



**NOAA Teacher at Sea
Patricia Donahue
Onboard NOAA Ship *Rainier*
August 18 – 23, 2008**

NOAA Teacher at Sea: Patricia Donahue

NOAA Ship *Rainier*

Mission: Hydrographic Survey of Bear Cove

Geographical Area: Kachemak Bay, Alaska, 59.43.7 N, 151.02.9 W

Date: August 19, 2008

Weather Data from the Bridge at 1600 hours

Broken clouds (5/8)

Visibility 11 to 27 nautical miles

Winds 230° at 6 knots

Seas 0-1 ft (light breeze) at 8.3°C

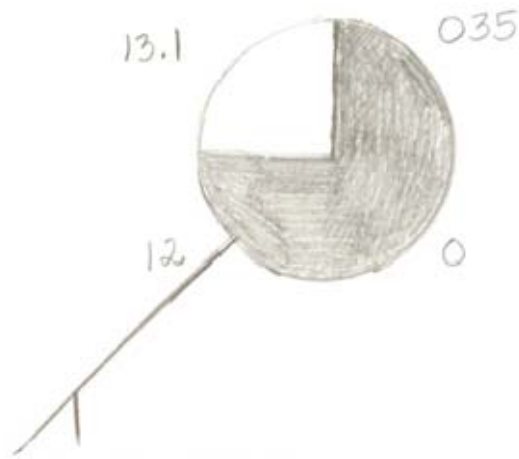
Air pressure 1003.5 millibars and falling slightly

Dry Bulb 13.1°C, Wet Bulb 12°C

Cumulus and cirrus clouds between 2000 and 3300 feet

Science and Technology Log

Today I recorded the temperature twice, once in the morning and once in the afternoon. The data is written on a sheet and then entered into a specialized computer program. Once saved, the floppy containing the data is placed in a transmitter for delivery via satellite to the National Weather Service. There are few weather stations in the area so the ship is acting as one! The information will then show up on maps as a station model such as the one shown above. My students learn how to code and decode these models and it was awesome to see where the data comes from and how it is delivered.



This is a weather map symbol that shows wind direction (the arm extending from the circle) from the southwest; wind speed (the smaller arm) at 6 knots; temperature at 13.1°C; dew point and 12°C; pressure at 1003.5 mb; and cloud cover which is indicated by the shaded circle and shows broken clouds, meaning partly cloudy.

Yesterday and today I also made note of true north and magnetic north. The difference between them was 17 degrees yesterday and 16 degrees today. In Texas a few weeks ago this difference was about 12 degrees. The officer on the bridge told me that there is a lot of interference that accounts for the larger difference here. I was reminded of what I've recently learned about the polarity reversals the Earth has undergone throughout its history. According to scientists, the planet is entering a period in which true north and magnetic north will deviate more and more from one another. I read a book I found in the wardroom about the geology of Alaska and discovered that the area we're in now is mainly sedimentary rock. Through the "big eyes" on the flying bridge I can see a lot of stratification in the rocks.

One of the engineers showed me the engine room. I was able to see the freshwater generator system that makes potable water for the ship. Salt water is “flushed” to its boiling point but not 100 degrees Celsius! This evaporation is done at a very low pressure by creating a vacuum of more than 90% so the boiling point of the water is much lower. This saves energy. The water



NOAA Ship *Rainier*

evaporates, leaving behind the salts and other minerals dissolved in it. The water vapor is condensed and stored in a tank for use by the crew. One of the evaporators can make about 130 gallons of water in an hour and the ship has two of them. (If the water intake is not as salty, such as where we are now due to the glacial melt water, then more water can be generated.) There are also two storage tanks, each holding 8,400 gallons for a total of nearly 17,000 gallons. The ship uses between 2000 and 3000 gallons per day so the

amount stored could last for 5 days if necessary. There are only 53 people aboard. I did the math and realized that the crew is using a lot less water than I thought. Generally, an estimate of water use is 150 gallons per person per day. Not only is the crew careful about water use, some salt water replaces freshwater. For example, the toilets use salt water. Another interesting thing about the evaporators is that they use titanium plates. Titanium is very, very expensive! Back home people are stealing catalytic converters out of cars to recover the titanium in them! Since I teach the gas laws, distillation, and the periodic table, I plan to include a lesson about the evaporators.

Personal Log

Today's big events were a fire drill and an abandon ship drill. Fortunately I've gotten to know the ship fairly well and I was able to get to my assigned muster station in a timely fashion. The newly arrived personnel, myself included, also watched survival videos. Extra survival equipment had to be put away and I volunteered to help. I was able to climb down through hatches into the area where dry goods are stored. I wonder if they'll let me climb the mast? My fears about seasickness have not been realized due to the fact that we are in very calm water. The bay seems more like a lake! From the ship I can see the Dixon Glacier and the Portlock Glacier. I'm sure they are a lot farther away than they appear! The survey team that went out today reported difficulties in the areas where the glacial runoff enters the bay. I hope I get to go out tomorrow.

Animals Seen Today

Bald Eagle

Otter

Question of the Day

How much fresh water is each person aboard the *Rainier* using in one day?

Challenge Yourself

Use the internet to find out how many people are aboard a large cruise ship or a large naval vessel. Calculate how many gallons of water they would use. How many freshwater generators would the ship need? How much water would the cruise ship have to store to last for 5 days?

Using the station model above, can you determine the relative humidity?