River Quest- Exploring the William A. Irvin Engine Room

2025 St. Louis River Quest Lesson Plan

Goal

Through this station, students will learn about the historical and transportation significance of the of the cargo ship William A. Irvin to the Twin Ports community and the Great Lakes. This lesson plan complements and avoids duplication of the Seaway Port Authority's lesson plan.

Objectives

After completing this learning station, sixth-grade students will be able to:

1. Describe historical and transportation significance of the William A. Irvin's contribution to commerce of the Twin Ports.
2. Understand the evolution and improvement of handling and transportation of cargo ship through aspects of design and engineering.
3. Describe how commercial shipping is more efficient than ground transportation.
4. Explain how commercial shipping is part of an intermodal transportation system.

Vocabulary

- **Bulk Cargo:** Cargo that is shipped loose as opposed to being shipped in packages or containers. Grain and coal are examples of goods usually shipped as bulk cargo.
- **Boiler:** A closed vessel in which fluid (generally water) is heated.
- **Cargo:** Any goods being transported regardless of mode of transport.
- **Carrier:** A carrier is a party that transports goods for another person or company.
- **Commodity:** Any commercial good that is shipped.
- **Intermodal:** Intermodal transportation is the movement of goods via more than one type of transportation (e.g. air, rail, sea, truck, etc.).
- **Logistics:** The management of the flow of products as they are transported from the point of origin to their final destination.
- **Maritime:** Relating to transportation by sea.
- **Origin:** Can mean 1) location where a shipment starts its journey, or 2) country where goods were originally manufactured.
- **Steam Turbine:** Engine that extracts thermal energy from pressurized steam and uses it for mechanical work.

Implementation

Students explore the William A. Irvin museum while learning about historical and transportation significance and how it compares to modern shipping. Students will learn

about commodity logistics and bulk carrier efficiency compared to other modes of ground transportation.

Time

~8-10 minutes (time available varies)

Evaluation and Assessment

Students will be asked to write down two things about what they learned from this station. If there is time, students may share what they learned with the rest of their class.

Learning Alignment with State Standards

- **MN 6E.4.1.1.1**: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. Examples of human activities that impact the environment may include withdrawing too much water from aquifers, altering stream flow by building dams or levees, increasing runoff caused by impermeable surfaces like parking lots, or adding undesirable materials to the air, water or land.
- **WI SCI.CC2.m (Cause and Effect):** Students use science and engineering practices, disciplinary core ideas, and cause and effect relationships to make sense of phenomena and solve problems.
- **WI SCI.ESS3.C.m (Earth and Human Activity)**: Students use science and engineering practices, crosscutting concepts, and an understanding of earth and human activity to make sense of phenomena and solve problems.
- **WI SCI.ETS2.B.m (Links Among Engineering, Technology, Science, and Society)**: Students use science and engineering practices, crosscutting concepts, and an understanding of links among engineering, technology, science, and society to make sense of phenomena and solve problems.

Teaching Template

Welcome to the William A. Irvin, a bulk cargo maritime lake freighter carrier turned into a floating museum attraction after she was retired in 1978 by U.S. Steel. The Duluth Entertainment and Convention Center purchased the Irvin and converted it into a museum in 1986. William A. Irvin was a president of U.S. Steel. Irvin was an interesting fellow having dropped out of grade school to support his mother's death while in 8th grade. He began working in the mines and worked his way up in the corporation.

The Irvin is a classic maritime laker, an example of a straight decker carrier with no self-unloading cargo system. She is on the National Register of Historic Places because of her significance in engineering, history and transportation.

Welcome to the Engine Room of the William A. Irvin! Please watch your step as you climb down the ladders or if you would rather stay up above feel free. Do not touch any of the levers or knobs as a lot of them are still active and could trip the breaker. If you have questions just raise your hand and I will do my best to answer.

The Irvin was built in 1937 by the American Ship Building Company in Lorain, Ohio and was owned by United States Steel as part of the Great Lakes Fleet and sailed for 40 years. It was retired in 1978 because it was slow and small compared to maritime commercial cargo ships that were built shortly after, some that are still on the Lakes today. Arthur Anderson (1952); Michipicoten (1952); Edward Ryerson (1959); Edmund Fitzgerald (1957).

The Irvin has a steam turbine engine with an automatic coal conveyor system to the boiler, that was one of the first of its kind. Instead of having staff to shovel coal into the boiler system, the conveyor belt made it more efficient and faster to keep the Irvin running. The coal drops to the boiler and creates steam that powers the turbine and reaches pressures of 430 pounds per square inch and a temperature of 750 degrees Fahrenheit. The Irvin burned 1 ton of coal per hour which created 2000 horsepower which made the Irvin go 11 miles an hour, which is slow, compared to the Vista which goes about 27 miles per hour. Other Lakers can go up to 15-20 miles per hour. When the Irvin was running at full steam, where we are now would be about 120 degrees on a summer day.

Behind us, you'll see our electric generators that created 240 volts of direct current (DC) from when the Irvin first was built. Then they added Alternating Current (AC) to power newer technologies like radar, these are above us on the left.

You'll be learning more about the efficiency of cargo carriers and Great Lakes Shipping in another station with the Port Authority, but now you will be able to visualize what that actually means while being in the engine room.

Part of an intermodal transportation system, the Irvin carried primarily iron ore and taconite commodities which came to the Duluth Port from the Iron Range- Hibbing, Virginia, Eveleth mines on train, would get loaded on the boats and get shipped to where it needed to go. Detroit, Michigan, Ohio, etc. Fully loaded the Irvin could carry 14,000 tons, compared to 28,000 tons of commodities that ships can carry today. A 1000-footer can carry up to 70,000 tons. That same amount would take 3,044 trucks, and 584 train cars.