



Activity 3: Uranium Ore Sources in the U.S.

Objective:

Students will:

- Examine a map of U.S. uranium mines.
- Share personal stories about the impacts of uranium mining on their family.
- Examine the benefits and impacts of uranium mining on communities.

Next Generation Science Standards

The concepts in this activity can be used to support the following science standard:

- ESS3. Earth and Human Activity.

Materials and Resources

- *Uranium: Teacher Background Information.*
- *Vocabulary Materials.*
- *Uranium Ore: Benefits and Impacts Worksheet* (one per pair or group) and *Uranium Ore: Benefits and Impacts Teacher Answer Key.*
- *U.S. Uranium Mines* map (display with computer and projector or copy and share with students).
- Student computers with Internet access if allowing students to research in class.

Time

45-60 minutes, not including optional activities or extensions. Alternatively, students could complete the activity outside of class and discuss their findings in the next class period.

Vocabulary

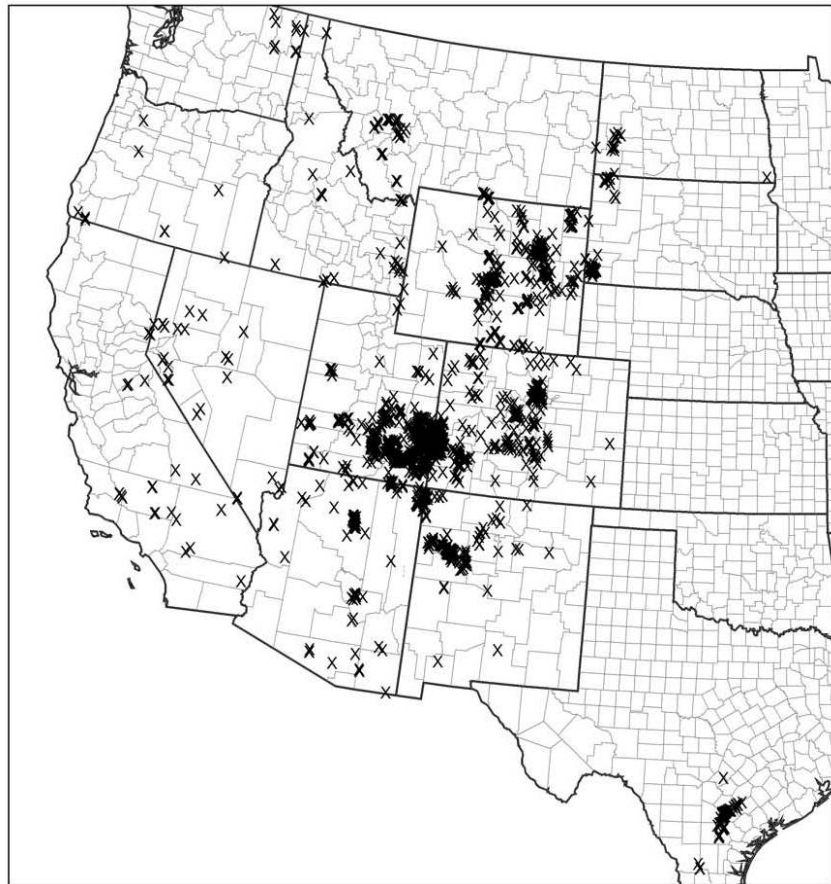
- Ionizing radiation
- Uranium
- Uranium mining
- Uranium milling

Directions

1. Start with a vocabulary activity if students are not familiar with uranium and the vocabulary used in this activity.
2. Poll students to determine how many are aware of any active or abandoned uranium mines within their state or region. In preparation, you may want to contact your regional Environmental Protection Agency office (<http://www2.epa.gov/radiation/forms/contact-us-about-radiation-protection#tab-2>) to confirm the location of any nearby mines.
3. Display the *U.S. Uranium Mines* map. Have students examine the map and proximity of active or abandoned uranium mines near their community.
4. Allow students to share stories of family members who have worked in uranium mines and any impact this has had on their family. Alternatively, you can share excerpts from *The History of Uranium Mining and the Navajo People* www.ncbi.nlm.nih.gov/pmc/articles/PMC3222290/.
5. Explain that the U.S. uranium mining boom started in the mid-1940s during World War II. Once the U.S. built a stockpile of uranium in the 1970s, the mining industry slowed. Many uranium mines were abandoned without restoring the land to its original state. Past mining activities and the abandoned mines have greatly impacted Native American communities.
6. Distribute the *Uranium Ore: Benefits and Impacts Worksheet* to pairs or groups. Direct students to research and identify benefits and impacts of uranium mining in the 1940s to 1970s. Students can use the *Uranium: Teacher Background Information* (Uranium Mines section), *The History of Uranium Mining and the Navajo People*, family members and other resources to complete the worksheet.
7. Conclude by discussing student responses as a class using the *Uranium Ore: Benefits and Impacts Teacher Answer Key* and ask students to share something they learned from the activity.
8. Optional activities or extensions: Have students:
 - Prepare for and debate the pros and cons of whether uranium mining should continue in the U.S. or in their area.
 - Research the benefits and impacts of uranium mining in other countries including Kazakhstan, Canada and Australia.
 - Develop a skit or song about the benefits and impacts of uranium mining.

U.S. Uranium Mines

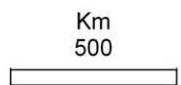
Closed and Abandoned Uranium Mines



Legend

x MAS/MILS Uranium Mines

Source of Mine Information:
EPA Uranium Location Database



Source: (U.S. EPA 2006b)

Uranium Ore: Benefits and Impacts Worksheet

Name: _____

Date: _____

Answer the following questions.

1. Research and identify the societal, economic and environmental benefits and impacts of uranium mining and milling in the 1940s to 1970s.

	Benefits	Impacts
Societal		
Economic		
Environmental		

2. How has your community benefited from or been impacted by uranium mining and milling?

3. What activities or regulations have been put in place to address the impacts of uranium mining on Native Americans and Alaska Natives?

4. In 2012, six underground mines and five in-situ leaching operations were in operation within the U.S. As of 2014, five in-situ leaching sites were in operations and two conventional mills were in standby (not in operation). Should the mining and milling of uranium continue in the U.S.? Explain your answer.

Uranium Ore: Benefits and Impacts Teacher Answer Key

1. Identify or hypothesize the societal, economic and environmental benefits and impacts of uranium uses, mining and milling in the 1940s to 1970s.

	Benefits	Impacts
Societal	People may have felt proud to support the Cold War and reduce our dependence on foreign oil and uranium supplies.	People didn't understand or were not fully told about the hazards or risks.
Economic	For tribal communities, the mines provided economic advantages including jobs at the mines and mills, development of new roads and airstrips, and money spent by non-tribal workers for food, lodging and other services.	Some miners began getting sick and dying. That likely placed economic burdens on the family. The Radiation Exposure Compensation Act (RECA) was passed to compensate families.
Environmental	Some may have believed and promoted the message that nuclear power is clean energy with little impact on the environment.	Tribal lands were disrupted by mining. Some mines were abandoned (and sometimes not restored to their original state). Water supplies were contaminated.

2. How has your community benefited from or been impacted by uranium mining or abandoned uranium mines?

Answers may vary.

3. What activities or regulations have been put in place to address the impacts of uranium mining on Native Americans and Alaska Natives?

The Uranium Mill Tailings Radiation Control Act (UMTRCA) required the cleanup of abandoned mill tailings, but not mines. RECA pays victims of the Cold War nuclear program. Controls and radiation protection standards have been put in place to protect uranium miners. The Navajo Nation has banned uranium mining and exploration on its lands. Congress authorized a comprehensive 5-year plan to coordinate the cleanup of contaminated structures, soil and water in the Navajo Nation.

4. In 2012, six underground mines and five in-situ leaching operations were in operation within the U.S. As of 2014, five in-situ leaching sites were in operations and two conventional mills were in standby (not in operation). Should the mining and milling of uranium continue in the U.S.? Explain your answer.

Answers may vary.