Any loss of data and equipment at sea is disheartening, particularly when it occurs on the first day of operations. The mood is somber as the scientists retreat to the lab where they peel off their wet clothing and pour water out of their boots. The talk is like that of soldiers who have just returned from battle. There is disappointment, but also optimism that the ensuing days will bring better weather and successful operations. And, there is solace in the fact that the lost equipment and data-loggers can be recovered by a manned submersible at some future date.

As the day progresses, the ship steams to another mooring site, stopping along the way to gather CTD data. Further inshore where the sea is calmer, the next mooring is launched and another recovered.

Days pass. The work is steady, and people adjust to the rigorous schedule. The atmosphere relaxes, the strangeness of being at sea wears off: the ship becomes a scientific clubhouse of sorts with running jokes and insider talk. Everything focuses on life at sea.

On the eighth day, *New Horizon* heads south toward San Diego. The cruise is a success. Gigabytes of new data fill the computers from 38 CTD deployments, 280 thermographs, hours of instrument tows, and recorders retrieved from five moorings. The old-timers feel comfort in the success; the students relish their newly acquired experience.

The final day is spent packing gear, shutting down computers, rolling up cables, and cleaning up for unloading. Another scientific group comes aboard in a few days.

In the late afternoon, as *New Horizon* sails into San Diego Bay, everyone is on deck. The world seems larger, fuller, more active than it did just a few hours ago. There are so many options, things to do, places to go. But there will always be memories of lessons taught both in and by the California Current.

Professor Clinton Winant (this page) on duty as deck boss. With Point Loma in sight (after insert), and the cruise near completion, the mood is relaxed and congenial.