



How Big is a Tanker

Grade Level: 4-8

Length: 120 Minutes, can be divided into 3 days

www.pwsrcac.org/lessons

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NGSS Standards

5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Crosscutting Concepts

Scale, Proportion, and Quantity In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change.

Related Resources

Websites

<https://www.pwsrcac.org/programs/maritime/>

Overview

We need creative solutions to the challenge of safely transporting oil around the world.

Objectives

- Students will form an opinion about double-hull tanker requirements.
- Students will understand why it is challenging to transport oil.
- Students will design their own tanker and develop ideas for safer transport.

Materials

- Articles from Anchorage Daily News about Tanker Safety Features or Student Access to Archives
- Drawing or Drafting Paper
- Pencils
- Colored Pencils
- Long Measuring Tape or Piece of String Marked to 967 Feet and 166 Feet
- Tanker Crew Member as Guest Speaker

Background

Measuring 967 feet, the Exxon Valdez was just a mid-sized tanker. The largest tanker in the world, the Seawise Giant was 1,504 feet (broken up in 2009). As of 2019, the largest tankers in operation are the 4 TI-class tankers at 1,247ft. Since the Exxon Valdez oil spill, issues of tanker safety have become very important. For example,

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some argue that if the Exxon Valdez had had a doublehull, the grounding on Bligh reef would have punctured much fewer containers, thus greatly reducing the size of the oil spill in Prince William Sound.

Preparation

Visit the Anchorage Daily News archive or other trusted media sources and print out articles related to oil tanker safety and security and double-hulled tankers. You can also find information about some of these safety features from PWSRCAC:

<https://www.pwsrcac.org/programs/maritime/>

Introducing the Lesson

Ask students what are the biggest things they can imagine? Oil tankers are some of the largest ships and they carry a cargo that is very hazardous to our oceans, coastlines, and the people, plants, and animals that inhabit these waters and shores. Yet oil is one of our most valuable resources and one that all of us use daily. In this activity we will be studying one way that oil reaches our homes and schools - by tanker.

Ask students if any of them know someone who works on a tanker. If possible, have a crew member from a tanker come into the class to talk about their job and experiences.

>>Educator Tip: If a tanker crew member cannot visit your class, consider asking someone else who works in the oil industry to talk about their job. You could also ask someone who captains boats (but not tankers) to describe their job and the challenges they face in safely navigating the ship.

Activity

1. Show students pictures of tankers and their crews. Trace the route of tankers from Alaska to the West Coast on a map of North America.
2. Look up marine weather predictions for the area through the National Weather Service (<http://www.nws.noaa.gov/om/marine/zone/alaska/akcstmz.htm>) and current ocean conditions at the Alaska Ocean Observing System (<http://data.aos.org/maps/sensors/#>).

3. Show students how some tankers go through the Panama Canal and on up to the East Coast. Look at past records of the wintertime weather in the Gulf of Alaska. Ask students to imagine what it would be like to drive a 1,000-foot boat full of oil in 100 mph wind.
4. Take a piece of string and measure out the length of the Exxon Valdez, 967' long and 166' wide, on the playground. Is the tanker larger than your playground? Explain that tankers are so big, some crew members ride bicycles ON THE BOAT to get back and forth to their jobs.
5. Role play some of the crew duties on your playground tanker. Load up oil in Valdez and run the tanker down to Seattle or another port, then unload the oil and get ready to head back up to Alaska.
6. Conduct a class debate on tanker safety. Have the students read the articles in the Anchorage Daily News about safety features and single versus double hulls. Encourage students to do additional research in the library. Encourage students to find information not just about safety features, but which community(s) or people originated and support the idea. Have students prepare a written opinion about safety features and give each student a chance to share their opinion with the class. Ask them to respond to the following prompts:
 - Do you support requiring double hulls? Why or why not?
 - What feature do you think is most important to prevent oil spills? Why? What are the trade-offs (costs) of this safety feature?
 - Are there any safety features you learned about that you think are not a good idea? Why?
7. After all students have presented, have the class discuss the different safety features highlighted. Challenge students to prioritize the list, choosing the top 1-2 safety features they think are most important. Guide this conversation so that students are supported to build on each other's ideas and respectfully disagree.
8. Have students design and draw the ultimate tanker including safety features that are based on science ideas. Encourage creativity and brainstorm possible features for preventing or minimizing the impact of oil spills. Have students present their tanker to the class, highlighting at least three safety features supported by science ideas.

Wrap-up

Discuss how preventing oil spills is many times easier than cleaning them up. Ask students if they think transporting oil by pipeline is less dangerous than bringing it by tanker. Explain that Congress was trying

to decide whether to run Alaskan oil by pipeline to Valdez and then by tanker to the West Coast and through the Panama Canal to the East Coast or by pipeline through Canada. The vote in the U.S. Senate was tied 50 to 50 and Vice President Spiro Agnew broke the tie vote, so the pipeline went to Valdez and then took the ocean route. Ask the students how they would have voted. Teachers may also want to research and discuss with students any current oil transportation topics in the news, such as new pipelines or rail transport of oil. Explain that if we conserve energy, then less oil will need to be transported. Ask students to list 10 ways they can conserve energy today. Every little bit helps.

Assessment

Evaluate student engagement, suggestions, and consideration of their peers' ideas during the debate. Listen during discussion and assess their tanker designs and presentations for evidence that they are trying to use science ideas to protect Earth's resources and the environment. Students who successfully meet the performance expectation demonstrate that they understand that many different communities use science ideas to protect Earth's resources and the environment.