

## 8th Grade Geography Lesson How Is Oil Transported?

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**National Geography Standard 14** - How human actions modify the environment

**National Geography Standard 15** - How physical systems affect human systems

### Five Themes of Geography

Theme III - Human-Environmental Interactions: how the land affects the people and how the people affect the land

Theme IV - Movement: how the movement of natural forces , people, goods, and ideas affect a place

### Concept

Oil is transported to the refinery in many ways.

### Objective

Students will learn that each form of oil transportation has advantages and disadvantages.

### Materials Needed:

Understanding Petroleum Exploration and Production - Teacher's Guide and Student Activities, Map of Kern County, Thinking Maps for Support and Structure, straws, maple syrup, glue, bowls, small funnels, yard sticks, tablespoons, note paper, pens, pencils, and a copy of the Bubble Map for each student

### Setting the Stage

In years past, little attention was paid to how oil was transported from one place to another. With the recent emphasis on ecology, many misconceptions and opinions about oil transport are being promoted as fact. The following questions and answers should provide the basis for a lesson with information relating to most of the common oil transportation concerns. If students have additional questions, they can contact their state petroleum association, or an individual oil company.

1. Large amounts of oil are shipped to the refinery by truck.

Why is oil shipped to the refineries by truck when there are more efficient methods of oil transportation?

Answer - Many oil fields are so remote or spread out that pipelines have not been built to connect them with the refineries. In some cases, the size of the oil fields does not warrant the cost of building pipelines.

2. Ships or barges provide a major means of shipping oil great distances.

Is shipping oil by sea really a good idea? There seem to be a lot of ship-related oil spills.

Answer - Transporting oil by ship or barge is a huge industry because many times there is no other way to get oil from one point to another except by ship. While we hear a great deal about a few ship-related oil disasters, we never hear about the thousands of deliveries which are made without incident. As our worldwide fleet of oil vessels gets older, there needs to be a concerted effort to keep the ships in proper repair to ensure safety of the crew and cargo. Sadly, many of these vessels are being registered to countries which do not demand proper maintenance. Responsible companies and countries all over the world are demanding that this situation be remedied. There is also an effort under way to build safer, double-hulled tankers which could keep oil more safely contained in the event of a minor accident.

3. Oil pipelines are being built to deliver oil in a safe, economical way.

Oil pipelines seem to be the perfect solution for oil transportation, so why aren't they used more often?

Answer - Oil pipelines are an excellent alternative for oil transportation when there is sufficient volume of product to warrant their construction, but there are problems encountered with oil pipelines, too (refer to pipeline activity). Pipelines are expensive to construct, and they are often stopped or delayed in their construction by people who do not want pipelines running on or near their property. It is estimated that approximately 97% of the oil and natural gas produced on the outer continental shelf is shipped to shore via pipelines.

## **Modeling and Structured Practice**

### Oil Pipeline Activity

#### **Materials:**

Large diameter plastic straws, glue, maple syrup (room temperature and chilled), a bowl, a small funnel, a yard or meter stick, and a tablespoon

#### **Procedure:**

1. Make three "pipelines" by slitting one end of a straw, applying glue to the slit end and then inserting it into the whole end of another straw. Repeat this process until you have two "pipelines" approximately three feet long and one pipeline four feet long.
2. Insert a measured amount of warm syrup ("oil") into one of the 3 foot "pipelines" (about 4 tablespoons should work).

3. Allow the “pipeline” to dip so that when a student blows through the “pipeline” to “pump” the “oil,” it must travel uphill before it empties into the bowl.
4. Repeat the experiment with the longer “pipeline.” Ask the students what differences a longer “pipeline” made on the effort it took to “pump” the “oil.”
5. Repeat the experiment with the second, short “pipeline,” only this time put in syrup which has been chilled. Ask the students what difference temperature made when they attempted to “pump” the chilled oil. A discussion about the Alaskan pipeline with the permafrost in the soil, the problems associated with temperature, the raised pipeline, and the distance involved should be quite profitable.

NOTE: If any of your “pipelines” should burst due to excess pressure or faulty construction, use the opportunity to relate the incident to actual pipeline construction and operation.

### **Guided and Independent Practice (Suggested Assessment)**

Using a map of Kern County, select a remote spot and tell the students that a refinery is going to be built in this location. Have the students determine which method of transportation to use for bringing the crude oil to the refinery. Students should examine the pros and cons of each method of transportation suggested. Students will complete a Bubble Map illustrating the attributes of each method of transportation. Use of the Bubble Maps will also help the students see some of the ramifications that each type of suggestion would introduce (traffic problems, environmental concerns, etc. ).