Lesson #4: Case Study— Nuclear Reactor Safety (Video Clips)

LESSON PLAN

Case Study: Nuclear Reactor Safety


Video Clip

Lesson Objectives:

- Students will review issues related to nuclear reactor safety
- Students will understand shifts in public perceptions of nuclear energy following the nuclear reactor accidents at Three Mile Island and Chernobyl
- Students will recognize the power of words, images and sound to bias impressions
- Students will analyze credibility, bias and truth in feature, documentary, educational and corporate film

Vocabulary:

Nuclear reactor, radiation, control room operator, meltdown, containment dome, Three Mile Island, Chernobyl, Nuclear Regulatory Commission, scram

Media als in the

The China Syndrome, 1979 (3:00)

Energy for Today and Tomorrow, Exxon 1980 (2:53)

Back to Chernobyl, PBS, 1989 (2:36)

Nuclear Energy/Nuclear Waste, 1993 (2:51)

Materials Needed:

- Five-page teacher guide: Case Study—Nuclear Reactor Safety (Video Clips)
- Four video clips (access online or via Lesson 4 digital media folder)
- Two-page student worksheet: Case Study—Nuclear Reactor Safety (Video Clips)

Time

50 minutes

Lesson Procedures:

1. Present the *Lesson Introduction* to the class
2. Distribute the *Student Worksheet* for logging the clips
3. Play the video clips while students log their answers
4. Lead students through a decoding of the video clips using *Media Sample Questions & Answers* Teacher Guide
5. Discuss bias and credibility in films using *Further Questions*

TEACHER GUIDE

Case Study: Nuclear Reactor Safety

Video Clips

1. Organize and make copies for the class activities.
2. Introduce the lesson:

Lesson Introduction

In 2007, almost 20% of the United States' electricity was produced by nuclear power plants in 31 states. The Nuclear Energy Institute, a policy institute for the nuclear energy industry, offers the following selling points for nuclear energy on its "Key Issues" Web page: Nuclear energy is America's largest source of clean-air, carbon-free electricity, producing no greenhouse gases or air pollutants. The industry's commitment to the environment extends to protecting wildlife and their habitats. No other source of electricity can provide the combined benefits of nuclear energy: large amounts of reliable and affordable electricity, long-term price stability and no greenhouse gas emissions (Nuclear Energy Institute).

The only information that many people have about nuclear energy comes from Homer's work as a safety inspector at the Springfield Nuclear Power Plant on "The Simpsons." This may be explained in part by the fact that since 1990 only five new nuclear reactors have been built with the newest being the Watts Bar reactor in Tennessee, which opened in 1996. There are many reasons why no new reactors have been built in recent years These include concerns about construction cost, vulnerability to terrorist attack, and waste disposal. Another reason for the absence of newer reactors has to do with public concerns about their safety. In a seven-year period between 1979 and 1986 ,two highly publicized accidents occurred at nuclear reactors in the United States and in the former Soviet. First the Three Mile Island reactor in Pennsylvania had an accident. This was followed by a more serious incident at the Chernobyl reactor in northern Ukraine.

3. Distribute student worksheets. Have students work individually or in pairs to log each film.
4. Read aloud the brief introductory excerpt before playing each film clip.
5. Play the film clip.
6. Have students write their answers on their worksheet after the showing of the clip.
7. Lead a discussion of the clips using the suggested teacher answers below as a guide.

The China Syndrome
1979

Film 1 Introduction

This excerpt is from the 1979 feature film *The China Syndrome* which was released by Colombia Studios just two weeks before the actual nuclear reactor accident at Three Mile Island. The film tells the story of a television news reporter played by Jane Fonda and her cameraman played by Michael Douglas who are making a profile on nuclear power when an accident occurs as they film the control room inside a nuclear rector. The first part of the clip shows the control room operator, Jack Lemmon, ordering a test to see if the reactor will be safe to go back on line following the accident. The second clip portrays the news reporter and cameraman as they show their footage of the accident to scientists who explain what they think might have happened in the control room.

Media Sample Questions & Answers

1.) What is the main message about the safety of nuclear reactors? Give evidence.

Possible Answer: Nuclear reactors are dangerous and could result in a catastrophic meltdown.
Evidence: Scenes of worry on the part of the reactor operators in the first scene. Scenes of distress on the video of the original accident in the second scene. Explanation of the scientists regarding the nearness to a China syndrome meltdown.

2.) Who is the target audience for this film? Give evidence to support your answer.

Possible Answer: Mainstream movie-going audience interested in thriller films.
Evidence: Mainstream film- Major stars of the time appear in the film. Release by a major studio, Colombia. Thriller- Anxiety producing scripting and scenes.

3.) What techniques do the filmmakers use to convey their message? Consider choices in scripting, visuals, audio background and voice-over in your answer.

Possible Answer: By showing three different representations of fear and potential disaster within a few minutes the filmmakers underscore the danger – the anxiety of the operators in the test (scene 1), the distress among the operators in the video of the original accident and the scientists explanations regarding the China Syndrome (scene 2)

4.) Explain how the historical context of the film in reference to the accidents at Three Mile Island and Chernobyl might have influenced how the filmmakers presented concerns about nuclear safety.

Possible Answer: This film was made before either Three Mile Island or Chernobyl accidents therefore there was no influence based on these accidents that had yet to happen.

***Energy for Today and Tomorrow: Nuclear Energy: A Perspective*, Exxon, 1980**

Film 2 Introduction

This excerpt is from a 1980 film produced by the Exxon Corporation, *Energy for Today and Tomorrow: Nuclear Energy: A Perspective*. Exxon Nuclear Company was founded in 1969 to manage and market nuclear products and service. Exxon describes the film as an exploration of "a source that is in limited use today, but which can become a viable, efficient, alternate source of energy in the future." This film was released a year after the Three Mile Island reactor accident and before the one at Chernobyl.

Media Sample Questions & Answers

1.) What is the main message about the safety of nuclear reactors? Give evidence.	**Possible Answer:** Nuclear reactors are safe due to many safeguards. **Evidence**: Explanations that nuclear reactors cannot explode, industry procedures, technician training.
2.) Who is the target audience for this film? Give evidence to support your answer.	**Possible Answer:** Members of the public who might be in a position to encourage the development of nuclear energy **Evidence:** As a corporation in the energy industry it is in Exxon's interest to persuade potential consumers to use their products and voters to lobby for their interests.
3.) What techniques do the film makers use to convey their message? Consider choices in scripting, visuals, audio background and voice-over in your answer.	**Possible Answer:** The script is consistent about the positive nature of nuclear power and safety measures. The voice over is an authoritative male. The background music is happy and upbeat. The images are of calm and competent workers, slow-moving trucks and blue skies.
4.) Explain how the historical context of the film in reference to the accidents at Three Mile Island and Chernobyl might have influenced how the film makers presented concerns about nuclear safety.	**Possible Answer:** The film maker's note in the script that concern about nuclear safety increased after the breakdown at Three Mile Island. There follows an extensive account of the safety measures that the industry has taken to ensure that such an event will not recur. This film was released before the Chernobyl accident.

***Back to Chernobyl Nova*, 1989**

Film 3 Introduction

The excerpt "Back to Chernobyl" is from a PBS documentary that aired on the *Nova* science series in 1989. PBS advertised the program in this way: "*Nova* goes to the Soviet Union for an inside investigation of the world's most catastrophic nuclear power accident."

Media Sample Questions & Answers

1.) What is the main message about the safety of nuclear reactors? Give evidence.	**Possible Answer:** Nuclear reactors in the United States are inherently safer than those in the Soviet Union due to design differences. Human error is a major cause for accidents that cannot be avoided. **Evidence:** "Operator error and equipment failure caused coolant to drop." "Chernobyl had no containment dome." "Fools can overcome any foolproof system."
2.) Who is the target audience for this film? Give evidence to support your answer.	**Possible Answer:** Public television viewers and those who might see the film thereafter on video. **Evidence**: This film was created for the public television series, Nova.
3.) What techniques do the filmmakers use to convey their message? Consider choices in scripting, visuals, audio background and voice-over in your answer.	**Possible Answer:** Interviews with scientists are used to make the case. Images of the evacuation at Three Mile Island and the containment dome at Chernobyl provide visual setting.
4.) Explain how the historical context of the film in reference to the accidents at Three Mile Island and Chernobyl might have influenced how the filmmakers presented concerns about nuclear safety.	**Possible Answer:** The film title, "Back to Chernobyl," suggests that the Chernobyl accident will be a primary focus. The comparisons between the accidents at Three Mile Island and Chernobyl suggest that these are now benchmarks for future discussions of nuclear reactor safety.

Nuclear Energy/Nuclear Waste
The Earth at Risk series, 1993

Film 4 Introduction

Nuclear Energy/Nuclear Waste was made as an educational video in 1993 as part of *The Earth at Risk* environmental video series. Library Video, the production company which made the video, introduces the series in this way: "Former MTV host Kevin Seal presents this fascinating look at the most important environmental issues of our time." It is designed for grades 5-12.

Media Sample Questions & Answers

1.) What is the main message about the safety of nuclear reactors? Give evidence.

Possible Answer: Most accidents at nuclear reactors are minor though operator mistakes can cause costly and dangerous incidents such as the one at Three Mile Island. Alternative energy forms are safer**.**
Evidence: "Most incidents are minor," "impossible for a nuclear reactor to explode," Three Mile Island accident "cost at least one billion dollars," search for alternative energy forms which are safer."

2.) Who is the target audience for this film? Give evidence to support your answer.

Possible Answer: Students from upper elementary through high school.
Evidence: "The Earth at Risk" environmental video series is designed for grades 5-12. Students are shown working on experiments with alternative energy forms.

3.) What techniques do the filmmakers use to convey their message? Consider choices in scripting, visuals, audio background and voice-over in your answer.

Possible Answer: The images of the calm control room and the worker with the clipboard suggest security in the system. The brief interaction with the students suggests the value of alternative energy experimentation.

4.) Explain how the historical context of the film in reference to the accidents at Three Mile Island and Chernobyl might have influenced how the filmmakers presented concerns about nuclear safety.

Possible Answer: Three Mile Island is referenced as a near meltdown incident that cost at least one billion dollars. This information, plus the comments regarding the search for safer alternative energy sources suggests that the earth may be at risk from nuclear energy as a result of Three Mile Island. Chernobyl is not mentioned in this excerpt, though it is a focus later in the film.

FURTHER QUESTIONS

- **How do funding sources and film making genres (feature, documentary, corporate, educational) impact the film makers' perspectives on the topic?**
- **Who might benefit from each film and who might be harmed?**
- **What important information is left out of these excerpts?**
- **What kinds of actions might one take in response to each film?**
- **How credible are these sources?**
- **How could you find additional information about nuclear reactor safety today?**
- **How much of your electricity comes form nuclear energy?**
- **Where is the closest nuclear reactor to your home?**

CONNECTIONS

See lesson 1 PowerPoint slides #29 & 30 (toxic waste)

Lesson #4 Case Study Student Worksheet

NAME_____ **DATE** _____

Read over the questions below before watching the short video clips. You may want to take notes as you view the clips. You will then be given time to write your answers after viewing the clips.

Title of Film: _____

1.What is the main message about the safety of nuclear reactors? Give evidence to support your answer.

2. Who is the target audience for this film? Give evidence to support your answer.

3. What techniques do the filmmakers use to convey their message? Consider choices in scripting, visuals, audio background and voice-over in your answer.

4. Explain how the historical context of the film in reference to the accidents at Three Mile Island and Chernobyl might have influenced how the filmmakers presented concerns about nuclear safety.