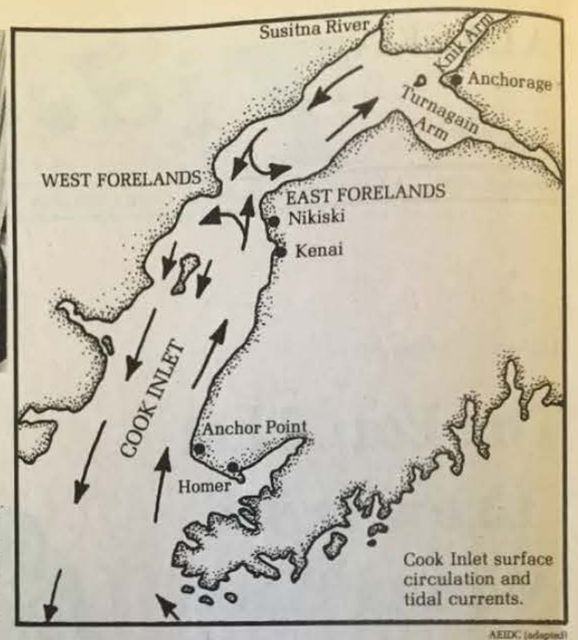
Mark, Jamie and Jack Brown, director of port operations and maintenance.



Cook Inlet surface circulation and tidal currents.

AEIDC (adapted)

To set the record straight, Anchorage isn't the only port that has to deal with strong tides and winds, muddy water and winter ice. other ports have those problems too.

The Canadian port of St. John on the Bay of Fundy is the one place in the world that has tides greater than those of Cook Inlet. In Mobile, Alabama, dredging silt and sand from the harbor is a non-stop operation. Icebreakers work through the winter to keep shipping lanes clear in the Great Lakes. And the weather can get pretty fierce in any number of places.

But Anchorage may be the only port that has all of these problems combined. And that's not counting the risks involved with earthquake faults that crisscross the region and the five active volcanoes that line the west side of Cook Inlet (Mts. Spurr, Redoubt, Iliamna, Augustine and Douglas).

The *Tidelines* tour started in the office of Jack Brown, director of port operations and maintenance, who agreed that keeping the Port of Anchorage in business year-round takes a lot of doing:

The Tides

Twice each day the tide enters Lower Cook Inlet at an average height of 14 feet. It moves along at about 3-4 miles an hour, building up steam as the inlet narrows. When it squeezes through the East and West Forelands, it may reach a speed of 9 miles an hour. And by the time it gets to Anchorage 200 miles and 4½ hours later, it can be as high as 34 feet.

Here the salty sea water mingles with the fresh silty waters of the rivers that flow in the Upper Cook Inlet. Then the tidal current swings around in a kind of whirlpool fashion before ebbing back to sea again.

"When the tide begins to turn after low low water, you can watch it rise on the pilings at the rate of about six inches a minute," Mr. Brown said.

So the dock itself is built as high as a seven-story building, rising 75 feet above the harbor bottom. That allows 40 feet above to clear the highest high tides, and leaves 35 feet of water below the lowest low tides so that ocean-going vessels can stay in port through the full tidal cycle.

Ships carefully time their comings and goings to follow the tides in and out—not just for free ride, but to carry them safely over the shifting shallows of the inlet.

The Muck

When the tide is out and the vast mud flats are exposed, you'd have a hard time finding a place to tie up a rowboat, let alone a freighter, if it weren't for large-scale dredging operations at the Port of Anchorage.

Keeping the harbor deep enough for shipping is the job of

Alaska District, Army Corps of Engineers

the Alaska District Army Corps of Engineers. All summer long, from mid-June to mid-September, dredging goes on 24 hours a day, seven days a week. Just digging out the mucky silt in front of the dock costs the Corps about one million dollars a year.

Some ports use a pipeline dredge that sucks the silt up into barges for dumping into deeper water. But Cook Inlet's tides and currents are too strong for that. So the Alaska engineers must use what is called a "clam shell" dredge to scoop out the silt—which makes the going about as slow as trying to carry gloopy soup between your two hands.

The mud flats are formed by millions of tons of fine sand and silty clay washed down each year by the Susitna River and the glacial streams that flow into Knik and Turnagain arms. Only a few species of clams, snails and worms are able to live in the sticky goop.

And since the tides keep the mud churned up, sunlight can't filter down far enough through the dark silty water to touch off much phytoplankton bloom (see *Tidelines*, April, 1980). So there is little marine life in the Upper Cook Inlet, except for seasonal travelers passing through, such as salmon and "hooligan" smelt heading for their upriver spawning grounds.

The Ice

The strong tides may create problems. But they also serve as natural built-in icebreakers. Without them, the Upper Cook Inlet would be frozen solid most of the winter.

This constant movement of the water keeps the ice broken up into small and medium-sized chunks, which slows shipping up a bit but rarely shuts it down. And if Cook Inlet silt is like "gloopy soup," the ice-filled water, according to one captain, is like "running your ship through tapioca pudding."

During extremely cold winters, such as 1970-1971, the ice can reach as far south as Anchor Point and Cape Douglas. And, said Mr. Brown, "I can remember a winter when the bay ice didn't move at all—it just went up and down with the tide."

Mac's Photo

Cook Inlet ice can slow up shipping, but rarely shuts it down.

Surprisingly, another thing that goes up and down with the combination of ice and tides is the Port of Anchorage dock itself.

"In a way," Mr. Brown explained, "the dock is floating on the mud because the pilings don't go all the way down to bedrock. During the winter, ice freezes between the pilings and clings to the bottom of the dock. This mass of ice—and the dock, of course, tends to be lifted up by the incoming high tide. And when the tide goes out, the weight of those thousands of tons of ice pulls the dock back down again."

"Some dock," somebody said.

"Sure thing," Mr. Brown agreed. "The engineers received awards for the design of this dock." So it seemed like a good time to go have a look.

The Tour

It was a cold raw day in late October, with a sifting of snow but no ice as yet. The great dock, which stretches 3,000 feet along the waterfront (the length of ten football fields) was empty. From far below on the low low tide came the chunking sound of a barge disgorging its load of cement. But the huge cranes stood silent, their wheels locked down to keep them from rolling along their tracks and right off the dock in winter winds that sometimes reach 100 miles an hour.

One of the big container ships carrying freight from Seattle had been due in that day, but was held up by storms in the Gulf of Alaska. "But it should arrive tomorrow, and two more are scheduled in the next day—and this place will be a circus," Mr. Brown said.

With roll-on roll-off vans rumbling onto the dock across high "sky bridges," and screeching cranes hoisting 35-foot containers off the ships, it would be a very noisy circus.

In the old days, freighters carried what was called "break bulk" or loose cargo—lumber, cases of food, heavy equipment, household goods—which all had to be handled separately. But today 90 percent of the two million tons of freight that enters the Port of Anchorage is boxed in vans that can be unloaded directly to waiting trucks. It is a fast and efficient operation.

Two container lines, Sea-Land and Totem Ocean Trailer Express (TOTE), make twice weekly runs to Anchorage. "With good weather, the trip from Seattle/Tacoma takes 68 hours," Mr. Brown said. "And ten hours later they have discharged their cargo and are gone."

"What do they take back?" Mike asked.

(Continued on page 6)

How to Read a Nautical Chart

Nautical charts are the road maps of the sea. They tell you how deep the water is and what the bottom is like. They warn you of rocks, reefs, mud flats and other hidden hazards. And they show the signposts you need, such as lights, bells, buoys, and landmarks on shore.

The waters of Cook Inlet are so tricky that a special pilot is required on all large vessels traveling north of Homer. But there's no law against a little desktop navigation. So study the Legend in the lower right hand corner and steer yourself safely into port.

1. In the lingo of the sea, *starboard* is to your right as you face the front of your boat, and *port* is to your left. (An easy way to remember: "port" and "left" have the same number of letters.) So from your boat's position shown on the chart, Moose Point is on your_____side and the lighted (oil) platform is on your_____side.

2. The Inlet bottom right about there is generally_____and _____.

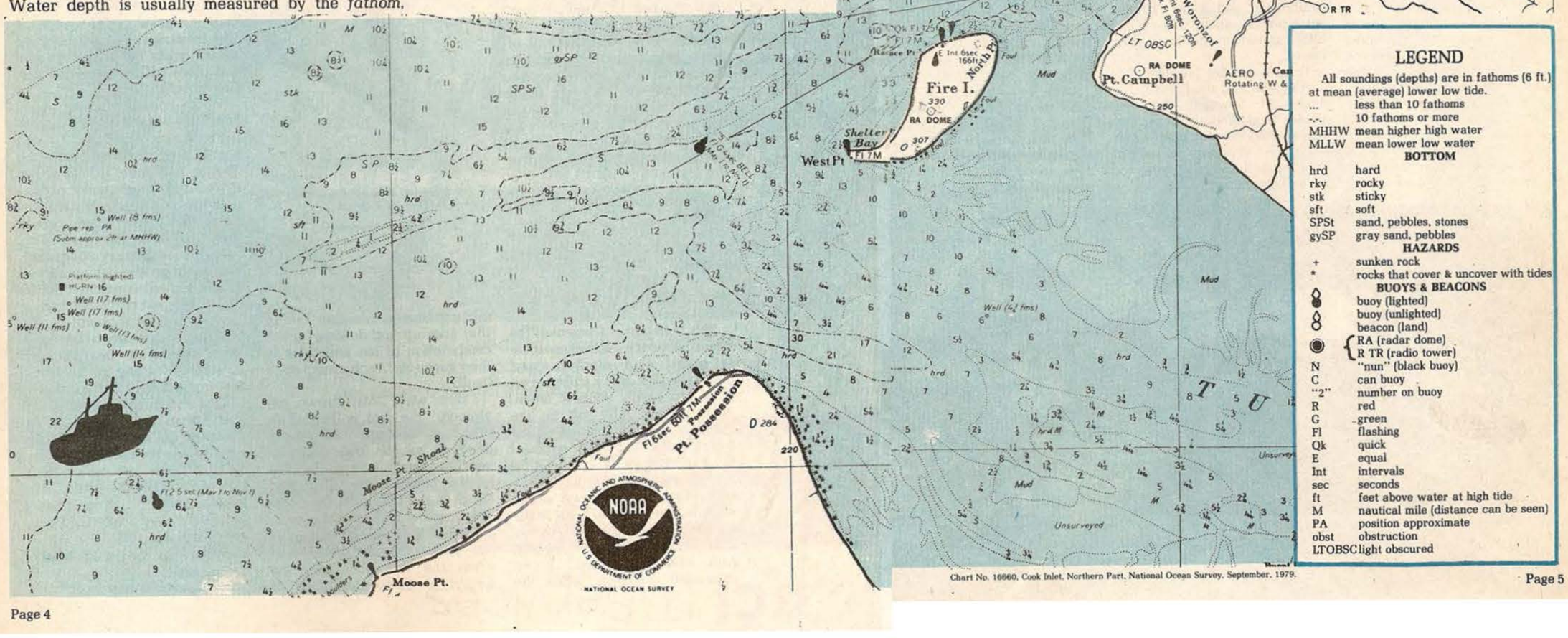
3. Moving right along, you have reached the buoy in the middle of the Inlet north of Point Possession. Water depth is usually measured by the *fathom*, which is equal to six feet. The chart shows the water depth here is 11 fathoms. How many feet is that?_____.

4. When heading in from the sea, the general rule is to keep red buoys and even numbers on your starboard side, and green lights or black buoys with odd numbers on your port side. (Remember: "red-right-returning.") So you want to keep that buoy on your_____side.

5. Now you're off Fire Island and lined up with the beacon lights on Point MacKenzie, (Note the solid and dotted lines on the chart which show the recommended route into port.) How high is the top light?_____. What does "E Int 6sec" mean?_____.

6. Getting close! Keep that N "2" buoy to your_____side.

7. The Port of Anchorage is in sight and you're on your own. Your vessel draws (needs) 36 feet of water. So check the fathom markings (this chart shows depths at average low low tide) and draw a line to plot your course to the dock.



LEGEND

All soundings (depths) are in fathoms (6 ft.) at mean (average) lower low tide.

...	less than 10 fathoms
-.-	10 fathoms or more
MHHW	mean higher high water
MLLW	mean lower low water
BOTTOM	
hrd	hard
rky	rocky
stk	sticky
sft	soft
SPSt	sand, pebbles, stones
gySP	gray sand, pebbles
HAZARDS	
+	sunken rock
*	rocks that cover & uncover with tides
BUOYS & BEACONS	
	buoy (lighted)
	buoy (unlighted)
	beacon (land)
	RA (radar dome)
	R TR (radio tower)
N	"nun" (black buoy)
C	can buoy
"2"	number on buoy
R	red
G	green
Fl	flashing
Qk	quick
E	equal
Int	intervals
sec	seconds
ft	feet above water at high tide
M	nautical mile (distance can be seen)
PA	position approximate
obst	obstruction
LTOBSC	light obscured

Chart No. 16660, Cook Inlet, Northern Part, National Ocean Survey, September, 1979.