"Hundreds – I may say thousands – asserted she would **never float**. Some say she would turn bottom side up….**public opinion** generally around here **said she would never come out of the dock**."

-John L. Porter, designer of the CSS Virginia

STEM Activity: Foil Boat Engineering Challenge

As the Union Navy hastily evacuated Portsmouth's Navy Yard in April 1861, they set afire and sank the sail powered wooden cruiser USS *Merrimack.* However, burned only to the water line, the ship would be salvaged by the Confederacy and modified into a completely different design; the steam powered and iron plated CSS *Virginia*.

This new design required 800 tons of iron, more iron than the Confederacy even had available at the time, to cover the ship in 4 inch armor plates. Delays in acquiring and shaping the needed iron meant the construction of the *Virginia* took almost an entire year.

When the *Virginia* released from the dry dock in February of 1862, many believed she would end up at the bottom of the river!

Instructions:

You will need: Heavy-duty aluminum foil, cut into four inch squares; some pennies; a sink or dishpan with an inch or two of water in it.

1. Using just your hands, shape the aluminum foil square into a boat shape of your own design with the goal of holding as much weight as possible without sinking.

2. **Before adding any weight, try to predict how many pennies your boat can hold before it sinks!**

3. Test your design and hypothesis by placing your boat into the water. Start putting the pennies, one at a time, in the middle of the boat first, then work your way towards the outsides.

How well did your design work? How close was your prediction to the outcome? What could you have done differently in design that may work better?