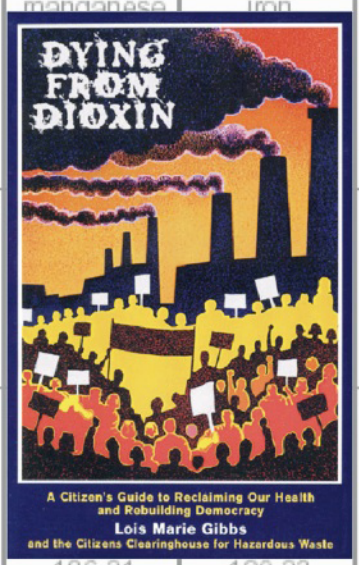
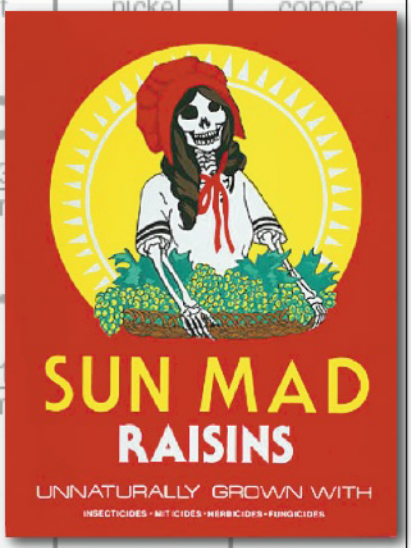
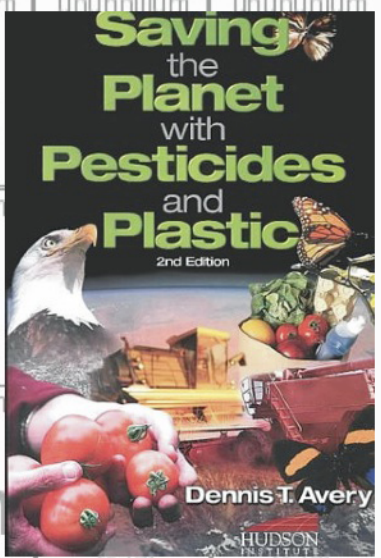
MEDIA CONSTRUCTION OF THE ENVIRONMENT:

CHEMICALS IN THE ENVIRONMENT







PROJECT LOOK SHARP

ITHACA COLLEGE

Media Construction of the Environment:

CHEMICALS IN THE ENVIRONMENT

by

Sox Sperry

www.projectlooksharp.org

Providing materials, training and support to help teachers prepare students
for life in today's media-saturated world.

ITHACA COLLEGE

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Mission Statement

Project Look Sharp is a not-for-profit, mission driven initiative committed to providing teachers with the training and materials they need to integrate media literacy, critical thinking and 21st century learning into the curriculum.

Project Look Sharp provides staff development workshops and consulting.

Please Consider Donating

All our curriculum kits are available **free** of charge on our web site. Please contact *Project Look Sharp* to make a donation.

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About The Environment Kit Series

The series includes:

CHEMICALS IN THE ENVIRONMENT
RESOURCE DEPLETION
ENDANGERED SPECIES

Each kit includes:
Introduction-Overview of the Kit, 5 lesson plans and teacher's guides, student worksheets, 40+ PowerPoint slides, 8 video clips, 8 print student readings, assessments and sources**.**

All materials can be accessed for free on our website and are also available through mobile non-Internet based versions viewed on a digital media device. Digital devices include a master PDF as well as all specified media within lesson folders purchased from the Ithaca College Bookstore. Access the bookstore through our website.

FAIR USE NOTICE:
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Media Construction of the Environment

Chemicals in the Environment

By **Sox Sperry**

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Sox Sperry is Program Associate and curriculum writer for Project Look Sharp. Sox began his career as a teacher and curriculum designer in 1974, working at the Learning Center parent-teacher cooperative in Fort Wayne, Indiana. Between 1984 and 2007 he worked at the Center For Nonviolence in Fort Wayne teaching nonviolence, developing curriculum and training trainers for a batterer's intervention program. While in Fort Wayne, he also taught peace studies and developed curriculum for the Three Rivers Jenbe Ensemble. He is author of Project Look Sharp's document-based history kits, *Media Construction of Chemicals in the Environment, Media Construction of Endangered Species* and *Media Construction of Resource Depletion* and co-author of *Media Construction of Presidential Campaigns* and *Media Construction of the Middle East*.

The author wants to thank his family, especially his partner Lisa Tsetse and his niece Amari Suskin-Sperry, whose support was essential during the creation of this work. The author wishes to acknowledge Jim Koplin as a mentor whose disciplined scholarship and constant friendship have informed this work from its foundation.

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OVERVIEW OF THE KIT

Chemicals in the Environment

Overview, Objectives, Pedagogy and Practice

Overview

This kit provides teachers, college faculty and other educators with the materials needed to engage students in a dynamic and constructivist process of learning how chemicals in the environment have been perceived by the people in the United States and how the U.S. media has constructed that public perception. The subject areas covered include agriculture, biology, chemistry, earth and environmental sciences and history of science. The kit contains five lessons including a slide history and four case studies.

This is one of a series of four curriculum kits that collectively examine the way various media have represented human interactions with the natural world. One kit, *Media Construction of Global Warming*, explores media interpretation of the scientific basis for climate change. The other three, *Media Construction of the Environment: Chemicals in the Environment, Endangered Species*, and *Resource Depletion* explore the media interpretation of the social basis of these concerns.

Objectives:

- To teach core information and vocabulary about the history of chemicals in the environment.
- To teach students to understand historical and scientific perspective as communicated through various media.
- To train students in visual literacy and media literacy skills, especially the ability to identify persuasion in marketing ideas and consumption.
- To engage all students, but particularly those disengaged from traditional school work, in complex critical thinking and the development of reading, listening and visual decoding skills and attitudes that support life-long democratic citizenship.

Learning Standards:

This kit addresses specific standards from the following:

National Science Education Standards (NSES):

- *Science in Personal and Social Perspectives:* personal and community health, environmental quality, natural and human-induced hazards, science and technology in local national and global challenges.
- *History and Nature of Science:* science as human endeavor, nature of scientific knowledge, historical perspectives.
- *Science as Inquiry*: Understandings about scientific inquiry.
- *Physical Science:* Chemical reactions.
- *Life Science*: Matter, energy and organization in living systems.
- *Science and Technology:* Understandings about science and technology.

National Council for the Social Studies (NCSS):

• *Culture*: Knowing how belief systems, such as those related to human and environmental health, influence other parts of the culture.
• *Time, Continuity, and Change*: Knowing what things were like in the past and how things change and develop. Drawing on their knowledge of history to make informed choices and decisions in the present.
• *People, Places and Environments*: Knowing why things are located where they are. How places and environments change and what implications these changes have for people.
• *Individual Development and Identity*: Knowing how personal identity is shaped by one's culture, by groups, and by institutional influences.
• *Individuals, Groups, and Institutions*: Knowing how institutions are formed, what controls and influences them, how they control and influence individuals and culture, and how institutions can be maintained or changed.

National Council of Teachers of English (NCTE):

• applying a wide range of strategies to comprehend, interpret, evaluate, and appreciate print and non-print texts.
• applying knowledge of media techniques, figurative language, and genre to critique and discuss print and non-print texts.

This kit also addresses many of the core learning skills that have been identified as essential skills for the **21st Century Literacy**, specifically:

--Information and media literacy skills: analyzing, accessing, managing, integrating, and evaluating information in a variety of forms and media.

--Critical thinking and systems thinking: exercising sound reasoning in understanding and making complex choices, understanding the connections, conflict and change among systems.

Finally, the activities foster group discussion skills, and can be easily linked to related lessons in other disciplines such as art, economics or multicultural studies.

Access Materials: Slides, Video and Print
All materials for this kit are available for free at www.projectlooksharp.org. This includes the PowerPoint slide show, video clips, and all print materials (PDF). Educators will need access to a computer and digital projector or large monitor so that the class can identify key details in each slide. Teachers may want to print and review the lesson and make copies of student histories and assessments prior to instruction.

Educators may purchase a mobile non-Internet based version of the curriculum kit on a digital media device from the Ithaca College Bookstore. Devices include the master PDF of the kit and all specified media within lesson folders. Check the Project Look Sharp website for more information.

OVERVIEW OF THE KIT

How to Use These Materials

LESSON #1: HISTORY SLIDES

This lesson consists of 48 slides organized into three parts.

a. The first section of 17 slides is arranged into thematic chapters overlapping in chronological order: **Before** (pre-1492), **Frontier** (17th-19th centuries), **Progress** (first half of the 20th century) and **Consequences** (latter half of the 20th century).

b. The second section, **Connections, Conflict, Change** includes 23 slides representing diverse perceptions about chemicals in the environment. These slides, many from websites, present contemporary views on issues including green marketing, endocrine disrupters, toxic waste, environmental justice and food issues including chemical additives, GMOs and native seed saving. The **Connections, Conflict, Change** chapter is designed to draw on information and understandings from the previous chapters in order to develop a more holistic and nuanced overview of contemporary media constructions of chemicals in the environment in the 21st century.

c. The last section of eight slides includes sets of ***Paired Image Comparisons***, which provides an opportunity for teachers to explore divergent representations of concepts relating to chemicals, corporate marketing and environmental justice.

The lesson begins with the students reading the four-page handout, **Student Reading – *Media Construction of Chemicals in the Environment*** that provides key knowledge and vocabulary for "decoding" the slides. It may be given for homework or read in class.

Each slide presents one or two documents that range from oil paintings, magazine advertisements and book covers to DVD jackets, editorial cartoons and web pages. The teacher introduces each slide/document with brief background information adapted to reflect the knowledge, level and subject area of the class. As each slide/document is projected the teacher asks document-based probe questions that require students to apply core knowledge while analyzing the scientific, historical and media context in which the document was created. The teacher follows the decoding by adding additional information on the topic or document and open-ended discussion questions.

This interactive decoding process is detailed in the ***Teacher Guide*** that includes a one-page lesson for each of the slides. Each slide lesson begins with ***Background Information*** that students may need in order to answer the probe questions and should be communicated to the class before decoding each slide. Probe ***Questions*** ask students to apply their knowledge of resources and media in each slide. ***Possible Answers*** are included as model evidence-based responses that address key historical and media visual literacy concepts and information. However, there is rarely one right answer to any of these interpretative questions, and the teacher should encourage multiple readings and a diversity of responses as long as students present evidence to back up their interpretations. It is important that students recognize that all people do not interpret media messages in the same way. It is also important to encourage students to begin to ask their own media literacy questions, especially as they become more familiar with this form of critical analysis.

LESSON #1 CONTINUED...

The teacher's guide includes ***Additional Information*** that adds information from the source document, including text from websites that may be too small to read when projected or additional historical details that the teacher may choose to share during or after the decoding. ***Further Questions*** prompt students to move beyond text-based analysis to discuss issues, make personal connections, do follow-up research or take social action. ***Connections*** link each slide to related topics in this and other kits with abbreviated references to specific slides and lessons.

Presenter Notes in the Power Point View Menu allows the teacher to view the current, previous and subsequent slides and includes a timer. This view also shows the ***Background Information, Questions*** and ***Further Questions*** for each slide.

LESSONS #2-5: CASE STUDIES

This kit includes two video lessons, *Rachel Carson on Film* and *Nuclear Reactor Safety*, each of which includes four short video clips for decoding. The video case study lessons, like the history slide lesson, have the teacher lead a whole class through decoding of each document. The two text based article reviews, *Rachel Carson Revised* and *Depleted Uranium,* ask students to analyze four two-page articles. The text-based case studies have students work as individuals or in groups and report out to the whole class. These text-based lessons may work better with more independent students. Each case study lesson includes a one-page ***Lesson Plan*** and detailed ***Teacher Guide***.

ASSESSMENT

The assessment asks each student to demonstrate his or her knowledge gained from the lesson and his or her critical thinking and media literacy skills through document-based analysis. The *Media Construction of Chemicals in the Environment* kit assessment, "Changing Public Attitudes Toward DDT," includes a student handout with images from six documents, a document-based essay question and a page of short-answer (scaffolding) questions. The teacher may choose to use only the short answer questions with the image handout, or only the essay question and images, or both.

LEVEL, TIME AND COVERAGE

Although the readings and questions were designed for upper-level high school and college classes, these materials can be used effectively with a wide range of students by editing the slides and questions and providing additional background information. The time it takes to deliver these lessons will vary depending upon the knowledge of the students, the experience of the teacher with this form and these materials, the amount of additional information delivered and further questions asked, and how many of the documents the teacher uses. Although teachers may need to edit the number of documents used, they should avoid the temptation to sacrifice student interaction for content coverage. The power of the lessons emerge when students actively apply their knowledge, identify evidence, articulate their interpretations, analyze authorship and point of view, and discuss meaningful issues. If a teacher does not have the time to do all of the lessons, he/she should edit the number of slides, videos or readings rather than cover all of the documents in a lecture format.

OVERVIEW OF THE KIT

Media Construction of the Environment Kit Series

The kits in this three-part series explore a wide variety of media in the United States with a broad chronological and topical sweep. Indigenous media forms prior to European contact with Native American peoples included petroglyphs, pottery and basketry. These media provided means for indigenous artisans to transmit ancestral knowledge and ritual forms concerning human interaction with their natural world relations – animals, plants and minerals.

In the early 19th century, media forms included etchings and paintings created by painters and illustrators. These artists were often hired by wealthy patrons, often kings or presidents, to represent their interests in distant corners of their dominion. In the late 19th century, with the expansion of the market economy, the first public relations experts began to create posters and fliers to sell the wares of their sponsors. Advertisements for a new McCormick's reaper and Black Death insecticide and fertilizer were created in this way. In this same period social critics began to publish their own individual challenges to prevailing views regarding people and the environment. Henry David Thoreau's *Walden* and the *Harper's Weekly* cover, "Slaughtered for the Hide" are examples of such early environmental advocacy.

By the mid 20th century, public relations firms were hired by multinational corporate clients to manage public perception and to help create new markets for their products. Magazine ads for DuPont, for example, heralded "Better Things For Better Living Through Chemistry" and encouraged consumers to buy new products such as nylons and antifreeze that were not previously available and thus not necessities just a decade before. In a similar way large governmental projects such as Hoover Dam were advertised on government report covers as "modern engineering triumphs". By the end of the 20th century as global corporations became even larger, the capacity to spread their message grew accordingly. In-house corporate marketing departments in coordination with industry councils created multi-year advertising campaigns to increase market share, to self-define as "green" and to defend themselves against critics.

With the advent of the modern environmental movement in the 1970s, new questions came from an awakened public as to the impact of scientific and technological progress. These questions were initially posed in writings by individuals such as Rachel Cason and Jacques Yves Cousteau, and then brought to the wider public in such visual forms as posters, editorial cartoons and satirical spins on corporate advertising. By the 1980s, environmentalism had such public approval that major corporations now use this popular environmental interest to sell their own products. Thus, *Time* magazine's editors could prepare a cover story on the toxic poisoning of the nation while relying on advertising revenue from some of the very corporations that were polluting.

Media Construction of the Environment Kit Series Cont...

In the 21st century, new media had advanced to the point where individuals and small groups advanced their own point of view to attack or support corporate or government positions. The Internet and digital technologies allowed advocacy journalism to thrive in the blogosphere. Environmental activist groups like Students for Bhopal and Greenpeace created their own media forms, as did their critics, groups like the American Chemistry Council and the Committee For a Constructive Tomorrow.

The proliferation of media forms and sources raises concurrent issues of concern: Can an advocate for a particular point of view also be objective? Is knowledge of the financial sponsorship of a group or individual essential in determining credibility of their media message? When corporations, the government and activist groups all use appeals to "planet stewardship" to further their disparate goals does the phrase itself lose its currency?

"As we peer into society's future, we -- you and I, and our government -- must avoid the impulse to live only for today, plundering, for our own ease and convenience, the precious resources of tomorrow. We cannot mortgage the material assets of our grandchildren without risking the loss also of their political and spiritual heritage. We want democracy to survive for all generations to come, not to become the insolvent phantom of tomorrow."

– President Dwight Eisenhower
Farewell Address

OVERVIEW OF THE KIT

Media Literacy and Democratic Citizenship

The founders of the United States articulated the need for a literate citizenship as core to the development of a deep and enduring democracy. We live in an age when the most influential messages about pressing social issues and events are delivered through mass media, such as television, magazines and the Internet. Most students use the Internet as their primary source of information, yet few have any formal training in assessing the credibility of information in Web sites. It is essential to the success of our democracy that young people consciously and consistently analyze and evaluate media messages. They need to be taught to seek out current, accurate, and credible sources of information; they need to understand the influence of media messages on their understanding of the world; and they need training in identifying and using various techniques for communicating messages in different media forms. Without these critical skills, we risk losing the diversity and freedom of thought that underpins a culture of true democracy.

Collective Reading of Media Messages

This curriculum is based on the classroom practice of collective reading, in which the teacher leads the class through the process of decoding images, sounds and text as a way of developing a range of critical thinking skills while teaching core knowledge. This constructivist approach encourages the development of moral reasoning as students clarify their own interpretations, listen to the analysis of their peers, and discuss ethical issues. Decoding of the documents in this curriculum will help train students to distinguish fact from opinion, analyze point of view and identify bias, interpret historical documents, and use evidence to back up a thesis. The classroom decoding process is particularly effective in involving students who rarely share their opinions about print-based material, including students with reading disabilities, visual learners, and students for whom English is a second language. The teacher should consider calling on students or going around the room to ensure participation by all students in the collective reading process.

Encouraging Multiple Readings

Although the Teacher Guides for each lesson include possible answers to the probe questions, the teacher should encourage multiple readings and a diversity of responses for most of the questions posed in the teacher guide. It is important that students give evidence in the document to explain their conclusions. Occasionally a question has only one right answer (e.g., "who created this video?"), and students should learn to distinguish between objective and subjective questions. The suggested answers given in the scripts are intended to reflect typical responses that address key historical and media literacy concepts and information. However, it is important that students recognize that all people do not interpret media messages the same way. Depending upon each reader's background, including life experience, age, gender, race, culture, or political views, he or she may have very different interpretations of a particular text. The collective reading experience provides the opportunity to explore these differences and discuss the important concept that readers interpret messages through their own lenses.

Reading Bias

A major theme of these materials is the recognition that all media messages come from a particular point of view and have a bias that reflects the intent and perspective of the producer and sponsor. With these materials, teachers can train students to recognize bias and point of view. The teacher should encourage students to ask critical questions about any media messages encountered inside or outside the classroom using the *Key Questions To Ask When Analyzing Media Messages* found at www.projectlooksharp.org.

Bias in this Curriculum and in the Classroom

This series of lessons, like all media, also has a point of view and a bias. As teachers use the lessons, they may identify opinionated language, selective facts, missing information, and many other subjective decisions that went into constructing this view of history. The same questions the curriculum applies to other documents can be applied to this media construction: Who produced this curriculum for what purpose and what is its bias? Teachers and students could and should be asking critical questions about the editorial choices that went into constructing these lessons. For instance, why did we choose to focus on certain topics (e.g., environmental justice, green marketing and GMOs), but not others (e.g., risk/benefit analysis, the precautionary principle and chemical body burden)? And, what is your evidence for these conclusions? When using these materials teachers will make their own decisions of what to include and to edit, what questions to use and what issues to avoid. All of these decisions, both by the creators and users of the curriculum, will influence the view of history that students receive. Teachers should encourage students to thoughtfully analyze and discuss the stories, the perspectives, and the biases celebrated and criticized within our own classrooms. Those skills and practices are core to an educated democratic citizenship.

Additional Resources

For more information about media decoding download these documents from the project Look Sharp website:

- Key Questions to ask when analyzing media messages
- Tips for Media Decoding
- Core Principles for media literacy education

Fair Use of Media Documents

The classroom critique of political and cultural documents (e.g., paintings, TV news clips, excerpts from films, web pages) is essential to the development of core literacy skills in our media saturated democracy. To enable educators to fulfill the mission of teaching these core civic objectives, Project Look Sharp has created media literacy integration kits using a variety of different media documents for critical analysis in the classroom. The documents in this curriculum are presented for the purpose of direct critique and solely to be used in an educational setting.

For more information about fair use in Media Literacy Education, go to the Media Education Lab at Temple University at www.mediaeducationlab.com.

Lesson 1: History of Chemicals in the Environment

LESSON PLAN

Slide Show: History of Chemicals in the Environment

PowerPoint Slide Show

Lesson Objectives:

- Students will understand how American views of chemicals in the environment have changed over time.
- Students will apply knowledge about chemicals to the decoding of diverse media representations.
- Students will learn critical thinking, information literacy and media literacy skills including understanding bias, point of view, sourcing, credibility, and key questions to ask when analyzing any media message.

Vocabulary:

Frontier: Anasazi, alchemist, chemist, market economy, advertisements, insecticides
Progress: ethyl (leaded) gasoline, public relations, DDT, Union Carbide, pesticides, plastics
Consequences: additives, non-organic, United Farm Workers, pesticide poisoning, lead poisoning dead zones, fertilizer, algae blooms, globalized markets, consumer product safety
Connections: indigenous peoples, persistent organic pollutants, American Chemistry Council. Greenpeace, greenwash, transnational corporations, Bhopal, sustainability, genetically engineered seed, Monsanto, nitrogen-based fertilizer, chemical herbicide, endocrine disruption, agribusiness, Love Canal, toxic waste, Dioxin, carcinogen, environmental justice, petro-chemical industry, environmental racism, Rachel Carson, *Silent Spring*, West Nile Virus, organic agriculture, biodiversity, development, green revolution, genetic engineering, GMOs, horticulturalists, nitrogen fixing, companion planting

Media

PowerPoint contains: Basket and bowl, paintings, pamphlet, advertisements, posters, web pages, DVD jacket, cartoons, and covers of magazines, books and a report

Materials Needed:

- PowerPoint slide show: *Chemicals in the Environment* (access online or via Lesson 1 digital media folder)
- Four-page Student Reading: *Chemicals in the Environment*
- Teacher's guide: Lesson 1: *Chemicals in the Environment*

Time

50 Minutes to 2 hours depending upon how quickly the teacher moves through the slides.

Lesson Procedures:

1. Introduce the lesson: explain that the class will learn the history of how chemicals have been presented in popular culture through analyzing media documents.
2. Distribute *Student Reading* to be done in class or for homework.
3. Project the slides and lead the student decoding. For each slide present *Background Information* followed by *Questions* from the *Teacher Guide*. The guide includes *Possible Answers* and *Evidence* to model student application of key knowledge through evidence-based analysis. Add *Additional Information* and *Further Questions* where appropriate. For more information on leading a decoding lesson see the *Kit Introduction*.
4. Use the *Final Assessment* to assess student learning.

Media Construction of Chemicals in the Environment

Media Representation of Chemicals

Our solar system was formed from the dust from the explosion of a supernova that began as hydrogen; the simplest element in the periodic table. All the other elements were formed in the energy of this explosion. The most common elements became the foundations of living matter. Life evolved through this vast expanse of time by reshaping and reforming this original "basket" of materials. It has only been in the past two hundred years that people began manipulating the elements to produce new, manmade chemical compounds.

What statement is this cover of the *Maine Body Burden Report* making about chemicals in the environment?

We began life as one cell that divides. By adulthood, humans are made up of approximately 100 trillion cells. At each division a complex set of chemical and biological processes takes place. There are opportunities for errors at every part of this process. Human-produced chemical compounds have interfered with these complex evolutionary processes that have evolved over millions of years but they have also helped to correct life-threatening problems and protect humans' health. What are your attitudes about chemicals in our environment? Are they generally positive or negative and why? How have your views been shaped and what sources do you base them on?

We gain much of our knowledge and many impressions about the world from the media. As we search the Internet, watch TV, and read newspapers, magazines and textbooks, we take in information and ideas about our health and the health of our planet. Some sources will emphasize the benefits of human-created chemicals while others will focus on their risks. How do we decide what and whom to believe?

The following lesson will help you to answer these questions. By analyzing and reading or "decoding" media representations, you will gain a better understanding of conflicting views of the benefits and the risks of chemicals in our environment. You will also develop critical thinking skills that will help you to make more informed and reflective decisions through asking key questions about all media messages. These lessons will include contemporary media documents that present conflicting perspectives. You will also examine historical documents and identify ways in which popular views about chemicals have changed over time, from "miracle cures" and "scientific progress" to "toxic waste" and "the Green Revolution." We will begin this study by exploring ancient messages about chemicals in the environment.

1841	1899	1906	1921
First U.S. advertising firm opens	*Black Death* marketed as insecticide and fertilizer	*Pure Food and Drug Act* forbids sale of poisonous patent medicines	Chemist Thomas Midgley discovers ethyl lead as gasoline enhancement

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Before: When Chemicals had No Names

In the millennia before 1492 Native Americans knew how to make crops flourish and how to cure many illnesses using chemical processes. An example of this was the knowledge that planting corn, beans and squash together would help each crop to thrive. Today we call this process companion planting and nitrogen fixing. Contemporary Native people carry forward this awareness as they continue to plant the 3-sisters (corn, beans and squash) in gardens and fields across the Americas.

The American Heritage College Dictionary defines chemistry as "the composition, structure, properties and reaction of matter" and "the elements of a complex entity and their dynamic interrelation." Is it possible that the Anasazi, the "ancient ones" of the desert southwest, had words for these concepts that today we call chemistry? The media left by the Anasazi, including petroglyphs, basketry and cliff dwellings, give us some clues about the complex and dynamic ways in which they interacted with their environment. In the 21st century we can learn from the Anasazi and their contemporary descendants about what chemical processes helped them to survive in a dry and hot climate.

Frontier: To Protect the People

Prior to 1900 the food supply for the majority of people living in North America was dangerously insecure. Crop failure, insect infestation, food poisoning, and other threats to the food supply were addressed by scientific and technological discoveries. By the late nineteenth century the science of chemistry had begun to provide a means to enhance people's struggle to survive and even to thrive in the face of these uncertainties. An example of this was a chemically based product marketed in the last decade of the nineteenth century called *Black Death*. Its makers promised to kill the dreaded potato bug. Products like *Black Death* marked the transformation of the United States into a modern market economy.

How does this ad reflect a19th century view of chemicals?

BUG KILLER and FERTILIZER: Two years of unprecedented success wherever introduced all over the United States has proved "Black Death" to be an absolute annihilator of all insects, bugs or beetles that prey on vegetation.

Supporting this new market development were the first advertising firms; the beginning of the modern public relations industry. Newspaper and magazine advertisements, media that we are so familiar with today, exploded in creativity and in consumer reach in these years. This effort to put chemicals to use for personal gain was nothing new. European alchemists had been trying to turn pewter into gold for centuries without much luck. But the process of scientific experimentation that the alchemists pioneered became an important link to the practices of modern chemistry.

Progress: Science to the Rescue

The idea of progress by chemical intervention changed as the economy changed. The 18th century craft economy was represented by the village chemist who worked in his small shop to create chemical remedies for individual patients who would come to his door. The 19th century saw the emergence of a market economy in which small companies produced chemical products such as *Horsford's Acid Phosphate*.

1925	1948	1962	1965
Dr. Alice Hamilton testifies on the public health dangers from lead exposure	Chemist Paul Muller wins the Nobel Prize for medicine for developing DDT	Rachel Carson publishes *Silent Spring* and is attacked by the chemical industry	Senate hearing on air pollution leads to the ban on lead in gasoline

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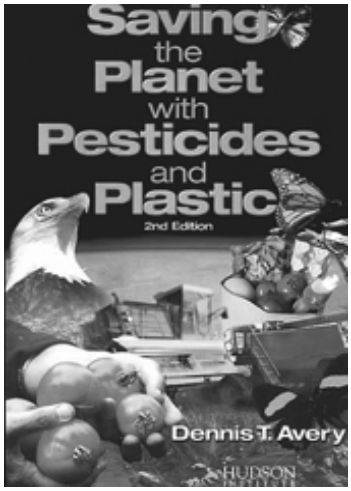
Such cure-alls promised to heal the ills of an expanding consumer base that purchased their remedies at retail stores rather than at the product's point of origin as they had in the past.

By the latter half of the 20th century, the multinational capitalist economy had emerged, bringing with it giant industrial corporations which produced, marketed and distributed a wide array of products worldwide. The village chemist would surely be hard pressed to recognize his vocation in the year 2000.

How does this book cover reflect a 20th century view of the benefits of human-produced chemicals in our environment?



During the 20th century, chemical discoveries led to widely publicized solutions to the modern challenges of an ever-growing populace. Ethyl leaded gasoline and DDT were marketed in the 1920s and 1940s as miracle products that would eliminate the problems of engine knocking and household pests. Advertisers let the world know: "DDT is good for me" and "Ethyl controls the giant power of gasoline." To create consumer demand, corporations created their own marketing departments. Advertising campaigns spread the word about chemical applications that were now marketed as the new necessities.

Peacetime research into chemical applications that had been developed during World War II provided jobs for scientists and technicians. The postwar consumer economy also created more jobs for advertisers and the new field of public relations. Huge chemical companies like Union Carbide built fertilizer factories in India and publicized their production as an effort to solve the problem of world hunger.

Consequence: It's a toxic world

What techniques do the author and designer use in choosing the title and cover of this book to connect chemicals and the environment?

Beginning in the early years of the 20th century and deepening with the mid-century advent of the modern environmental movement, citizen action spurred the media to focus on the dark and often hidden side of scientific progress. Many scientists took leadership in helping the public to recognize the downstream dangers of chemical toxicity for human and environmental health. In 1962 Rachael Carson's landmark book, *Silent Spring*, helped raise awareness of environmental toxins. Research and activism on the part of Carson and many others set the stage for ongoing revelations regarding the dangers of chemical contamination in countless places from toxic waste dumps near

1970	1972	1980	1984
First Earth Day held following Santa Barbara oil spill and Cuyahoga River chemical fire	DDT is banned for general use in the U.S	President Carter orders evacuation of Love Canal neighborhood toxic site	Chemical gas leak at the Union Carbide plant in Bhopal India kills thousands

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Niagara Falls to nitrogen-laden dead zones in the Gulf of Mexico. As the mainstream media began to cover these stories, public awareness of chemical dangers led to pressure on the government to oversee the environmental and public health impacts of corporate chemical pollution. The first Earth Day in 1970 was in part inspired by public reaction to the news stories about a chemical fire on the Cuyahoga River and an oil spill off the coast of Santa Barbara. This wave of environmental awareness led to federal legislation establishing the Environmental Protection Agency and such environmental laws as the Clean Air Act and the Water Quality Improvement Act.

Wes Jackson, renowned plant geneticist and founder of the Land Institute, summarized the consequences of the progress era in this way: "Whether it is the application of farm chemicals to our land and water, cutting of the tropical rain forest, or overhauling the architecture of the genomes of our major crops and livestock by introducing genes from long evolutionary distances, we are seeing everywhere that the resilience of nature is not infinite, that cultural stability is fragile, and that the small cascades of the past become predictors for the future."

Connections: Conflict and Change

Today we have begun to understand that complex and often unknown relationships exist between scientific manipulation of chemicals, environmental consequence and community impact. We have learned that nitrogen-based fertilizers that helped create a green revolution in crop production also helped to create a dead zone in the Gulf of Mexico. We now know that DDT kills mosquitoes that carry deadly malaria but also that it enters the food chain causing egg shell thinning which threatens bird populations.

Contrast the messages about the risks and benefits of chemicals in these two magazine covers.

These complexities can be difficult to evaluate when the perspectives of corporations, citizen action groups, governments and scientists flood our information-saturated world. These divergent media constructions should prompt us to ask critical questions about what we know, how we know it, and the ways in which we make our judgments.

- Which messages about chemicals in the environment do I agree with? Which do I disagree with? Why?
- Do I have well-reasoned evidence to support my perspective?
- Can I articulate conflicting views and understand the interests of others?
- Do my choices matter for me, for my community, for the world I inhabit?

The following lessons aim to help you ask these critical questions, to decode conflicting messages and to understand history so that you can make your own informed and reflective decisions on the appropriate role of chemicals in our environment.

1987	1988	2006	2007
United Church of Christ environmental justice study on toxic waste and race	Great Louisiana Toxics March along Mississippi River "cancer alley"	Dow Chemical Company releases new "Human Element" ad campaign	Monsanto press release on pros of genetically modified food crops

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TEACHER GUIDE

SLIDE #2: *Anasazi basket,* pre-1450 & Mimbres Bowl, c 1000

BACKGROUND INFORMATION

The basket was created by craftspeople from the Anasazi culture that flourished in the four corners region of the desert southwest 1000 years ago. It was discovered in a cave in Arizona with 48 ears of corn still stored in it. It was made of yucca fiber and decorated with pigments from minerals and plants.

The bowl was made by Mimbres potters, part of the Mogollon culture inhabiting what is now southern New Mexico during the same time period as the Anasazi. The bowl depicts a family using digging sticks to cultivate the soil.

→ Project the document

QUESTION

Where do you see evidence of chemicals in these images?

POSSIBLE ANSWER

In the basket, chemical processes were involved in the growing of the fiber plants from which it was made and in the making of the dyes with which it was stained. In the image on the bowl, hydrogen, oxygen and carbon were all active in the process of photosynthesis.

QUESTION

The *American Heritage College Dictionary* defines chemistry as "the composition, structure, properties and reaction of matter" and "the elements of a complex entity and their dynamic interrelation." Is it likely that the potter and basket maker would have used these words to describe what they did?

SLIDE #2

Anasazi basket
pre-1450 & Mimbres Bowl, c 1000

ADDITIONAL INFO

The Anasazi's expertise in weaving baskets and growing corn was a product of many generations of practice and accumulated knowledge in the act of making dyes and growing crops. Today we speak of these processes in the modern scientific terms of chemistry, biology and horticulture.

In Mimbres funeral ceremonies, bowls like this one were often placed over the face of the one being buried. The hole in the center of the bowl may have been created in order to release the spirit of the painted figures.

Between 700 and 1200, the success of Anasazi agriculture, in particular the cultivation of corn, led to significant population increases. It is not clear what caused the Anasazi and Mogollon cultures to abandon their homelands in the 13th century. Theories for the evacuation include climate change, drought, resource depletion and war.

In more recent times, population pressures have given rise to scientific efforts to increase and protect the food supply through enhancing plant growth, protecting against insects and preserving food. These efforts have led modern scientists to develop chemical means for fertilization, pest control and food preservation.

FURTHER QUESTIONS

Were there chemists before the science of "chemistry" was named? If so, who were they and what did they look like?

CONNECTIONS

MCC slides 3, 39, 40, 41, 50 (Native American agriculture) & MCRD slides 3, 40

TEACHER GUIDE

SLIDE #3: *The Alchemist's Experiment Takes Fire,* 1687 painting

BACKGROUND INFORMATION

In the 17th century, alchemists sought to achieve "transmutation," transforming common metals into precious metals. During this time, alchemists were often looked upon with deep suspicion, especially by the church hierarchy. They were often portrayed as crackpots who wanted a quick road to riches. "Real" scientists were scoffed at if they used alchemy. The experimentation involved in such efforts sometimes led to important discoveries in the nature of matter which opened the doors to modern chemical science. In this painting, the Dutch artist Hendrick Heerschop portrays the alchemist working at home, heating a portion of the pewter plate in an effort to turn it into gold or silver.

→ Project the document

QUESTION	**What do you learn about the practice of 17th century alchemy from this painting? Give evidence to support your answer.**
POSSIBLE ANSWER	The alchemist's search is dangerous and unpredictable work done at home.
EVIDENCE	Dangerous and unpredictable are suggested by the fire in the flask and the alchemist's startled reaction. The mother and child in the far room and the vases, bottles and bellows suggest that this is taking place at home.
QUESTION	**Why might the artist have chosen to portray an alchemist at home using a practice that puts his family at risk?**
POSSIBLE ANSWER	In order to further the stereotypical images of alchemy at the time.
EVIDENCE	Since alchemy was frowned on by the church this image would support the idea that alchemy and those who practice it should be avoided.

SLIDE #3

The Alchemist's Experiment Takes Fire
1687 painting

ADDITIONAL INFO

Alchemy, the frontier of modern chemistry in 17th century Europe, could be a dangerous undertaking. Like much of modern scientific inquiry alchemy could often lead to dead ends. Perhaps the background scene of the alchemist's wife wiping the baby's bottom was the artist's comment on the utility of the transmutation effort.

Chemist and science history professor Lawrence M. Principe suggests such failed experiments might have been an important link in the path to modern chemistry. "Experimentalism was one of alchemy's hallmarks. You have to get your hands dirty, and in this way alchemists forged some early ideas about matter" (Principe).

FURTHER QUESTIONS

Why would the person who commissioned this painting want to display it?

CONNECTIONS

MCC slides 3, 4 (pre-19th century European chemistry)

TEACHER GUIDE

SLIDE #4: *The Village Chemist,* 1760 painting

BACKGROUND INFORMATION

This painting by 18th century German artist Justus Juncker was made at a time when physicians were beginning to accept the use of chemistry in their practice. The man at the table, the village chemist, is wearing a physician's cap. The man standing behind him is probably a messenger waiting to deliver a prescription to a sick patient.

→ Project the document

QUESTION	**When was this made in reference to the previous painting? Before or after?**
POSSIBLE ANSWER	It was made in the following century, 73 years after the previous painting.
QUESTION	**How does the message of this painting compare with that of the previous one in terms of the role of the chemist in the community?**
POSSIBLE ANSWER	In this, a physician chemist prepares healing remedies for community members. It is a much more positive view of chemistry than the previous image of a reckless alchemist.
EVIDENCE	In "The Village Chemist," the gentle light bathing the subject projects calmness, the books and globe suggest scholarship and the men working in the adjoining room suggest a public and sanctioned activity. The overall theme suggests serenity and dignity in pursuit of the new science of chemistry, though there is still an edge of uncertainty with the skull and disorder.

SLIDE #4

***The Village Chemist,* 1760 painting**

ADDITIONAL INFO

In the 17th century, alchemists tinkered with making medicines. These "iatrochemists" were thought by many to be quacks who administered poison rather than healing remedies. Justus Juncker was among the prominent artists who chose to present a more positive image of the modern chemist that began to emerge in the 18th century.

FURTHER QUESTIONS

Who might have commissioned this painting and why?

CONNECTIONS

MCC slides 3, 4 (pre-19th century European chemistry)

TEACHER GUIDE

SLIDE #5: *Horsford's Acid Phosphate,* 1891 pamphlet

BACKGROUND INFORMATION

By the mid-19th century, the United States had moved into a market economy. The first advertising firm in the U.S. opened in Philadelphia in 1841. Between 1849 and 1850, advertising in the *New York Tribune* doubled with extensive advertisements purchased by entrepreneurs like pioneer salesmen P.T. Barnum.

This pamphlet for Horsford's Acid Phosphate was produced by the Rumford Chemical Company in 1891, by which time advertising had taken a firm hold in the United States media.

→ Project the document

QUESTION	**What are the messages about chemicals in this product pamphlet?**
POSSIBLE ANSWER	Chemicals are a gift to people seeking relief from physical ailments.
EVIDENCE	The idea of a gift is communicated by the ribbon and wrapping paper. Relief from ailments is communicated by the text "When you are tired…Takes Horsford's Acid Phosphate" and "For the weak and debilitated."
QUESTION	**What techniques does the designer of this advertisement use to suggest that this product is effective and legitimate?**
POSSIBLE ANSWER	"This is the genuine", "*Professor* E. N. Horsford," "Look out for imitations."

SLIDE #5

***Horsford's Acid Phosphate,* 1891 pamphlet**

ADDITIONAL INFO

From Horsford's Acid Phosphate pamphlet:

> A solution of the phosphates of lime, magnesia, potash and iron in phosphoric acid. It is not a compounded patent medicine but a scientific preparation, recommended and prescribed by physicians of all schools.

The pamphlet promises that Horsford's Acid Phosphate can provide relief from the following maladies: Indigestion, dyspepsia, nervousness, exhaustion, headache, tired brain, abuse of alcohol, weakened energy, ill-effects of tobacco, sleeplessness, seasickness and night sweats. It is also billed as a "delicious drink."

The description of its effect on nervousness and exhaustion is as follows:

> Acid Phosphate supplies the waste of phosphates caused by every mental and physical exertion, imparting new energy, increasing the intellectual and physical power, and is an agreeable and beneficial food and tonic for the brain and nerves.

FURTHER QUESTIONS

How could you research the credibility of claims made by current pharmaceutical company commercials and advertisements?

CONNECTIONS

MCC slides 5, 6, 7 (late 19th century marketing)

TEACHER GUIDE

SLIDE #6: *Science in the Kitchen,* 1893 book cover

BACKGROUND INFORMATION

The full title of this book is *Science in the Kitchen: A Scientific Treatise on Food Substances and their Dietetic Properties, Together with a Practical Explanation of the Principles of Healthful Cookery, and a Large Number of Original, Palatable, and Wholesome Recipes*. It was published by the Modern Medicine Publishing Company.

This book came out of the health food movement of the early 20th century. This movement advocated mostly vegetarian food, good exercise and fresh air. Ella Eaton Kellogg, the author of this book, was married to Dr. John Kellogg, founder of the famous "Sanitarium" health spa and namesake of Kellogg cereals.

→ Project the document

QUESTION	**Who is the target audience for this book? How do you know?**
POSSIBLE ANSWER	The target audience would be middle class white women homemakers looking to follow the current interest in health foods and scientific applications.
EVIDENCE	The image shows a white woman with an apron in a "modern kitchen" at a time when the role for most middle class white women was to prepare food for the family. The interest in science is projected in the title and in the image of the flask and microscope.
QUESTION	**Who might benefit from its production and sale?**
POSSIBLE ANSWER	The Kellogg company, the author and those preparing food might benefit. Others benefiting might be other supporters of the idea of scientific progress whose beliefs would be supported by science advertisements such as this.

SLIDE #6

Science in the Kitchen
1893 book cover

ADDITIONAL INFO

The author references the alchemists' search in this passage from her introduction:

> The mistress of the kitchen is still groping her way amid the uncertainties of mediaeval methods, and daily bemoaning the sad results of the "rule of thumb." The chemistry of cookery is as little known to the average housewife as were the results of modern chemistry to the old alchemists; and the attempt to make wholesome, palatable, and nourishing food by the methods commonly employed, is rarely more successful than that of those misguided alchemists in transmuting lead and copper into silver and gold. (Kellogg)

FURTHER QUESTIONS

Contrast the perspectives on the role of science and technology between the natural foods movement of 1890s and that of the 1970s.

CONNECTIONS

MCC slides 5, 6, 7 (late 19th century marketing) 6, 10, 12, 14, 17, 34, 35, 47 (chemicals in food)

TEACHER GUIDE

SLIDE #7: *Black Death,* 1899 print advertisement

BACKGROUND INFORMATION

This is an advertisement published in 1899 for "Black Death," marketed as both an insecticide and fertilizer. The ad continues: "THE POTATO BUG is the greatest enemy the potato grower has. He has a good mouth with upper and under jaws and eats the leaves with a relish. 'BLACK DEATH' sprinkled on the leaves kills him with expedition and dispatch."

Insect infestations were a real worry for the farmer or gardener at the turn of the century threatening to destroy the crops on which people relied for survival.

→ Project the document

QUESTION	**Who made this message and what was their purpose?**
POSSIBLE ANSWER	The producers of the product made this to market Black Death insecticide and fertilizer to farmers.
QUESTION	**What techniques did the designers use to convince people to use their product? Give examples for your explanation.**
POSSIBLE ANSWER	They focus on the use of the product as an insecticide rather than as a fertilizer using dramatic representations preying on farmers' fears of crop loss.
EVIDENCE	The repeated image of the devil carrying a coffin and the large, bold proclamation "Black Death" underscore the danger of potato bug infestations.

SLIDE #7

***Black Death,* 1899 print advertisement**

ADDITIONAL INFO

This ad did not include information about the ingredients of "Black Death" nor about possible environmental or health dangers resulting from its use. In the years before federal regulation corporations could make claims as these advertisers did without testing or independent verification: "Safety…does no injury to persons handling it."

Included in the endorsements section of the ad was a comment from J. Jensen, head farmer at the Binghamton N.Y. State Hospital: "I cannot speak too highly of the 'Black Death' bug killer, which we used on the state farm this past summer, as it completely exterminated all the bugs." In 1899, a 100 lb. keg of "Black Death" cost $3.50.

FURTHER QUESTIONS

What steps can you and your community take to ensure the products you purchase are safe for human and environmental health?

CONNECTIONS

MCC slides 5, 6, 7 (late 19th century marketing) 7, 10, 12, 14, 33, 46 (pesticides)

TEACHER GUIDE

SLIDE #8: *Ethyl Controls,* 1932 magazine ad

BACKGROUND INFORMATION

In 1921, Thomas Midgley, a chemist and researcher for General Motors, discovered the chemical compound tetraethyl lead could help reduce engine knocking in automobiles while helping to boost the octane rating. General Motors and DuPont joined together to create the Ethyl Gasoline Corporation to manufacture and market the leaded gasoline.

The text of this Ethyl Corporation ad begins "Just as the strength of the elephant must be controlled to be of service, so gasoline needs a trainer to deliver its power smoothly." The artist was Karl Godwin.

→ Project the document

QUESTION	**What is the message about leaded ethyl gasoline?**
POSSIBLE ANSWER	Leaded ethyl gasoline provides more power for engines and more control for drivers. Ethyl is strong, but tamable.
EVIDENCE	The image of the elephant suggests power, as do the words “Giant power.” The image of the tamer and the words “ethyl controls” suggest the power can be tamed.
QUESTION	**What values about power and control are implied in this ad?**

SLIDE #8

Ethyl Controls
1932 magazine ad

ADDITIONAL INFO

In 1999k, Bill Kovarik, Professor of Communication at Radford University, published "Ten Myths about Leaded Gasoline on the 75th Anniversary of the 1924 environmental controversy."

Myth 1. Now that leaded gasoline is banned in the U.S., there is no reason to revisit the 75-year-old controversy. My opinion: This is a neglected and vital part of our history. It was the "Chernobyl" of the 1920s and one of the great environmental disasters of the 20th century. Only in recent years have European nations banned leaded gasoline. It is still widely marketed in Latin America, Asia and Africa.

Myth 2. Only in the 1970s did scientists become aware of the dangers of leaded gasoline. Fact: GM's Charles Kettering and Thomas Midgley were well aware of the dangers and were repeatedly warned by scientists from Harvard, MIT, Yale and Potsdam about this "creeping and malicious poison" long before it was put on the market in 1923.

Myth 3. The 1921 discovery of tetraethyl lead was the product of a systematic and scientific search through all the possible octane boosting alternatives. Fact: This is a widely accepted view but, in light of recently available historical evidence, wildly off the mark. In fact, leaded gasoline was originally meant to be a bridge to higher octane fuels of the future, especially alcohol (ethanol) from cellulose. (Kovarik, Ten)

FURTHER QUESTIONS

What information was left out of this ad that might be helpful to know in deciding whether to buy ethyl gas?

CONNECTIONS

MCC slides 8, 15, 18 (lead) 8, 9, 10, 11 (mid-20th century chemical advertising)

TEACHER GUIDE

SLIDE #9: *Which Face Will You Wear?* 1945 magazine ad

BACKGROUND INFORMATION

By the mid-twentieth century professional public relations firms were creating new corporate advertising campaigns to convince consumers to buy their clients' products.

In 1935 the DuPont Corporation hired the firm Batten, Barton, Durstine and Osborne to change their image from "the powder people" to "peacetime manufacturer." The result was a famous slogan: "Better Things for Better Living…Through Chemistry." (DuPont) This 1945 ad for car anti-freeze includes this slogan next to the company logo.

The text on the top begins on the left: "This sad face is reserved for the car-owner who forgets to get anti-freeze for his car in time." On the right: "This bright face is for the car owner who will have a DuPont antifreeze put into his radiator in plenty of time."

→ Project the document

QUESTION	**Who paid for this advertisement and who might benefit from it?**
POSSIBLE ANSWER	The DuPont Corporation paid for this and would benefit from increased sales of its products. Car owners or repair shops that used the product might benefit as well.
QUESTION	**Advertisers often use the idea of democratic values by offering "consumer choice" as a means to sell their products. How is this idea used in this ad?**
POSSIBLE ANSWER	By posing the question "Which face will you wear?" and offering the visuals of the choice of masks this advertisement suggests that consumers should exercise their democratic rights and choose DuPont as they consider how best to protect their car.

SLIDE #9

Which Face Will You Wear?
1945 magazine ad

ADDITIONAL INFO

From "Heritage: Advertising" on the DuPont Web site:

> The rise of environmentalism in the 1970s gave chemistry a bad name, and by the 1980s DuPont's television spots and print advertisements had been shorn of the tag line "through chemistry." Indirect means of advertising, particularly its sponsorship of award-winning NASCAR racer Jeff Gordon, continued to work effectively for DuPont, but public animus toward the chemical industry, and the company's own success in linking "better living" with "chemistry" finally led the company to break with its advertising past.
>
> In 1999 a new campaign and a new slogan, "the miracles of science," capitalized on DuPont's traditional strength by identifying the company as a science company. At the same time it established DuPont's credentials as an exemplary global citizen with a television spot that featured a "to do list for the planet." The advertisement emphasized how company efforts to create drought- and disease-resistant crops, develop anti-HIV drugs, and design safer building materials benefited the poorest as well as the most affluent dwellers on the globe. (DuPont)

FURTHER QUESTIONS

How influential is advertising in your purchasing choices?

CONNECTIONS

MCC slides 8, 9, 10, 11 (mid-20th century chemical advertising)

TEACHER GUIDE

SLIDE #10: *DDT is Good for Me,* 1947 magazine ad

BACKGROUND INFORMATION

In 1939, Swiss chemist Paul Muller developed a new chemical compound, Dichloro-Diphenyl-Trichloroethane, commonly known as DDT, for use as an insecticide. In 1948, he was awarded the Nobel Prize in medicine for his discovery.

The text for this DDT ad begins: "The great expectations held for DDT have been realized. During 1946, exhaustive scientific studies have shown that, when properly used, DDT kills a host of destructive pests, and is a benefactor of all humanity."

→ Project the document

QUESTION	**Who is the target audience for this ad? Give evidence for your answer.**
POSSIBLE ANSWER	Rural white families, and especially housewives and children, are the target.
EVIDENCE	Rural families are indicated by images of orchards, dairy farms, vegetable rows and farm animals. The people portrayed are two white women, one holding a baby. The dancing vegetables and animals would likely appeal to children.
QUESTION	**Why would the ad show a white woman rather than an African American man or a Native American child?**

SLIDE #10

***DDT is Good for Me,* 1947 magazine ad**

FURTHER QUESTIONS

How could you research the credibility of claims made by Killing Salt Chemicals, the U.S. Department of Agriculture or the editors of mindfully.org?

ADDITIONAL INFO

The Web site mindfully.org reproduced a 1947 U. S. Department of Agriculture (USDA) pamphlet that promoted DDT as "a faithful and effective ally of the good housekeeper…" The USDA pamphlet notes that DDT is a "mild poison" but affirms that it is safe when used correctly. The image on the USDA pamphlet shows a housewife spraying DDT in her kitchen cabinets.

The editors of mindfully.org follow this excerpt with their own editorial comment: "Because of the US government's campaign to convince people of DDT's safety, millions of families were needlessly exposed to it. The only benefactor in the exercise was the pesticide industry. Because the factories were built to supply the US military, and the war had ended, the pesticide industry desperately needed new customers for DDT to keep the factories busy and profits coming in…The best advice anyone can give you is to NEVER use pesticides" (Mindfully DDT).

Mindfully.org describes its mission on its Web site as follows:

> The goal of mindfully.org is to provide useful information to people who would not obtain this information otherwise. Mindfully.org is to be used as a nonprofit research tool. Our opinion is indeed biased — because it seems to us that the "balanced news" of today's journalism is accomplished by blending fact with fiction. Each article on this website is far from the final word on any subject and one can only get an overall view by viewing a lot of it (Mindfully About).

CONNECTIONS

MCC slides 7, 10, 12, 14, 33, 46 (pesticides) 8, 9, 10, 11 (mid-20th century chemical advertising)
6, 10, 12, 14, 17, 34, 35, 47 (chemicals in food) Case Study Lessons 2 & 3 (Rachel Carson & DDT)

TEACHER GUIDE

SLIDE #11: *Science Helps Build a New India,* 1962 magazine ad

BACKGROUND INFORMATION

By the mid-20th century chemical companies like Union Carbide were producing and marketing chemical solutions to the problems of feeding the world. This 1962 Union Carbide advertisement which appeared in *National Geographic* and *Fortune* magazines includes the text: "Oxen working the fields... the eternal river Ganges... jeweled elephants on parade. Today these symbols of ancient India exist side by side with a new sight -- modern industry. India has developed bold new plans to build its economy and bring the promise of a bright future to its more than 400,000,000 people. But India needs the technical knowledge of the western world….Union Carbide recently made available its vast scientific resources to help build a major chemicals and plastics plant near Bombay."

→ Project the document

QUESTION **What message is Union Carbide suggesting about the use of their chemical fertilizer in India?**

POSSIBLE ANSWER Chemical fertilizer is a modern miracle brought to the developing world by Union Carbide.

EVIDENCE A miracle is suggested in the image of a hand pouring from a test tube onto a field. The hand is enormous, white and above the field in which a much smaller dark-skinned Indian man is plowing. The text reads "India needs the technical knowledge of the western world….Union Carbide recently made available its vast scientific resources to help."

QUESTION **How might different people understand this message differently?**

POSSIBLE ANSWER The white hand descending from above might allude to western notions of the divine. Other cultures might not read the same symbolic meaning**.** Depending on one's trust for Union Carbide, one might see the red liquid as a boon or a poison. People might interpret industrial development in different ways. Mahatma Gandhi saw western material aspiration as a danger to Indian society while a Union Carbide executive might see it as a worthy goal.

SLIDE #11

***Science Helps Build a New India,* 1962 magazine ad**

ADDITIONAL INFO

On the 12th anniversary of the gas leak at Union Carbide's Bhopal plant, Peter Montague wrote about this poster in *Rachel's Democracy and Health News*:

> Behind this agricultural scene, still in the bottom third of the painting, is the River Ganges; across the Ganges on the far shore, bathed in golden sunlight, is a scene that could line the New Jersey Turnpike as it passes through Linden -- an enormous chemical complex, a tangle of bulky pipes, tall stacks and huge tanks resembling a petroleum refinery, except that Linden's refineries are dark with soot and grime while Carbide's rendition shimmers with the color of gold... The hand seems clearly intended to remind us of the ceiling of the Sistine Chapel, where Michelangelo depicted the hand of God bestowing life by touching Adam. (Montague)

FURTHER QUESTIONS

Who might benefit from this ad? Who might be harmed?

CONNECTIONS

MCC slides 8, 9, 10, 11 (mid-20th century chemical advertising) 11, 22, 23, 24, 49 (Carbide in India) 7, 11, 16, 19, 25, 26, 40, 41 (fertilizer)

TEACHER GUIDE

SLIDE #12: *Saving the Planet with Pesticides and Plastic,* 2000 book cover

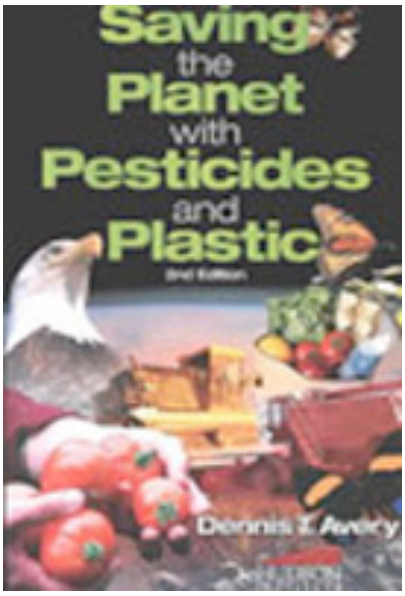
BACKGROUND INFORMATION

The book *Saving the Planet with Pesticides and Plastic* was written by Dennis Avery, Senior Fellow with the Hudson Institute, which published the book. The Hudson Institute's Web site defines its mission as "a non-partisan policy research organization dedicated to innovative research and analysis that promotes global security, prosperity, and freedom…Hudson Institute challenges conventional thinking and helps manage strategic transitions to the future through interdisciplinary and collaborative studies in defense, international relations, economics, culture, science, technology, and law. Through publications, conferences and policy recommendations, we seek to guide global leaders in government and business" (Hudson).

→ Project the document

QUESTION	**Who published this and why?**
POSSIBLE ANSWER	It was published by the Hudson Institute to earn money on book sales and to convey the idea that chemicals can save the country and the earth by helping to produce abundant food crops.
EVIDENCE	Hudson Institute is credited in the lower right hand corner of the book cover. The images of the combine, the full bag of groceries and ripe tomatoes in hand suggest abundance. The eagle and butterfly are meant to be symbols for the United States and the wider natural world.
QUESTION	**What information about pesticides and plastics is left out of this message?**

SLIDE #12



***Saving the Planet with Pesticides and Plastic,* 2000 book cover**

ADDITIONAL INFO

In 2000, the organization Fairness and Accuracy in Reporting (FAIR) challenged an ABC news program report on organic foods in which the main critic was Dennis Avery. FAIR's letter to ABC is quoted in its press release:

> The chief critic of organic foods in the report is Dennis Avery, identified as "a former research analyst for the Agriculture Department." But Avery's current and more relevant work is as director of the Center for Global Food Issues for the Hudson Institute, which receives funding from chemical companies like Monsanto, DuPont, ConAgra and Procter & Gamble, among others. Such facts, absent from the broadcast, would have enlightened viewers about Avery's point of view (as would have the title of Avery's infamous book, *Saving the Planet with Pesticides and Plastics)*. (FAIR)

ABC responded:

> Mr. Avery is indeed director of the Center for Global Food Issues. He is paid $35,000 per annum for this particular duty. He says, and we have no reason to doubt him, that he's never met or seen or been influenced by any representatives of the businesses who contribute to the Hudson Institute. Mr. Avery says the bulk of his yearly income is a federal pension. Mr. Avery's research has not been, as you write, "widely challenged." It has been disputed principally by organic farm organizations and environmental groups, which are the main targets of his writings. (FAIR)

FURTHER QUESTIONS

In light of FAIR's challenge and ABC's response, do you think the funding source for a study might impact the credibility of its findings?

CONNECTIONS

Slides 7, 10, 12, 14, 33, 46 (pesticides)
Case Study Lessons 2 & 3 (Rachel Carson & DDT)

TEACHER GUIDE

SLIDE #13: *The Poisoning of America,* 1980 magazine cover

BACKGROUND INFORMATION

In the latter half of the 20th century, with the advent of the modern environmental movement, the media began to focus on the dark and often hidden side of scientific progress.

In 1980, following revelations of possible health risks to people living near toxic dumps, Ed Magnuson authored a *Time* magazine cover story on "The Poisoning of America" which began: "Belatedly, the campaign begins to control hazardous chemical wastes." The cover artist was James Marsh.

→ Project the document

QUESTION

Who made this message and for what purpose?

POSSIBLE ANSWER

The editors of *Time* commissioned artist James Marsh to create this painting and the cover editors designed the copy. Like all magazine covers, it was made as an advertisement to encourage potential readers to buy the magazine.

QUESTION

It is well known in the advertising world that "fear sells." How did the artist and design editors use fear to sell this magazine?

POSSIBLE ANSWER

The image of the human and fish skeleton coupled with the bold headline at top center – "The Poisoning of America" – communicate fear. The fact that this information is laid over and beneath a blue sky and smiling face makes the image stronger because it suggests danger (and chemicals) may be hidden beneath the surface.

SLIDE #13

***The Poisoning of America,* 1980 magazine cover**

ADDITIONAL INFO

Time's cover story continued with a quote from an influential book, *Only One Earth*, by Barbara Ward and René Dubos:

> In the last 200 years, and with staggering acceleration in the last 25, the power, extent and depth of man's interventions in the natural order seem to presage a revolutionary new epoch in human history, perhaps the most revolutionary the mind can conceive. Men seem, on a planetary scale, to be substituting the controlled for the uncontrolled, the fabricated for the unworked, the planned for the random. And they are doing so with a speed and depth of intervention unknown in any previous age of human history. (Ward & Dubos)

The story's author continued:

> Of all of man's interventions in the natural order, none is accelerating quite so alarmingly as the creation of chemical compounds…Many have been an undeniable boon to mankind, mitigating pain and disease, prolonging life for millions and expanding the economy in myriad ways by stimulating the creation of new products. There is, however, a price to pay for an industrial society that has come to rely so heavily on chemicals: almost 35,000 of those used in the U.S. are classified by the federal Environmental Protection Agency (EPA) as being either definitely or potentially hazardous to human health. Although cause-and-effect relationships between many chemicals and specific illnesses are still difficult to prove, the danger is clearly growing. Long concerned about more familiar pollution problems… the nation has only belatedly begun to recognize the threat of chemical wastes poisoning America's earth and—more ominously —its underground reservoirs.

FURTHER QUESTIONS

How might you interpret the box on the top right corner entitled "THE PERSIAN GULF: Preserving the Oil Flow" in light of the main cover image?

CONNECTIONS

MCC slides 13, 19, 29, 30, 31, 32 (toxic waste)

TEACHER GUIDE

SLIDE #14: *Sun Mad Raisins,* 1982 poster

BACKGROUND INFORMATION

Chemicals appear in food not simply as additives. Many non-organic fruits and vegetables have been sprayed with chemicals in the fields to reduce the risk of crop loss due to insects, mites, weeds or fungus. These pesticides can impact the health of farm workers who pick the crops and of consumers who eat them.

In 1986 Cesar Chavez and the United Farm Workers (UFW) union initiated the "Wrath of Grapes" campaign in order to draw public attention to the issue of pesticide poisoning of grape pickers and their children. The UFW became the first union to successfully negotiate for hand washing facilities, protective clothing against pesticide exposure, banning pesticide spraying while workers are in the fields, outlawing DDT and other dangerous pesticides, lengthening pesticide re-entry periods beyond state and federal standards, and requiring the testing of farm workers on a regular basis to monitor for pesticide exposure. The poster artist is Ester Hernandez.

→ Project the document

QUESTION

Who might benefit from this message and who might be harmed by it?

POSSIBLE ANSWER

The artist, Ester Hernandez, might benefit from the sale of the poster. Those working to raise awareness about the dangers of chemical applications for food crops would benefit. Sun Maid and other producers of food grown with insecticides might be harmed.

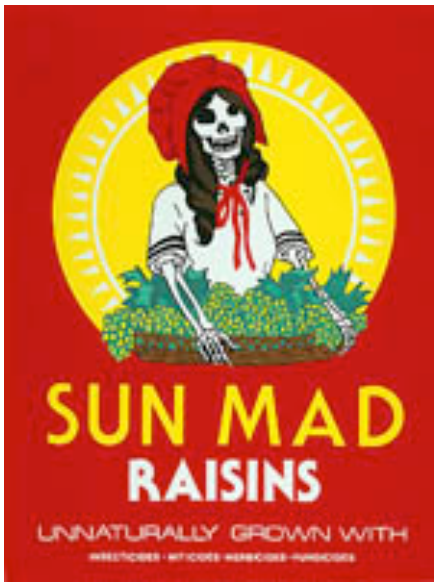
QUESTION

What techniques does the artist use to accentuate the dangers of chemicals sprayed on food crops?

POSSIBLE ANSWER

Danger is underlined with the image of the skeleton holding the grapes and the words "unnaturally grown with" and assortments of –cides (killing agents).

SLIDE #14



***Sun Mad Raisins,* 1982 poster**

ADDITIONAL INFO

The Smithsonian Art Museum, which exhibits the work of artist Ester Hernandez, offers this biography of her on its Web site:

> When Ester Hernández was a child she watched as Chicano farmworkers marched through her hometown of Dinuba, California, and were harassed by other local residents. Despite the danger, her family greeted the workers and their leader, César Chávez. At Grove Street College in Oakland, California, as she learned more about Chicano studies, she turned to the art department as an outlet for her anger about the treatment of Latina women…She recounts how *Sun Mad* began when she went "home to visit my mother in 1979, reading the articles she saved about water contamination in the barrio." After thinking about it for two years, remembering how she had worked as a farmhand, she focused her anger on the dangers of growing grapes for the raisin industry. "I focused on something personal, the Sun Maid box," Hernandez said. "Slowly I began to realize how to transform the Sun Maid and unmask the truth behind the wholesome figures of agribusiness. *Sun Mad* evolved out of my anger and my fear of what would happen to my family, my community, and to myself." Hernández finds strength and inspiration in the Latina women with whom she has worked. (Smithsonian)

FURTHER QUESTIONS

How is the artist's message helped by the already existing imagery of the Sun Maid?

CONNECTIONS

MCC slides 7, 10, 12, 14, 33, 46 (pesticides) 14, 19, 23, 26, 29, 30, 31, 44, 50 (environmental justice)

TEACHER GUIDE

SLIDE #15: *Ethyl War,* 2003 web page

BACKGROUND INFORMATION

One ongoing concern regarding chemicals in the environment has been the presence of lead in many forms – in the workplace, in children's toys, in waste sites and in gasoline fumes. Studies have concluded that lead poisoning can cause serious neurological and brain impairments, especially in children.

In his Web site "Ethyl War: Forbidden Fuel and Public Poison," Radford University professor Bill Kovarik recounts the history of lead as an additive to gasoline. See text below.

→ Project the document

QUESTION	**What's the message about leaded gasoline in this Web site article?**
POSSIBLE ANSWER	Leaded gasoline has led to serious health problems, especially currently in the developing world. The oil industry deliberately added lead to gas on the pretext of moving toward safer fuels and only withdrew it in the U.S. and Europe when forced to by government.
EVIDENCE	"Great environmental disaster," "serious public health impacts in developing nations," "originally nothing more than a bridge," "had to be phased out by government order."
QUESTION	**What kinds of actions might one take in response to this message?**

SLIDE #15

Ethyl War,
2003 web page

ADDITIONAL INFO

Text of Ethyl War:

Leaded gasoline should be counted among the great environmental disasters of the 20th century, given the numbers of people killed or slowly poisoned by the dull grey metal. Significantly, alternatives were well known from the beginning and preferred by the same researchers who created leaded gasoline. They originally saw it as nothing more than a bridge to other, safer fuels. Leaded gasoline was phased out in the US from 1975 - 1986 and in Europe in the 1990s. It is still being used in the developing world.

Lead is not something that comes with gasoline that has to be taken out -- it was deliberately added by the oil industry to boost "octane" or anti-knock ratings for fuel. It had to be phased out by government order, for public health reasons, starting in 1975, and concluding in 1986. It was also banned in various European nations in the 1990s. It is still having serious public health impacts in developing nations, and a complete global phase-out has long been advocated by the World Health Organization and all other international health organizations.

Most recently, the "Declaration of Dakar" of June 28, 2001, part of the World Bank's Clean Air Initiative, called for help in phasing out leaded gasoline in 25 sub-Saharan nations. Leaded gasoline is typically a suspension of 3 to 4 cc tetra-ethyl lead per gallon of gasoline. Although diluted at over 1,000 to 1, the lead is readily absorbed into the skin on contact with gasoline or into the lungs from automotive exhaust. (Kovarik)

FURTHER QUESTIONS

Is this a credible message? How can you find out?

CONNECTIONS

MCC slides 8, 15, 18 (lead)

TEACHER GUIDE

SLIDE #16: *Dead in the Water,* 2007 web page

BACKGROUND INFORMATION

The Environmental Working Group (EWG) is a not-for-profit organization whose mission is to use the power of public information to protect public health and the environment.

This article begins: "It is one of the toughest environmental problems facing America. For over 20 years, scientists have documented the appearance of a summertime 'Dead Zone' that all but obliterates marine life in what is arguably the nation's most important fishery, the Gulf of Mexico...The main culprit: an annual flood of wasted fertilizer from heavily farmed land, running off into rivers and finally into the Gulf, where it feeds the development of massive algae blooms. The algae then die and decompose, robbing the water of oxygen and suffocating all life that cannot leave the area."

→ Project the document

QUESTION	**Who made this message and why would they have posted it?**
POSSIBLE ANSWER	The Environmental Working Group made and posted this message to further the protection of marine life in the Gulf of Mexico and to solicit reader's support for their cause.
QUESTION	**What is the message in this article about the effects of nitrogen fertilizer on the Gulf of Mexico? Give evidence for your conclusion.**
POSSIBLE ANSWER	Nitrogen runoff from fertilizer causes widespread damage to marine life.
EVIDENCE	The title "Dead in the Water." The map of fertilizer drainage into the Gulf. The text describing the "Dead Zone" with the main culprit named as "wasted fertilizer."

SLIDE #16

***Dead in the Water,* 2007 web page**

ADDITIONAL INFO

From the article:

> A new Environmental Working Group (EWG) analysis of government and industry data…found that the vast majority of fertilizer pollution comes from a relatively small area of heavily subsidized cropland along the Mississippi and its tributaries where taxpayer funded commodity spending overwhelms water quality related conservation spending by more than 500 to 1. Shifting a modest portion of commodity subsidies, particularly the portion that goes to the largest and wealthiest growers, into programs that encourage more careful fertilizer use, wetland restoration and the planting of streamside buffers of grass and trees to absorb runoff, could reduce dead zone pollution significantly while also boosting the bottom line for family farms.
>
> The EWG analysis, an update of fertilizer run-off modeling that was conducted for the Mississippi River Basin (MRB) in the early 1990s, shows that at current prices, farmers flush more than one third of a billion dollars of nitrogen fertilizer down the Mississippi River each spring. This annual surge of nitrate fertilizer pollution is responsible for more than 70 percent of the total nitrate pollution entering the Gulf in the crucial spring months prior to the formation of the Dead Zone. In contrast, municipal sewage accounts for about 11 percent, animal waste about 12 percent, and atmospheric deposition about 6 percent. (The Environmental Working Group)

FURTHER QUESTIONS

How can you find out where your local runoff drains?

CONNECTIONS

MCC slides 7, 11, 16, 19, 25, 26, 40, 41 (fertilizer)

TEACHER GUIDE

SLIDE #17: *Chemical Cuisine,* 2007 web page

BACKGROUND INFORMATION

In the 1970s, public interest in chemicals in the environment extended to the chemicals in the food we eat. The Center for Science in the Public Interest (CSPI) was created in 1971 with twin missions to conduct innovative research and advocacy programs in health and nutrition and to provide consumers with current, useful information about their health and well-being. This Web page comes from a New Zealand site, AlternativeHealth.co, which used information from CSPI.

→ Project the document

QUESTION	**What is the message about food additives in this Web page graphic?**
POSSIBLE ANSWER	Food additives can be dangerous and potentially lethal.
EVIDENCE	The images of the "Processor" food box and the "graveyard" flask suggest potential death from food consumption as do the bullet headings "Cancer testing" and "food additive cemetery."
QUESTION	**Who might be the target audience for this message?**

SLIDE #17

Chemical Cuisine, **2007 web page**

FURTHER QUESTIONS

What type of actions might one take in response to this media message?

CONNECTIONS

MCC slides 6, 10, 12, 14, 17, 34, 35, 47 (chemicals in food)

ADDITIONAL INFO

Web page text:

> Shopping was easy when most food came from farms. Now, factory-made foods have made chemical additives a significant part of our diet. Most people may not be able to pronounce the names of many of these chemicals, but they still want to know what the chemicals do and which ones are safe and which are poorly tested or possibly dangerous. This listing provides that information for most common additives. A simple general rule about additives is to avoid sodium nitrite, saccharin, caffeine, olestra, acesulfame K, and artificial coloring. Not only are they among the most questionable additives, but they are used primarily in foods of low nutritional value. Also, don't forget the two most familiar additives: sugar and salt. They may pose the greatest risk because we consume so much of them. Fortunately, most additives are safe and some even increase the nutritional value of the food. Additional information about some of the additives is available elsewhere in this Web site. Use the search engine provided to locate that information.

AlternativeHealth makes this disclaimer about the material it presents:

> A Health Advisory Message - AlternativeHealth.co.nz does not make value judgments or qualifying recommendations relating to any web site listed or referenced on this set of web pages. Information presented within the pages of this web site as well as hyperlinks to other remote pages, is presented for informational and educational purposes only, and should not be considered medical advice. AlternativeHealth.co.nz recommends you confide with established alternative physicians and or your health care provider, regarding any complementary course of treatment you desire to undertake. (AlternativeHealth)

The website Quantcast identifies the viewership of AlternativeHealth in this way:

> This site reaches approximately 19,387 U.S. monthly uniques. The site is popular among a rather female, primarily older audience. The typical visitor patronizes evitamins.com, reads healthboards.com, and visits cancer.gov. (Quantcast)

TEACHER GUIDE

SLIDE #18: *Lead Paint Danger,* 2007 web page

BACKGROUND INFORMATION

The increase of global markets allows chemicals, along with their associated benefits and problems, to be spread worldwide. Leaded gasoline from companies headquartered in the United States is sold in Africa. Children's toys from China with lead in the surface paint have been sold in the United States.

This webpage is from WDIV TV, the NBC news affiliate station in Detroit Michigan. It includes a link to the October 2007 Consumer Product Safety Commission (CPSC) webpage. The CPSC webpage includes notice of the voluntary recall of more than 1,300,000 toys from a dozen toy companies due to violation of governmental lead paint standards and the risk of lead exposure. (CPSD)

→ Project the document

QUESTION	**Who paid for this message and why was it posted? How do you know?**
POSSIBLE ANSWER	It was paid for by WDIV TV and its parent company to attract viewers to its Web site and television broadcasts and to bring business for its advertisers.
EVIDENCE	As a media company with links, buttons and searches it wants to attract more viewers which translates to more profits for its advertisers, Monster, Mastercard and Experian.
QUESTION	**What emotions do the designers play on to invite people to read this story and click on the link? Give evidence to justify your conclusion.**
POSSIBLE ANSWER	Fear.
EVIDENCE	Lead in children's toys is dangerous as made clear by the title: "Lead paint danger. Chinese made toys to be recalled" and the link to "Ruth to the Rescue."

SLIDE #18

***Lead Paint Danger,* 2007 web page**

ADDITIONAL INFO

In June 2007 the *New York Times* reported:

> China manufactured every one of the 24 kinds of toys recalled for safety reasons in the United States so far this year, including the enormously popular Thomas & Friends wooden train sets, a record that is causing alarm among consumer advocates, parents and regulators…Over all, the number of products made in China that are being recalled in the United States by the federal Consumer Product Safety Commission has doubled in the last five years, driving the total number of recalls in the country to 467 last year, an annual record. It also means that China today is responsible for about 60 percent of all product recalls, compared with 36 percent in 2000. Much of the rise in China's ranking on the recall list has to do with its corresponding surge as the world's toy chest: toys made in China make up 70 to 80 percent of the toys sold in the country, according to the Toy Industry Association. (*NY Times*)

FURTHER QUESTIONS

How could you research potential dangers in the toys in your home?

CONNECTIONS

MCC slides 8, 15, 18 (lead)

TEACHER GUIDE

SLIDE #19: *Drum Beat for Mother Earth,* 1999 video jacket

BACKGROUND INFORMATION

At the start of the 21st century, there was a growing awareness of the interconnections of all life systems. Some recognized the need to heed the voices of indigenous peoples, many of whom had lived in one place on the earth for centuries or longer.

In 1999, the Indigenous Environmental Network and Greenpeace worked together to produce this video documentary. Persistent organic pollutants (POPs) are long-lived chemicals that can travel thousands of miles from the point of production or use. They build up in the food chain, slowly contaminating fish, animals and humans.

→ Project the document

QUESTION

What choices did the cover designer make in order to communicate that this DVD concerns the effects of chemicals on indigenous people and the environment?

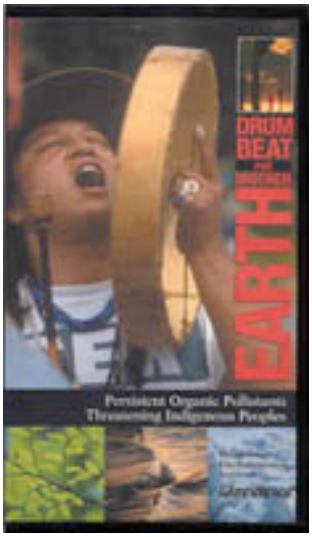
POSSIBLE ANSWER

Chemicals are indicated by the text: "Persistent Organic Pollutants" and the images of factory smokestacks. Indigenous people are referred to by the text: "Threatening Indigenous Peoples" and by the image of the man playing the drum. The environment is referenced by the title, "Drum Beat for Mother Earth," by the names of the sponsoring organizations, the Indigenous Environmental Network and Greenpeace, and by the nature images of leaves, waterways and ice.

QUESTION

What kinds of actions might one take in response to this message?

SLIDE #19



***Drum Beat for Mother Earth,* 1999 video jacket**

ADDITIONAL INFO

In 2005 Shelly Vendiola wrote about POPs and their effect on indigenous populations for the Web site *Indian Country* which calls itself "the nation's leading American Indian News Source:"

> We depend on traditional foods and plants for ceremony and to nourish our communities. Indigenous people are united by our lands, natural resources, and traditional knowledge - the foundations of indigenous wealth, strength, identity and culture. When our water, soil and air are poisoned with toxic chemicals, our rights to practice our traditional lifestyles and live in a clean and safe environment are violated.
>
> Indigenous people who maintain a land-based culture can be heavily exposed to POPs through their diet; in this way, POPs threaten our culture and our future. Fishing and hunting are not sport or recreation for indigenous people, but part of a spiritual, cultural, social and economic lifestyle that has sustained us from time immemorial. Many tribes possess treaty rights to fish, hunt and gather at all ''usual and accustomed'' places. The waters we depend on to support fish, aquatic plants and wildlife within and outside our reservations have been contaminated. POP contamination undermines historical tribal hunting and fishing rights. (Vendiola)

FURTHER QUESTIONS

Who sponsored this message and what does that sponsorship tell you about the likely point of view of the DVD content?

CONNECTIONS

MCC slides 13, 19, 29, 30, 31, 32 (toxic waste) 14, 19, 23, 26, 29, 30, 31, 44, 50 (environmental justice)

TEACHER GUIDE

SLIDE #20: *Essential,* 2005 web page

BACKGROUND INFORMATION

There are many different perspectives concerning the place of chemicals in our society. The American Chemistry Council is likely to have a different view about chemicals in the environment than the environmental action group Greenpeace.

These ad slicks or camera-ready advertisements are found on the Internet site of the American Chemistry Council (ACC), which represents the leading companies engaged in the business of chemistry. On its home page the American Chemistry Council states its belief that "information and dialogue have the power to create change: in our industry, in our communities, and in our world. Our member companies are investing in the future through community outreach projects, ground-breaking research, and initiatives that protect public health and the environment" (American Chemistry).

→ Project the document

QUESTION

What cultural values do the designers appeal to in this ad? Give evidence to justify your answer.

POSSIBLE ANSWER

People value safety and freedom from fear.

EVIDENCE

The designers have chosen images of an infant in an incubator, an automobile airbag and a police officer's protective vest as visuals for this campaign as daily reminders that we need to protect ourselves and those we love. The American Chemistry Council wants to communicate that chemicals keep us safe.

QUESTION

What is your reaction to and interpretation of this series of images as a sales technique?

SLIDE #20

Essential,
2005 web page

ADDITIONAL INFO

From media kit information provided on the ACS news room Web site:

security - Having led the charge for national chemical security regulations, ACC and our member companies continue to be committed to safeguarding America's chemical facilities.

essential2® public education campaign - ACC is proud of chemistry's contributions to modern life, from innovations in products we use everyday to the economic impact in the U.S. and abroad. ACC's public education campaign demonstrates that chemistry is essential to safety, health, innovation, the environment, the economy… essential2 our lives.

Responsible Care®- Responsible Care® is a ACC and is a mandatory program for ACC members. Responsible Care helps America's leading chemical companies go above and beyond government requirements and openly communicate their results to the public. Through Responsible Care, these companies are making available the most performance information of any private sector industry group. (American Chemistry)

FURTHER QUESTIONS

What images would you select to represent those things that are essential to your life?

CONNECTIONS

MCC slides 20, 21, 24, 25, 26, 43, 48, 49 (21st century chemical industry advertising)

TEACHER GUIDE

SLIDE #21: *Greenwash,* 1996 book cover

BACKGROUND INFORMATION

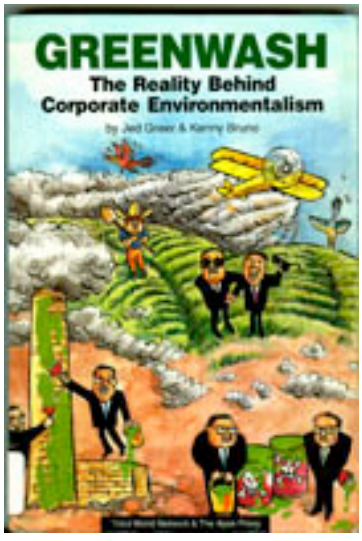
Wordspy.com defines "greenwash" as "to implement token environmentally friendly initiatives as a way of hiding or deflecting criticism about existing environmentally destructive practices (Wordspy).

The publisher of this book offers this synopsis of *Greenwash*: "In recent years, transnational corporations (TNCs) have been greenwashing their dismal environmental performance by posing as friends of the environment. This new book provides an overview of TNCs in the global economy and of their impacts on the global environment." Paul Normandia is the cover artist.

→ Project the document

QUESTION	**What is the message that the book publishers want to portray about corporations and their concern for environmental safety? Give evidence.**
POSSIBLE ANSWER	Corporations make efforts to present themselves as concerned about the environment for public relations purposes when in reality they collude in destroying the environment.
EVIDENCE	The title and subtitle suggest a hidden agenda. The images of the corporate men painting smokestacks and waste drums and shaking hands beneath the crop duster suggest they may be creating illusions or covering up the truth.
QUESTION	**Why might the publisher hire an artist to design a cartoon cover for this book?**
POSSIBLE ANSWER	The book cover is an advertisement to attract sales. They hope to use humor, color and satire to get potential buyers to pick up their product.

SLIDE #21



Greenwash,
1996 book cover

ADDITIONAL INFO

From the publisher:

> This book contrasts corporate greenwashing with the many damaging effects of transnational corporations (TNCs)' actual behavior, and shows how TNCs remain the primary creators and peddlers of dirty, unsustainable technologies. Additionally, to help citizens move from recognizing to challenging greenwashing and the harm caused by corporate activities, the book offers guidelines and principles which communities everywhere can use to hold TNCs accountable and to regain control of their lives and environment.

On the Web site activistcash.com co-author Kenny Bruno's background is listed as: Media trainer, the Ruckus Society; Campaign Coordinator, EarthRights International; former international campaigner, Greenpeace; Project coordinator, CorpWatch.com. (Activistcash)

FURTHER QUESTIONS

Can you think of an example of "greenwash" advertising? How about slanted advertisements by non-corporate groups?

CONNECTIONS

MCC slides 20, 21, 24, 25, 26, 43, 48, 49 (21st century chemical industry advertising)

TEACHER GUIDE

SLIDE #22: *India's Disaster,* 1984 magazine cover

BACKGROUND INFORMATION

On the night of December 3, 1984, methyl isocyanate (MIC) gas leaked from a tank at the Union Carbide plant producing pesticide in Bhopal India. According to the state government, 3,800 people died from the leak and several thousands more were left with permanent disabilities. This event gained worldwide attention to the dangers of chemical leaks.

Baldev was the photographer who took this cover shot.

→ Project the document

QUESTION

Why might the editors have chosen the words "A Global Worry" to headline a story about a disaster in India?

POSSIBLE ANSWER

We don't know the answer to this, but it is possible that the editors wanted to point out the potential global implications of chemical industry leaks or to suggest that even though it happened in India, U.S. citizens should be concerned since it was a U.S. company that was responsible for the leak.

QUESTION

What is left out of this message that might be important to know?

POSSIBLE ANSWER

Who was responsible for this disaster? (Union Carbide is not mentioned on the cover) How many people were impacted? How are the company, national government and local community dealing with the disaster? What makes this disaster unique? Are other communities at risk for similar disasters?

SLIDE #22

***India's Disaster,* 1984 magazine cover**

ADDITIONAL INFO

In the introduction to the article "Anatomy of the Methyl Isocyanate Leak in Bhopal," D. R. Varma writes of the Bhopal leak:

> A total of 200,000 in a city of 800,000 were exposed to the gas and over 60,000 of them required long-term medical treatment. This was the worst industrial accident. Some called this disaster the Nagasaki and Hiroshima of peace time. 'This may be how the world will end – not with a bang but with an ecological whimper' wrote Abu Abraham. (Sunday Observer, December 23, 1984)

The chairman of Union Carbide, Warren Anderson, immediately flew to India with a technical team. While there, he was placed under house arrest and urged to leave the country by the Indian government. He subsequently testified to Congress stressing Union Carbide's commitment to safety and pledging action to make sure a similar leak would not happen again.

FURTHER QUESTIONS

How might different people interpret this message differently?

CONNECTIONS

MCC slides 11, 22, 23, 24, 49 (Carbide in India)

TEACHER GUIDE

SLIDE #23: *$500 is Plenty Good for an Indian,* 2002 poster

BACKGROUND INFORMATION

Some analysts of the environmental movement have argued that free markets allow the consequences of destructive environmental practices to flow downstream creating a particularly heavy burden on the poor and on people of the global south. Others argue that a real achievement of the environmental movement has been to force corporations to face the human costs of their decisions. This poster speaks to both of these positions. It was created by Students for Bhopal, "the international student campaign to hold Dow accountable for Bhopal, and its other toxic legacies around the world" as described on their Web site. See text below.

→ Project the document

QUESTION	**Who produced this message and for what purpose?**
POSSIBLE ANSWER	Students for Bhopal produced this as part of their efforts to hold Dow accountable.
QUESTION	**What message do the creators of this poster want to communicate about Dow Carbide's settlement in the Bhopal gas leak suit?**
POSSIBLE ANSWER	Dow Carbide applies a double standard in its payments to victims in India and the US.
EVIDENCE	Showing side-by-side photos of Indian and US children while accentuating the quote from the Dow spokesman.

SLIDE #23

***$500 is Plenty Good for an Indian,* 2002 poster**

ADDITIONAL INFO

Poster text:

> DOW-CARBIDE PAID the family of Joshua Herb, a child who became brain-injured after being exposed to their pesticide, Dursban, $10 million in an out-of-court settlement. Brain-injured victims of its Bhopal gas leak got around $500 to last them the rest of their lives. When asked if this was not a blatant example of double standards, Dow Public Affairs Leader Kathy Hunt made the remark quoted above. Dursban has now been withdrawn from household use in the United States, but Dow still markets it as safe in India. More double standards. Don't Indian children's lives matter? Well, Dow has already told us what it thinks about that.

On the Students for Bhopal Web site, the student menu includes these questions and actions under the heading "Dow and YOU:"

> Is Dow At My School? - Is Dow at YOUR school? Find out! If so, spread the word – and then do something about it.
> Napalm: Student Power Crushes Dow - Only once in its corporate life has Dow's immoral profiteering been seriously challenged, and it wasn't lawyers or governments behind the challenge. It was a mass student movement, conceived and built during the Vietnam War, that forced Dow to end its production of Napalm for the US military. How did they do it?
> Students: Dow's Chemical Guinea Pigs - How would YOU like to be a chemical guinea pig for Dow? If you're a student strapped for cash, Dow will happily give you some pesticide to swallow.

FURTHER QUESTIONS

What other student actions for environmental justice are you aware of?

CONNECTIONS

MCC slides 11, 22, 23, 24, 49 (Carbide in India) 14, 19, 23, 26, 29, 30, 31, 44, 50 (environmental justice)

TEACHER GUIDE

SLIDE #24: *Human Element,* 2006 magazine ad

BACKGROUND INFORMATION

In 1999, Dow Chemical merged with Union Carbide to form Dow Carbide. Dow Carbide describes itself as "a diversified chemical company that harnesses the power of science and technology to improve living daily. Built on a commitment to its principles of sustainability, Dow has annual sales of $46 billion and employs 42,000 people worldwide". In 2006, they launched a new ad campaign entitled "The Human Element." See text below.

→ Project the document

QUESTION	**Is this ad fact, opinion or something else?**
POSSIBLE ANSWER	It contains elements of both. While it is true that the world contains hydrogen and oxygen asserting that chemistry solves human problems is an opinion that not all would share.
QUESTION	**Which is more credible, this ad or the Students For Bhopal poster you just saw?**

SLIDE #24

Human Element,
2006 magazine ad

ADDITIONAL INFO

Ad text:

> And just like that, the laws of chemistry change. A world that includes the Human Element, along with hydrogen, oxygen and the other elements, is a very different world indeed. Suddenly, chemistry is put to work solving human problems. Bonds are formed between aspirations and commitments. And the energy released from reactions fuels a boundless spirit that will make the planet a safer, cleaner, more comfortable place for generations to come. A world that welcomes change is about to meet the element of change: the Human Element.

In a press release, Dow defined the intent for the advertising campaign:

> Dow's Human Element campaign is about reconnecting the company with the faces and values of the people Dow touches in a positive way," said Toby Sachs, senior vice president/group management director at FCB Chicago. "Our creative approach was driven by the need to capture visually the commitments Dow has made to use its expertise and influence to make a difference in the lives of real people around the world.
>
> The Human Element advertising creative was developed featuring real people rather than professional actors and includes dramatic environmental and human imagery (a blacksmith in Mexico, children at an orphanage in Namibia, an artist at his studio in Prague) gathered on location on four continents. The campaign runs in U.S. broadcast, print and online media through the end of 2006, with plans to extend the campaign to key international markets in 2007." (Dow Chemical)

FURTHER QUESTIONS

How much of this campaign is about marketing products to earn profit and how much is about Dow-Carbide's ethical commitment to valuing people and the earth?

CONNECTIONS

MCC slides 11, 22, 23, 24, 49 (Carbide in India) 20, 21, 24, 25, 26, 43, 48, 49 (21st century chemical industry advertising)

TEACHER GUIDE

SLIDE #25: *One Can Make a Diffence,* 2006 web page

BACKGROUND INFORMATION

The Monsanto Company is a multinational corporation specializing in agricultural products such as fertilizer, herbicide and genetically engineered seed. In 2007, Monsanto total revenues exceeded $8.5 billion. In 2006, Monsanto announced its collaboration with Quail Forever, the Tall Timbers Research Station and the Southeast Quail Study Group in a Quail Conservation Program. This advertisement was part of the joint publicity campaign announcing the partnership. See text below.

→ Project the document

QUESTION	**What values are implied in this ad? Give evidence to justify your answer**
POSSIBLE ANSWER	Values of individual commitment, of collaboration and of wildlife conservation.
QUESTION	**Who might benefit and who might be harmed by this message?**

SLIDE #25

***One Can Make a Difference,* 2006 web page**

FURTHER QUESTIONS

What information is left out of this ad that might be helpful to know in judging Monsanto's environmental commitment?

ADDITIONAL INFO

Ad text:

> Monsanto has teamed up with Quail Forever, the Tall Timbers Research Station and the Southeast Quail Study Group to form The Quail Conservation Collaboration, dedicated to restoring natural quail habitats. For every gallon of Monsanto's Roundup WeatherMAX® or Roundup Original MAX® purchased for use on conservation acres, Monsanto will donate $1.00 to the Quail Conservation Collaboration in the name of the farmer who purchased the product. In addition, Monsanto will donate $75,000 annually for three years to fund conservation research.
>
> To participate, farmers from eligible grower areas should fill out the enrollment form and submit it with their Roundup WeatherMAX and Roundup Original MAX receipts. Or visit any of the websites below for additional program and participation information. For information on Quail Forever's Roundup Agricultural Herbicides sweepstakes, visit: www.QuailForever.org/roundup. Monsanto Company is a leading global provider of technology-based solutions and agricultural products that improve farm productivity and food quality. Quail Forever is a division of Pheasants Forever, a nonprofit conservation organization consisting of locally based chapters dedicated to improving quail habitat through national conservation leadership and local habitat results.

In its "Who We Are" page Monsanto defines itself in this way:

> Monsanto is an agricultural company. When farmers succeed, we succeed. Using the tools of modern biology, we support our commitment to agriculture and to the farmers that feed, clothe and fuel our growing world. (Monsanto)

CONNECTIONS

MCC slides 7, 11, 16, 19, 25, 26, 40, 41 (fertilizer), 25, 26, 36, 37, 38, 45 (GMOs)

TEACHER GUIDE

SLIDE #26: *Monsantoland,* 2006 web page

BACKGROUND INFORMATION

Monsanto has been criticized by some environmentalists for its role in promoting genetically modified seeds without sufficient oversight. Others have taken the company to task for its role in the production of nitrogen-based fertilizer, which leads to water source contamination when it runs off farm fields.

The editor of Think-aboutit.com describes the intent of the site on its home page: "Your place for Alternative Views & Truths in World News, Health, Healing, Spirituality, NWO, Censorship, Alien's, UFO's, Underground Bases and other Hidden Agenda's." See text below.

→ Project the document

QUESTION	**Who produced this message and for what purpose? Give evidence.**
POSSIBLE ANSWER	The editor of the Web page produced this to encourage viewers to give "alternative views" on Monsanto, to explore other pages and links and to join the Web site network.
EVIDENCE	The amplified nature of the page, from the multiple exclamation marks at the top of the page to the dramatic image of the scarecrow, are designed to pull the viewer in. The buttons for donate, join and classifieds all point to the effort to encourage readership.
QUESTION	**How credible is this Web page compared with the previous ad on the Monsanto Quail Conservation project? Why do you think so?**

SLIDE #26

***Mansantoland,* 2006 web page**

FURTHER QUESTIONS

How could you research the claims made in this article to verify their accuracy?

ADDITIONAL INFO

Text:

> Right now, there is probably no other company that is doing more to endanger the health of this planet, and it's inhabitants. With Nazi-like attitude, they are leading the world in shear destructive evil greed. First they were a drug company, and then they expanded to become a drugs and genetic engineering company, and now Monsanto is attempting to acquire water rights in countries with water shortages in a move to control the people's basic means of survival, and production of the global food supply.

Think-aboutit.com continues in its comments on Monsanto:

> It's hard to even describe the evil of Monsanto in a brief article. From the people who brought you such wonders as Agent Orange, and the deadly sweetener aspartame, it's... genetically modified food! They are one of the major forces behind GMOs -- genetically modified organisms. Even though the vast majority of Americans feel that genetically modified food should be labeled as such, Monsanto has successfully stopped all such laws -- and they've gotten the US government to try to stop other countries that do.

The editor of the site makes this disclaimer:

> I make no claims for the accuracy of this information and express no personal opinion on the matter. The information was acquired off the web and from authors (owners of said pages) and other sources and described as "information" and I wanted to pass it along to anyone who might find it interesting or otherwise useful" to key international markets in 2007. (Dow Chemical)

CONNECTIONS

MCC slides 7, 11, 16, 19, 25, 26, 40, 41 (fertilizer) 14, 19, 23, 26, 29, 30, 31, 44, 50 (environmental justice)eoples" and by the image of :er

TEACHER GUIDE

SLIDE #27: *The Price of Research,* 2003 journal cover

BACKGROUND INFORMATION

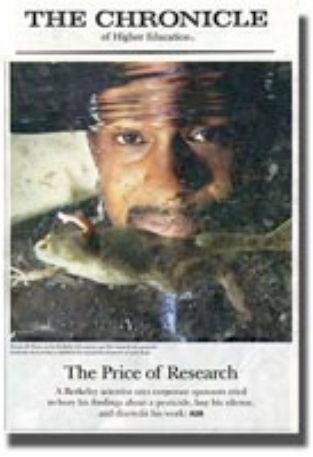
Syngenta is a chemical company that manufactures atrazine, a chemical herbicide used by many farmers. In 1997 Syngenta hired researcher Dr. Tyrone Hayes of the University of California at Berkeley to review studies supporting the company's goal to re-register atrazine as environmentally safe with the Environmental Protection Agency (EPA). Dr. Hayes' study found that very low levels of atrazine produced endocrine disruption in African clawed frog tadpoles. When Syngenta failed to release these studies Hayes resigned from the review panel and published the results.

The photo caption reads "Tyrone Hayes in his Berkeley laboratory says his research on a popular herbicide showed that it inhibited the sexual development of male frogs."

→ Project the document

QUESTION	**Who is the target audience for this message? Give evidence to support your conclusion.**
POSSIBLE ANSWER	People studying or working in the field of higher education.
EVIDENCE	The journal's title, *The Chronicle of Higher Education*, suggests an academic audience. The headlines about a university researcher's conflict with corporate sponsors would likely appeal to university professionals who might know of similar struggles.
QUESTION	**What is left out of this message that might be important to know?**

SLIDE #27



The Price of Research **2003 journal cover**

FURTHER QUESTIONS

What kind of actions might one take in response to this message?

ADDITIONAL INFO

In 2006, the EPA re-registered atrazine concluding that it posed "no harm that would result to the general U.S. population, infants, children or other…consumers" (qtd. in Knef). In the summer of 2004, Syngenta was sued in a class action lawsuit by a water utility in Illinois which alleged that atrazine pollution made its drinking water unsafe. The case is still pending.

From the article text:

> When the early studies from his laboratory at the University of California at Berkeley began producing hints that the product, the herbicide atrazine, might be inhibiting the sexual development of male frogs, he was excited. Maybe, he thought, his research would lead to some breakthrough findings. He never imagined just how unenthusiastic his research sponsors—and others with a financial stake in atrazine—would be about his discovery.
>
> Six frustrating years later, Mr. Hayes and his defenders say they know only too well the lengths to which those companies will go to undermine his findings that atrazine may be harmful. . . . Mr. Hayes and some other scientists believe that the campaign to discredit him will have played a part in helping the herbicide's primary manufacturer, a company called Syngenta, win that approval. His colleagues here at Berkeley and around the country say the story is a classic example of the subtle and not-so-subtle tactics that companies sometimes use to influence the outcome of university research that they pay for. (Chronicle)

CONNECTIONS

MCC slides 27, 28 (endocrine disrupters) and MCES Case Study Lesson 5 – Frogs and Atrazine

TEACHER GUIDE

SLIDE 28: *Atrazine: Legendary Marketing of a Legendary Molecule,* 2007 web page

BACKGROUND INFORMATION

From Syngenta's Web page, Vision & Business Principles: "Syngenta is a world-leading agribusiness. We are committed to sustainable agriculture – farming with future generations in mind. We contribute to that in many ways, for example by raising productivity through innovative research and new technology." (Vision)

AgriMarketing describes itself as the only magazine that covers the unique interests of corporate agribusiness executives, their marketing communications agencies, the agricultural media, ag trade associations and other ag-related professionals. Its audience annually sells products and services to the estimated $400 Billion United States and Canadian agricultural markets.

→ Project the document

QUESTION	**Who posted this Web page and was it posted before or after Dr. Hayes' published the results of his study?**
POSSIBLE ANSWER	Syngenta posted this following the publication of Dr. Hayes research.
QUESTION	**Why was this Web page posted? Give evidence to back up your conclusion.**
POSSIBLE ANSWER	To counter the arguments made by Dr. Hayes and others concerning study results showing the negative.
EVIDENCE	This Web page offers eight documents relating to atrazine safety, regulation and impact on frogs. This is likely to be far more information than might have been offered prior to Dr. Hayes' findings.

SLIDE #28

***Atrazine: Legendary Marketing of a Legendary Molecule,* 2007 web page**

ADDITIONAL INFO

From Syngenta's fact sheet "Atrazine's Safety"

> New research confirms no adverse effects to human health and the environment. Atrazine is the most thoroughly tested product ever used in crop protection. In the last four decades, more than 800 scientific studies evaluating its potential effects on health and the environment have been conducted by universities, government agencies, the crop protection industry and independent laboratories. More than 200 of these studies have been completed since 1995, ensuring that atrazine has passed the most up-to-date scientific tests and reviews. Overwhelmingly, the body of research supports the safety of atrazine to humans and the environment.

From Dr. Tyrone Hayes Web page "What is Atrazine? And why do we love it?"

> Atrazine is the most common chemical contaminant of ground and surface water in the United States. It is a potent endocrine disruptor with ill effects in wildlife, laboratory animals and humans. Atrazine chemically castrates and feminizes wildlife and reduces immune function in both wildlife and laboratory rodents. . . . The peer-reviewed scientific studies to support these statements are summarized and can be viewed as you navigate this web site. (AtrazineLovers)

FURTHER QUESTIONS

How could you research the claims made in Syngenta's Web page, Tyrone Hayes' Web page and the previous article to verify their accuracy?

CONNECTIONS

MCC slides 27, 28 (endocrine disrupters) and MCES Case Study Lesson 5 – Frogs and Atrazine

TEACHER GUIDE

SLIDE #29: *Dying from Dioxin*, 1995 book cover

BACKGROUND INFORMATION

In May 1980, President Carter ordered a state of emergency requiring the evacuation of 710 families from their homes in the community of Love Canal in Niagara Falls, N.Y. A study released the previous week had reported that 30% of the residents had suffered chromosome damage in the neighborhood where Hooker Chemical Company had located a toxic waste dump in the 1950s.

Lois Marie Gibbs, the author of this book, was a leader of the grassroots community movement that brought this information to light. Among the many chemicals found beneath the homes was dioxin. Dioxin is defined by the Healthy Children Project as a man-made chemical by-product formed during the manufacturing of other chemicals and during incineration. Studies show that dioxin is the most potent animal carcinogen ever tested, as well as the cause of severe weight loss, liver problems, kidney problems, birth defects and death (Glossary).

→ Project the document

QUESTION **What techniques did the designer use to communicate the author's perspective about the impact of chemicals in the environment?**

POSSIBLE ANSWER The image of smoke from the factory stacks covers the top of the frame and is incorporated into the title lettering communicating that chemical waste is a lethal danger. The images of the faceless crowd of protesters coupled with the words "citizens" and "democracy" suggests that anyone and everyone can halt the problem by engaging in mass citizen protest.

QUESTION **Who made this message (the cover) and for what purpose?**

SLIDE #29

Dying from Dioxin, **1995 book cover**

FURTHER QUESTIONS

Where is the closest Superfund site to your home? How can you find out?

ADDITIONAL INFO

Public protest over toxic waste dumps was instrumental in the passage of Superfund legislation as described on the Superfund Web site:

> Superfund is the name given to the environmental program established to address abandoned hazardous waste sites. It is also the name of the fund established by the Comprehensive Environmental Response, Compensation and Liability Act of 1980. . . . This law was enacted in the wake of the discovery of toxic waste dumps such as Love Canal and Times Beach in the 1970s. It allows the EPA to clean up such sites and to compel responsible parties to perform cleanups or reimburse the government for EPA-lead cleanups.
>
> The Superfund cleanup process is complex. It involves the steps taken to assess sites, place them on the National Priorities List, and establish and implement appropriate cleanup plans. This is the long-term cleanup process. In addition, the Agency has the authority to conduct removal actions where immediate action needs to be taken; to enforce against potentially responsible parties; to ensure community involvement; involve states; and ensure long-term protectiveness. Over the past 20+ years, we've located and analyzed tens of thousands of hazardous waste sites, protected people and the environment from contamination at the worst sites, and involved others in cleanup. (EPA)

CONNECTIONS

MCC slides 13, 19, 29, 30, 31, 32 (toxic waste) 14, 19, 23, 26, 29, 30, 31, 44, 50 (environmental justice)

TEACHER GUIDE

SLIDE #30: *The Great Louisiana Toxics March,* 2007 web page

BACKGROUND INFORMATION

The movement for environmental justice arose out of the common concerns of the civil rights movement of the 1950s and 1960s and the environmental movement of the 1970s and 1980s. Commercial photographer Sam Kittner draws connections to the peace movement as well in his introduction to this series of "Environmental Documentary" photos: "The threat of chemical warfare strikes terror in the minds of people around the world. But there is an ignored story about the chemical warfare being endured daily by those who live along the fence-lines of the petro-chemical industry. People who live where petro-chemical products are refined suffer constant exposure to air laced with chemicals, the very threat that is so unnerving in this time of terrorism and war." See text below.

→ Project the document

QUESTION	**What is the message on Sam Kittner's Web page about the impact of chemical waste on the people of Louisiana?**
POSSIBLE ANSWER	Chemical waste from factories in Louisiana poses a significant threat to people's health and spurs the community to collective action.
EVIDENCE	Community action is communicated by images of marchers with signs such as "I'm tired of smelling my air." Kittner underlines the threat by reporting the area as "cancer alley."
QUESTION	**On his Web site, Sam Kittner lists corporate industry as primary clients. Why might he display this page when he seeks to appeal to industry?**

SLIDE #30

The Great Louisiana Toxics March, **2007 web page**

ADDITIONAL INFO

Text:

In 1988 I was hired to document toxic dumping along the Mississippi River. During that trip I photographed The Great Louisiana Toxics March where African-American residents living under the cloud of the "chemical corridor," alternately called "cancer alley," joined forces with environmental groups in a protest from Baton Rouge to New Orleans. It was dynamic and inspiring to see their plea for clean air, land, and water placed in a civil rights context. After witnessing the severity of hazardous wastes and the local protests against it, I realized, as a photographer, the importance of documenting places that illustrate pollution infringing on everyday lives. Over the years I have traveled around the country looking at communities affected by chemical spills and hazardous waste releases.

From the article “Great Louisiana Toxics March Sets the Pace for the Movement” in the October 30, 1988 issue of *Rachel's Environment & Health News*:

> The Great Louisiana Toxics march has been organized to celebrate change, and to protest the destruction of the southern Mississippi region, where the chemical industry has now created the nation's largest cancer alley, an industrial wasteland of enormous chemical factories spewing filth on a massive scale. The march is an important symbol, at once festive and deeply serious, a shared celebration and protest that can be carried on in other states to bring people together in action to stop the poisoning of America.

FURTHER QUESTIONS

What actions for environmental justice are currently taking place in your community?

CONNECTIONS

MCC slides 13, 19, 29, 30, 31, 32 (toxic waste) 14, 19, 23, 26, 29, 30, 31, 44, 50 (environmental justice)

TEACHER GUIDE

SLIDE #31: *Toxic Waste and Race at Twenty,* 2007 report cover

BACKGROUND INFORMATION

In 1987, the United Church of Christ (UCC) commissioned a study on toxic waste and race. This study was seen by many as a groundbreaking study in the field of environmental justice. Twenty years after the first report the UCC commissioned a follow-up study. This is the cover for that follow-up study which was subtitled: "Grassroots Struggles to Dismantle Environmental Racism in the United States."

Lead author of the report, Robert Bullard, considered by some to be "the father of the environmental justice movement," authored the book *Dumping in Dixie*, which laid out the concepts of environmental justice.

→ Project the document

QUESTION

What social institutions are linked together in this message? Explain the links that you see.

POSSIBLE ANSWER

It links together industry, faith communities, social justice movements and universities.

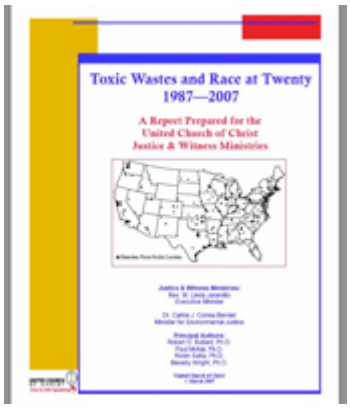
EVIDENCE

Industry creates toxic waste facilities. A faith community sponsors the study. Social justice movements inform the "Justice and Witness Ministries" and "Minister for Environmental Justice." Universities train and hire the researchers listed as Ph. D.

QUESTION

Why might this message matter to me?

SLIDE #31



***Toxic Waste and Race at Twenty,* 2007 report cover**

FURTHER QUESTIONS

Which faith communities are addressing this concern where you live?

ADDITIONAL INFO

The UCC press release for this new study declared:

> The findings show that 20 years later, disproportionately large numbers of people of color still live in hazardous waste host communities, and that people of color are not equally protected by environmental laws. . . . The new report points to the dismal post-Katrina response in New Orleans as one example of unequal treatment of minorities in hazardous waste emergencies. The findings also show that environmental laws don't protect minority communities any more than they did 20 years ago when the report was originally commissioned.
> The report analyzed the percentages of all people of color in host communities by EPA region, including 50 select metropolitan areas. Every region with commercial hazardous waste facilities had a disproportionate number of minorities in host neighborhoods.
>
> In addition to analyzing the total percentage of people of color in host communities, the report analyzes separately the percentages of African Americans, Asians and Pacific Islanders, Hispanics/Latinos/as, and Native Americans. For example in Michigan, which had the largest disparity in the proportion of people of color living in host neighborhoods, the majority of those minorities affected were African American.
>
> The report also gives more than three dozen recommendations for action at the Congressional, state and local levels to help eliminate the disparities. It also makes recommendations for nongovernmental agencies and the commercial hazardous waste industry. (Report)

CONNECTIONS

MCC slides 13, 19, 29, 30, 31, 32 (toxic waste) 14, 19, 23, 26, 29, 30, 31, 44, 50 (environmental justice)

TEACHER GUIDE

SLIDE #32: *The American People,* 1981 Cartoon

BACKGROUND INFORMATION

Rachel Carson was a key figure in the origins of the modern environmental movement. Her 1962 best-selling book, *Silent Spring*, explained the ecological web, which carried the chemical pesticide DDT through the food chain, from sprayed crops to insects and eventually into the eggshells of nesting birds. She urged methods of pest control that "do not destroy us along with the insects." In May 1981, a postage stamp was issued to honor her work on behalf of environmental awareness.

President Ronald Reagan took office in January 1981. Cartoonist Tony Auth drew this editorial cartoon for *The Philadelphia Inquirer*. It was published shortly after the release of the Carson stamp.

→ Project the document

QUESTION

What is the cartoonist's view about the Reagan administration's environmental policies and the U.S. Postal Service release of the Rachel Carson stamp during that administration?

POSSIBLE ANSWER

It is ironic that a stamp honoring Ms. Carson is issued in 1981 during the Reagan administration, which the cartoonist feels was a poor environmental steward.

EVIDENCE

The image of the degraded landscape and the return address suggest Reagan administration complicity in environmental destruction. The stamp honoring Rachel Carson implies a counterpoint since many readers would have known of her contributions to environmental stewardship.

QUESTIONS

Why might *The Philadelphia Inquirer* have chosen to publish this cartoon just six months into the new administration?

SLIDE #32

***The American People,* 1981 cartoon**

ADDITIONAL INFO

In an article titled "Toxic Image," *Time* magazine offered a view of President Reagan's environmental policies in July 1984 at the end of his first term in office:

> On Theodore Roosevelt Island in the Potomac, Reagan signed the 14th annual report of the Council on Environmental Quality, paying tribute to an agency that his Administration had tried to cut from the budget. In a speech before some 20,000 members of the National Campers and Hikers Association, Reagan pledged to "take all necessary steps to protect the American people against the menace of hazardous wastes." All the while, he was dogged by questions about his recent appointment of Anne Burford to the National Advisory Committee on Oceans and Atmosphere; Burford was forced to resign as head of the Environmental Protection Agency last year amid allegations of conflict of interest and mismanagement of its toxic-waste fund. The EPA payroll had been reduced by 4,300 employees because of Reagan's budget cuts, and work has been completed on only 120 of the nation's 7,000 hazardous waste sites since he took office. Said Adrienne Weissman of the Sierra Club: "He must think we've been living in a cave, while he has waged a 3½ -year war on the environment."

FURTHER QUESTIONS

How do you think Rachel Carson would rate the current administration's environmental policies? Why?

CONNECTIONS

MCC slides 13, 19, 29, 30, 31, 32 (toxic waste)
Case Study Lessons 2 & 3
(Rachel Carson & DDT))

TEACHER GUIDE

SLIDE #33: *DDT! DDT!,* 2002 cartoon

BACKGROUND INFORMATION

West Nile Virus is an infection caused by a mosquito-borne virus. It was first found in the U.S. in 1999 when it caused an outbreak of human encephalitis near New York City.

At the time of this editorial cartoon in 2002, there were many media reports about the dangers of West Nile virus transmission. Some environmentalists opposed spraying pesticides to kill mosquitoes, arguing that the risks of pesticide use outweighed the potential benefit of mosquito suppression. Cox and Forkum are the editorial cartoonists who made this cartoon.

→ Project the document

QUESTION	**What are the cartoonists' perspectives about environmentalists' commitment to change and what techniques do they use to convey their message?**
POSSIBLE ANSWER	Environmentalists are hypocrites and weak in their convictions.
EVIDENCE	The cartoonists use caricature and satire to convey this message by portraying the environmentalist as quick to call for DDT when his own health is threatened.
QUESTION	**Where do you see stereotyping in this cartoon? Do you see stereotyping in other media documents regarding environmental issues?**

SLIDE #33

DDT! DDT!,
2002 cartoon

FURTHER QUESTIONS

How are the cartoonists' stated values - reason, individualism, secularism, individual rights and capitalism – reflected in this cartoon?

CONNECTIONS

MCC slides 7, 10, 12, 14, 33, 46 (pesticides) Case Study Lessons 2 & 3 (Rachel Carson & DDT)

ADDITIONAL INFO

In August 2002, Lynn Landes wrote an article for the Common Dreams Web site entitled "Blowing the Whistle on West Nile - Shades of 1950's and DDT." She began:

> I'm reminded of the 1950's...TV newscasts showing clouds of DDT sprayed on a clueless public, compromising their health and contaminating the environment for decades to come, as Rachel Carson writes "Silent Spring." But the time is now, other toxic pesticides have joined the ranks in our wayward war against mosquitoes, and the Rachels of today are drowned out by a media rushing to sound the alarm, rather than report the news. And the news is - pesticides pose a much greater health hazard than the West Nile virus. (Landes)

Cox and Forkum offer this explanation about their political views on their Web site:

> Because an editorial cartoon usually offers only a narrow slice of a cartoonist's political views, some readers naturally make assumptions about our politics, such as that we're conservatives or libertarians, particularly because we often criticize leftists. However, we are neither of those. Most of the cartoons come from my perspective as an Objectivist, which is the philosophy of Ayn Rand. In the introduction to our first book, Robert W. Tracinski described the political perspective of his magazine, The Intellectual Activist (TIA), and in doing so summed up our perspective as well: "TIA's outlook is not 'conservative'; we do not look backward and attempt to preserve traditional values for their own sake. TIA advocates basic principles -- reason, individualism, secularism, individual rights and capitalism -- that are still radical, unorthodox and 'politically incorrect' today. Those principles obviously put us at odds with the subjectivism and socialism of the left; but they also put us at odds with the religious and pragmatist tendencies of the right. (Cox)

TEACHER GUIDE

SLIDE #34: *Organic Food: New and Natural,* 1970 magazine cover

BACKGROUND INFORMATION

The U. S. Department of Agriculture (USDA) offers this definition of organic food: "Organic agriculture is an ecological production management system that promotes and enhances biodiversity, biological cycles and soil biological activity. It is based on minimal use of off-farm inputs and on management practices that restore, maintain and enhance ecological harmony" (USDA).

There was nothing new about organic food when this issue of *Life* magazine went on the stands in December 1970 with a cover story entitled "The Move to Eat Natural: New converts to organic food are sprouting up all over." Farmers for generations had grown crops with deep awareness of "ecological harmony" long before the modern health food movement began.

→ Project the document

QUESTION

Who made and paid for this message? What was the purpose?

POSSIBLE ANSWER

A photographer and cover designer were paid by the editors of *Life* to design this cover in such a way that potential readers would be encouraged to buy the magazine which exists to sell the products advertised within.

QUESTION

What techniques do the designers use to tell about organic food?

POSSIBLE ANSWER

A young model was hired and dressed in simple clothing with a rough cloth sack to communicate the message that organic food is trendy and in keeping with the "young and natural" image of the sixties.

SLIDE #34

Organic Food: New and Natural, **1970 magazine cover**

ADDITIONAL INFO

Cathy Greene wrote for the USDA on food labeling:

> Organically grown food has been produced and marketed for over half a century in the United States. The most influential early advocate of organic farming systems in the United States was J.I. Rodale, who began popularizing these systems in the 1940's with the publication of Organic Farming and Gardening magazine.
>
> A few farmers began experimenting with these systems, marketing directly to consumers, and, by the late 1950's, organic foods were being featured in small health food stores. By the late 1960's, "a new generation of environmentally conscious consumers—Baby Boomers—were coming of age and demanding foods produced without chemicals". Large natural foods supermarkets began developing in the 1980's, and industry analysts estimate that retail sales of organic food totaled about $4 billion annually in the mid-1990's, approximately 1 percent of consumer expenditures for food consumed at home. The amount of certified organic cropland in the United States more than doubled between 1992 and 1997. (Greene)

FURTHER QUESTIONS

In what ways do current media, individuals and corporations market "green" as hip?

CONNECTIONS

MCC slides 6, 10, 12, 14, 17, 34, 35, 47 (chemicals in food)

TEACHER GUIDE

SLIDE #35: *The Truth About Organic Foods,* 2007 web page

BACKGROUND INFORMATION

This Web page is from CFACT which describes its intent as follows: "The Committee For A Constructive Tomorrow" was created "to offer a positive new voice on consumer and environmental issues. CFACT is a public policy organization focusing on issues of environment and development. CFACT's mission is to enhance the fruitfulness of the earth and all of its inhabitants." CFACT advisor Alex Avery, whose book is profiled in this article, is the son of Dennis Avery, the author of *Saving the Planet with Pesticides and Plastics*. (Text below.)

→ Project the document

QUESTION	**Who made and paid for this message? What was the purpose?**
POSSIBLE ANSWER	CFACT hired a Webpage designer to construct this page in order to publicize and sell the books, videos and other products, which carry their message.
QUESTION	**How does CFACT's message about organic food differ from the *Life* magazine message you just saw? Give evidence to support your conclusion.**
POSSIBLE ANSWER	CFACT seeks to discredit the supposed benefits of the organic foods that *Life* endorses.
EVIDENCE	Text: "virtually all of these claims (about organic food) are largely hype."

SLIDE #35

***The Truth About Organic Foods,* 2007 web page**

ADDITIONAL INFO

Slide text:

> If you think that organic food is safer, healthier, more nutritious, and is more eco-friendly, you might be surprised to learn that virtually all of these claims are largely hype. As for taste and quality, those depend on far more than using manure fertilizer or natural pesticides. That's the gist of *The Truth About Organic Foods,* a provocative new book by CFACT Advisor Alex Avery, who serves as Director of Research and Education for the Hudson Institute's Center for Global Food Issues.

Continued article text:

> Already, we have the capability to greatly increase crop yields through agricultural chemicals, to harness the power of the atom for electricity, and to eliminate many life-threatening diseases through biotechnology. One can only wonder at the possibilities that lay ahead. The Committee boldly proclaims that the tremendously powerful forces of competition, progress, political and economic freedom, and genuine environmental stewardship can and do offer the best hope for protecting not only the earth and its wildlife, but just as importantly, its people. CFACT is therefore working to promote market-oriented and safe technological solutions to such growing concerns as energy production, waste-management, food production and processing, air and water quality, wildlife protection and much more.

FURTHER QUESTIONS

What do the other stories and links on this page tell you about the website owners' perspective on environmentalism?

CONNECTIONS

MCC slides 6, 10, 12, 14, 17, 34, 35, 47 (chemicals in food)

TEACHER GUIDE

SLIDE #36: *The Next Green Revolution,* 1999 magazine cover

BACKGROUND INFORMATION

In the late 1990s, many of the major chemical companies including DuPont, Monstanto and Dow Carbide began to invest in genetically engineered seed production. This *Business Week* cover story from April 12, 1999 describes the promise in this way: "The gene-splicing technology that has transformed health care is now being applied to plants, and the possibilities are endless. With conventional breeding, it takes seven to eight years to produce a new plant, which may be only marginally better than its predecessor. Genetic engineering allows researchers to insert virtually any gene into a plant and create a new crop--indeed, a whole new species--in nearly half the time. And virtually anything is possible."

→ Project the document

QUESTION	**Who is the target audience for this message? What makes you think so?**
POSSIBLE ANSWER	Businesspeople and potential readers with an interest in farming and science.
EVIDENCE	The title of the magazine and the other stories suggest a business audience. The image of the beaker and combine and the cover story are meant to invite farming and science buffs.
QUESTION	**What is the message in this magazine cover about genetically engineered seed technology?**
POSSIBLE ANSWER	The new technology of genetically engineered seeds will transform production of essential goods in a positive new revolution.
EVIDENCE	The words "revolution" and "will change" suggest transformation. The image of blue skies and orderly fields suggest good outcomes and the beaker and combine suggest high tech applications.

SLIDE #36

***The Next Green Revolution,* 1999 magazine cover**

ADDITIONAL INFO

Excerpt from the cover story entitled, "Fields of Genes - Reengineered crops will change the way the world feeds, clothes, and heals itself":

> Plants could be engineered to emit their own pesticides, to grow in dry or salty soil, and to produce food nutritionally superior to what's available today. Crops are being designed to produce new kinds of plastics as well as vaccines and foods that can ward off disease. Most scientists believe consumers' fears (of human health risks) have little basis in fact.…There is greater concern, however, about the possible effect of transgenic crops on the environment. In the constant struggle between humans and nature, insect-resistant plants could lead to the appearance of even tougher insect pests. Genes to resist insects or pesticides might also find their way into wild species, leading to the creation of superweeds. It doesn't help that the giant agrochemical firms, already living down a pollution-laden legacy, have become symbols for all that is wrong with Big Science and Big Business…In the U.S. there are mounting concerns about the concentration of power within agriculture.

FURTHER QUESTIONS

Can you think of an example of other new technologies that have offered great promises coupled with environmental concerns?

CONNECTIONS

MCC slides 25, 26, 36, 37, 38, 45 (GMOs)

TEACHER GUIDE

SLIDE #37: *Seeds of Deception,* 2003 book cover

BACKGROUND INFORMATION

In the first years of the new century genetically engineered organisms (GMOs) made headlines in the world press. The U.S. government and large corporations producing GMOs wanted to export genetically engineered materials. The European Union resisted importing such products for fear of unknown health and environmental consequences.

The author, Jeffrey Smith, directs the Campaign for Healthier Eating in America from the Institute for Responsible Technology, where he is executive director. According to its website The Institute for Responsible Technology was founded in 2003 "to promote the responsible use of technology and stop GM foods and crops through both grassroots and national strategies." (IRT)

→ Project the document

QUESTION

What is the message about genetically engineered seed technology?

POSSIBLE ANSWER

Genetically engineered crops are not safe and government and industry have misled the public.

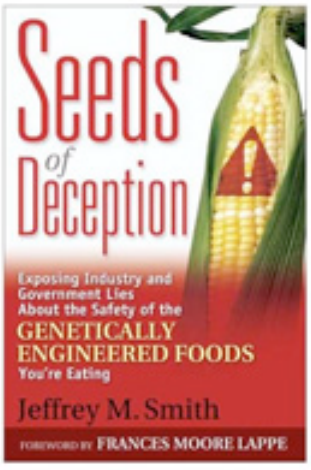
EVIDENCE

The image of the corn with an exclamation mark in red and "lies about the safety" suggest they are not safe. "Seeds of Deception" and "Exposing industry and government lies" suggest misleading.

QUESTION

How might the mission statement of the author's workplace shape his reporting?

SLIDE #37



***Seeds of Deception,* 2003 book cover**

ADDITIONAL INFO

From the book's Web site:

> The explosive exposé Seeds of Deception reveals how industry manipulation and political collusion-not sound science-allow dangerous genetically engineered food into your daily diet. Company research is rigged, alarming evidence of health dangers is covered up, and intense political pressure applied….Scientists were offered bribes or threatened. Evidence was stolen. Data was omitted or distorted. Government employees who complained were harassed, stripped of responsibilities, or fired. Laboratory rats fed a GM crop developed stomach lesions and seven of the 40 died within two weeks. The crop was approved without further tests.
>
> When a top scientist tried to alert the public about his alarming discoveries, he lost his job and was silenced with threats of a lawsuit. Read the actual internal memos by FDA scientists, warning of toxins, allergies, and new diseases-all ignored by their superiors, including a former attorney for Monsanto. Discover how industry studies are designed to avoid finding problems. Learn why the FDA withheld information from Congress after a genetically modified supplement killed nearly a hundred people and disabled thousands. Eating such experimental food is gambling with your health. Find out how you can protect yourself and your family." (About the book)

FURTHER QUESTIONS

How might you research the credibility of the very different assertions about GMOs contained in this and the previous document?

CONNECTIONS

MCC slides 25, 26, 36, 37, 38, 45 (GMOs)

TEACHER GUIDE

SLIDE #38: *Kellogg's Tiger Targeted,* 2000 web page

BACKGROUND INFORMATION

Some environmental activists choose to write books like Jeffrey Smith who wrote *Seeds of Deception*. Some organize protests like the Great Louisiana Toxics march. Other activists believe that these forms of protest are incapable of creating the social change they desire and choose instead to engage in direct action.

Greenpeace, the group that created this webpage, describes their beginnings as a direct action organization: "It was a group of thoughtful, committed citizens that came together in 1971 to create Greenpeace. A handful of determined activists leased a small fishing vessel, called the Phyllis Cormack, and set sail from Vancouver for Amchitka Island in Alaska. Their mission was to protest U.S. nuclear testing off the coast of Alaska with a brave act of defiance: to place themselves in harm's way. Despite being intercepted by the U.S. Coast Guard, these daring activists sailed into history by bringing worldwide attention to the dangers of nuclear testing." (See text below)

→ Project the document

QUESTION

Who sponsored this message and what was their purpose?

POSSIBLE ANSWER

Greenpeace sponsored this to publicize and to encourage action-opposing GMOs.

QUESTION

What techniques do the webpage designers use to communicate their views about genetic engineering and Kellogg's?

POSSIBLE ANSWER

The headline "Kellogg's Tiger Targeted" and the "FrankenTony" cereal box image ties Kellogg's to GMOs. The headline "Targeted in Action," the Act! button and the image of the Greenpeace banner on Kellogg's headquarters communicate action.

SLIDE #38

***Kellogg's Tiger Targeted* 2000 web page**

ADDITIONAL INFO

Text:

Battle Creek, Michigan, March 23, 2000 - Today Greenpeace activists went after Kellogg's Tony the Tiger for helping market genetically engineered "FrankenFoods" to U.S. children. Greenpeace activists climbed the towering facade of Kellogg's Cereal City to unfurl a huge banner reading, "Kellogg's: Stop Feeding FrankenFood to America's Kids." An additional message was hung by Tony the Tiger's mouth, which has him saying, "They're Gr-ross!" Greenpeace climbers draped the banners at the children's exhibit hall located adjacent to Kellogg's headquarters.

"A breakfast of Kellogg's cereals is a breakfast of untested GMOs," said Greenpeace genetic engineering specialist, Charles Margulis. Margulis led FrankenTony into the corporate headquarters where they left for Kellogg CEO, Carlos Guittierez, a copy of the FDA petition and two boxes of his company's cereals from Europe with labels reading, "GMO-free in Europe, why not here?" "Kids shouldn't be duped by Tony the Tiger into starting each day with a science experiment in every bowl. Kellogg's must stop feeding FrankenFood to America's kids. (Kellogg's Tiger Targeted)

FURTHER QUESTIONS

What direct action campaigns have captured your interest?

CONNECTIONS

MCC slides 25, 26, 36, 37, 38, 45 (GMOs)

TEACHER GUIDE

SLIDE #39: *Enduring Seeds,* 2002 book cover

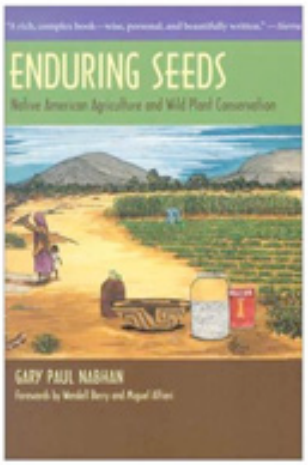
BACKGROUND INFORMATION

The chemical and agricultural practices that supported the Anasazi and the Mimbres peoples more than 1000 years ago are still alive in 21st century Native American farming techniques. While the scientists of Monsanto experiment in the laboratory to create seeds which will emit their own pesticides Native American horticulturalists continue to seek out hardy strains of wild plant seed in order to conserve the genetic diversity found within native seed stock. Gary Paul Nabhan, author of *Enduring Seeds*, is co-founder of Native Seed/SEARCH.

→ Project the document

QUESTION	**What is the message about seed engineering in this book cover?**
POSSIBLE ANSWER	Native American farmers grow crops by saving and cultivating seeds of wild plants.
EVIDENCE	The title connects wild plant conservation with Native American agriculture. The image of farmers, children, seeds and the natural landscape convey conservation within a nature setting.
QUESTION	**What values concerning seed conservation and native peoples are implied in this image?**

SLIDE #39



Enduring Seeds, **2002 book cover**

ADDITIONAL INFO

Excerpts from *Enduring Seeds*:

> In the oldest, most stable of the Native American farming villages, plant species that are otherwise rare or at the limits of their ranges have gradually accumulated. Mixed crop fields or fallow ones, hedges, ditches, dooryard gardens, and pastures as well as ungrazed scrublands--all offer habitats to an astonishing variety of plants and animals. As Jan Alcorn has shown among the Huastec Maya, the spatial heterogeneity of habitats created by native land management fosters both intraspecific and interspecific diversity….[E]cologist [David] Ehrenfeld argues that . . .'the presence of people may enhance the species richness of the area, rather than exert the negative effect that is more familiar to us.'
>
> Some native farmers don't necessarily plant the same kind of corn every season, but vary their selection depending upon the weather. By having caches of other seed stocks for particular weather conditions, farmers can hedge their bets.
>
> The only real policy that our Department of Agriculture has for the native crop legacy of our country is a policy of neglect. Fortunately, tribal governments no longer believe fatalistically that this must be their policy as well. Among the Iroquois, the Sioux, the Mississippi band of the Anishabey, San Juan Pueblo, the Winnebago, the Tohono O'odham, the Navajo, and other tribes, there have emerged community or tribal projects to conserve and revive native crops as cottage industries for their rural-based tribal members. (Nabhan)

FURTHER QUESTIONS

What crops are indigenous to your bioregion? How can you find out if you don't know?

CONNECTIONS

MCC slides 3, 39, 40, 41, 50 (Native American agriculture) & MCRD slides 3, 40

TEACHER GUIDE

SLIDE #40: *Celebration of the Three Sisters,* 2001 painting

BACKGROUND INFORMATION

Most living organisms, from grass to humans, need nitrogen to survive. Although the atmosphere is composed mainly of nitrogen gas (N2), in this form nitrogen is unusable to most plants. Beans and other legumes are capable of biological nitrogen fixing, a process whereby inert atmospheric nitrogen (N2) is changed into useful ammonia (N3) by the bacteria contained in the root nodules of legumes. When nitrogen is transformed into ammonia it can be used by plants to manufacture nitrogen-containing life supports such as amino acids, proteins and nucleic acids.

Native American horticulturalists, mostly women, discovered that the fertilization process of companion planting in which beans, squash and corn are planted together helped all these plants, the three sisters, to thrive. This acrylic painting was made by contemporary Oneida artist Dave Hill.

→ Project the document

QUESTION

What values concerning seed conservation and native peoples are implied in this image? Give evidence to support your answer.

POSSIBLE ANSWER

To honor and follow the leadership of native women and unknown ancestors.

EVIDENCE

Honoring of native women is implied in the title, which refers both to the corn, beans and squash and to the women horticulturalists. Following the leadership of women elders is implied in the title word "celebration" and in the image of three generations of women working together. Unknown ancestors is implied in the artist's choice to eliminate details of face or location suggesting that this is an archetypal scene.

QUESTION

What complex chemical relationships are portrayed?

SLIDE #40

Celebration of the Three Sisters, **2001 painting**

ADDITIONAL INFO

Squash and beans were among the early plants that were cultivated by Native horticulturalists. Native American geneticists later were able to domesticate the wild grass teosinte, creating the first maize or corn plants. In addition to the nitrogen fixing capacity of the beans the process of companion planting provided the added benefit of suppressing weed growth and minimizing erosion.

Most Native farmers did not fertilize the soil with added elements but would rotate their fields to maintain fertility. They would also burn their fields to clear the dead plants, leaving nitrogen rich ashes in the soil.

This painting was featured in a 2002 exhibit at Ithaca College's Handwerker Gallery entitled "Sidekicks, Savages, and Other Anthropological Curiosities: A Native American Study of Indian Stereotyping".

FURTHER QUESTIONS

What traditions, passed on by elder generations, have been important in your life?

CONNECTIONS

MCC slides 3, 39, 40, 41, 50 (Native American agriculture) 7, 11, 16, 19, 25, 26, 40, 41 (fertilizer) & MCRD slides 3, 40

TEACHER GUIDE

SLIDE #41 *The Original Companion Planting,* 2007 web page

BACKGROUND INFORMATION

Not all companies which market seeds and crop improvement techniques in the 21st century are giant multinationals. Park Seed Company was founded in 1868 by George Watt Park. In 2007, his granddaughter, Karen Park Jennings, was co-owner and board chair for the company.

Park Seed's public relations Web page declares its product focus: "High quality seeds, plants, and bulbs for reasonable cost-great value for the money." Its media holdings include *Park's Floral* magazine, which eventually had a circulation of over a million, and the Park Seed catalog, which grew to over 5 million in circulation. (See text below)

→ Project the document

QUESTION	**What is Park Seed's message about growing a healthy corn crop?**
POSSIBLE ANSWER	Planting beans, squash and corn together help corn yields in a natural way.
EVIDENCE	The text "boost yields naturally" through "the original companion planting – the three sisters." The image of the three sisters – corns, beans and squash reinforce the message.
QUESTION	**Who might benefit from this message and who might be harmed?**

SLIDE #41

The Original Companion Planting, **2007 web page**

FURTHER QUESTIONS

How credible is the information? How do you know?

CONNECTIONS

MCC slides 3, 39, 40, 41, 50 (Native American agriculture) 7, 11, 16, 19, 25, 26, 40, 41 (fertilizer)

ADDITIONAL INFO

Text:

> The ancient Native American technique of growing Corn, Beans, and Squash together in an arrangement called the Three Sisters is the ultimate in companion planting and helps increase harvests, naturally! Corn acts as a support for climbing bean vines, the beans fix nitrogen in the soil for the high feeding requirements of corn and squash, and the squash provides mulch and root protection for the corn and beans!
>
> After cooperating beautifully in the garden, corn and beans form a complete protein when eaten together! How's that for a mutually beneficial relationship? The Three Sisters are all easy to direct sow in the garden and are a great project for children, teaching them about the beauty of natural harmony while providing a fast-growing reward for their efforts. Make the best possible use of your garden space this season, and try growing the Three Sisters! Just follow the easy steps listed below, fertilize well, plant other companions like herbs to assist with pest control, and you'll be harvesting your best crop in no time!

Park Seed's Public Relations page includes this information about company co-owner and board chair Karen Park Jennings:

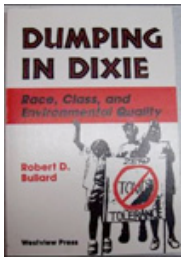
> Much as Karen relishes her work in the boardroom and in the merchandising arena, she is happiest when in the garden. In fact, she uses the extensive gardens surrounding her own 1850s-era home as an extension of the corporate trial garden, testing new introductions being considered for Wayside Gardens and Park Seed. Karen has a lively sense of humor, and broad, hands-on knowledge of gardening. She is a delightful interview subject for any medium. (Park Seed Public Relations)

Paired Image Comparisons

Slide # 43 - *The New Monsanto*, 1996 web page, & *Monsantoland*, 2006 web page

Compare messages concerning Monsanto's role in environmental protection.

Slide # 44 – *Dumping in Dixie,* 1990 book cover, & *Essential*, 2005 web page

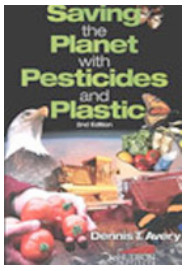


Compare messages regarding the impact of chemicals on the quality of life.

Slide # 45– *The Next Green Revolution*, 1999 magazine cover, & *Bad Seed*, 2001 magazine cover

Compare messages about genetically engineered crops.

Slide # 46 - *Warning*, 1996 poster, & *Saving the Planet*, 2000 book cover



Compare messages concerning pesticides and human and environmental health.

Slide # 47 – *Chemical Cuisine,* 2007 web page, & *Science in the Kitchen*, 1893 book cover

Compare messages about chemicals in food.

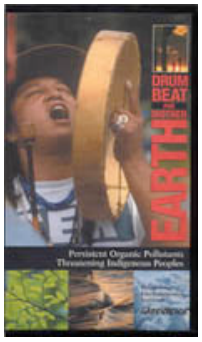
Slide # 48 – *Horsford's Acid Phosphate*, 1891 pamphlet, & *Flying Red Bull,* 2006 magazine advertisement

Compare techniques used to sell energy drinks in different centuries.

Slide # 49 – *Science Helps Build a New India*, 1966 magazine advertisement, & *Human Element*, 2006 magazine advertisement

Compare Dow Carbide advertising techniques in 1962 and 2006.

Slide # 50 –*Drumbeat for Mother Earth*, 1999 video jacket, & *Celebration of the Tree Sisters*, 2001 painting



Compare the impact of techniques to enhance crop growth on native people.

Lesson #2: Case Study— Rachel Carson (Video Clips)

LESSON PLAN

Case Study: Rachel Carson

Video Clips

Lesson Objectives:

- Students will review issues related to pesticide use
- Students will understand different perceptions of Rachel Carson as an historically significant figure
- Students will recognize the power of words, images and sound to bias impressions
- Students will analyze credibility, bias and truth in various forms of documentary film

Vocabulary:

Rachel Carson, Silent Spring, DDT, pesticide, balance of nature, malaria

Media

The Silent Spring of Rachel Carson, *CBS Reports,* 1963 (:52)

Rachel Carson's Silent Spring, American Experience, 1993 (2:10)

DDT and Rachel Carson, Simpleton's Guide, 2007 (2:11)

Rachel Carson, Nature's Guardian Bill Moyers Journal, 2007 (1:55)

Materials Needed:

- Teacher Guide: Case Study—Rachel Carson
- Lesson #2 Case Study Student Worksheet
- Four Video Clips (access online or via Lesson 2 digital media folder)

Time

50 Minutes

Lesson Procedures:

1. Present *Lesson Introduction* to the class
2. Distribute *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 and Answers* Teacher Guide
5. Discuss bias and credibility in documentary films using *Further Questions*

TEACHER GUIDE

Case Study: Rachel Carson

Video Clips

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

Lesson Introduction

Rachel Carson became a central figure in the modern environmental movement upon the publication of her 1962 book, *Silent Spring*. This lesson explores the meaning of her contributions as viewed in four clips from different time periods ranging from a 1963 CBS news special to 2007 videos from PBS and YouTube. The lesson also explores different film making formats including professionally produced documentaries, a film of a stage performance and a self-produced Internet video.

The film excerpts you are about to see are part of longer productions by different filmmakers. They are not meant to show the full story as told in the much longer works from which they are taken. As you view these films you will be asked to contrast points of view regarding Carson's historical legacy and filmmaking techniques that convey those viewpoints. You will see the films in chronological order according to their dates of release.

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 Silent Spring of Rachel Carson
***CBS Reports,* 1963**

Film 1 Introduction

This excerpt is from a CBS news documentary entitled "The Silent Spring of Rachel Carson." which aired in April, 1963 shortly after publication of Silent Spring. The chemical industry mounted an immediate and forceful attack on Carson's work. A letter writing campaign was initiated to urge CBS not to air the program and several sponsors withdrew support prior to the broadcast. The man in the clip is Robert White Stevens, a representative of the American Cyanamid chemical company. The woman is Rachel Carson.

Media Sample Questions & Answers

1.) What is Rachel Carson's position on the use of DDT? Give evidence to support your answer.	**Possible Answer:** DDT must be seen in the context of the balance of nature, which people cannot interrupt. **Evidence**: "Apparently the balance of nature was repealed when man came on the scene. One might just as soon repeal the law of gravity."
2.) Who oppose Rachel Carson's views and what is their message? Give evidence.	**Possible Answer:** Robert White Stevens speaking on behalf of American Cyanamid chemical company argues that man controls nature not the other way around. **Evidence**: The excerpt information explains who Stevens is. He says: "Miss Carson suggests that the balance of nature is a major force in the survival of man. The modern chemist believes that man is steadily controlling nature."
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:** Stevens is clothed in a lab coat sitting in a laboratory to convey the scientific and corporate authority that supports his position. Images of a waterfall, trees and swirling leaf illustrate Carson's point of view on the primacy of the balance of nature.
4.) How might one further research the credibility of the conflicting perspectives that are referenced in this clip?	**Possible Answer:** One could read articles by Stevens or other industry spokespeople to better understand the chemical industry perspective. One could read Silent Spring or articles by Carson's supporters to better understand her perspective. One could read contemporary analysis about the controversy surrounding the publication of Silent Spring.

Rachel Carson's Silent Spring
American Experience, 1993

Film 2 Introduction

This excerpt is from "Rachel Carson's Silent Spring," a documentary produced for the PBS series American Experience in 1993. Actress Meryl Streep narrates the voice of Rachel Carson in this video.

Media Sample Questions & Answers

1.) What is Rachel Carson's position on the use of DDT? Give evidence to support your answer.

Possible Answer: The use of pesticides like DDT would result in a spring silent of birdsong, a prospect that moved her to action to write Silent Spring.
Evidence: Carson's testimony as she recalls her friend Olga Hawkins' request.

2.) Who oppose Rachel Carson's views and what is their message?

Possible Answer: Government and chemical industry endorse DDT as an effective means of insect control.
Evidence: "You had government endorsing a product and the chemical industry pushing it aggressively." "There was a development program saying a little bit is good and a lot more much better."

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: They use ominous background music with images of DDT spraying and dying birds to encourage an uneasy feeling about the pesticide use. They use an actress' voice as Carson with images of a typewriter writing a letter to underscore Carson's personal commitment.

4.) How might one further research the credibility of the conflicting perspectives that are referenced in this clip?

Possible Answer: One could research government and industry statements about DDT use in the postwar years and read Carson's accounts of her decision to write *Silent Spring*.

DDT and Rachel Carson
***Simpleton's Guide,* YouTube, 2007**

Film 3 Introduction

This excerpt is from "DDT & Rachel Carson," a 2007 addition to the Simpleton's Guide series of videos produced for YouTube and linked to the group Bureaucrash. On its website Bureaucrash describes itself as a "Freedom Activist Network": "We believe that if governments are to exist they should be small and just have the power to protect us from force and fraud. Because we believe that any other arrangement breeds corruption and gives other people (bureaucrats) power over us. Any other arrangement makes us all slaves to the bureaucrats."

Media Sample Questions & Answers

1.) What is Rachel Carson's position on the use of DDT? Give evidence to support your answer.	**Possible Answer:** She believed, correctly, that DDT was overused and, incorrectly, that DDT use could threaten human health. **Evidence**: "Carson did have a legitimate point about the overuse of pesticides." "Little or no proof of any human health threat."
2.) Who oppose Rachel Carson's views and what is their message? Give evidence.	**Possible Answer:** Those who believe that DDT is a useful tool in suppressing malaria. **Evidence:** "DDT was and is one of the safest, most affordable and most successful tools for fighting malaria."
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 script includes strong language such as "devastating impact" and "still kills over one million people a year" to underscore the filmmaker's point of view. Images of fear-filled faces and a red cross signal danger when discussing malaria, and images of a U.S. flag and a lifesaver suggest security when discussing the power of DDT.
4.) How might one further research the credibility of the conflicting perspectives that are referenced in this clip?	**Possible Answer:** One could research scientific studies on the effects of DDT on human health, malaria suppression and on the incidence and lethality of malaria.

Rachel Carson, Nature's Guardian
***Bill Moyers Journal,* 2007**

Film 4 Introduction

This final excerpt is from "Rachel Carson, Nature's Guardian," a program produced for *Bill Moyers Journal* and aired on PBS in 2007. The section of the program that you will see features writer and actress Kaiulani Lee performing a section of her one woman show, "A Sense of Wonder." In this play she portrays Rachel Carson in 1963 just as *Silent Spring* began to get significant public attention.

Media Sample Questions & Answers

1.) What is Rachel Carson's position on the use of DDT? Give evidence to support your answer.	**Possible Answer:** DDT was an untested poison and its risks were unknown to the public that was regularly exposed to it. **Evidence:** "people had no understanding of the risks." "They're nonselective poisons." "They had never been tested for large-scale agricultural use"; "their use had become commonplace."
2.) Who opposes Rachel Carson's views and what is their message? Give evidence.	**Possible Answer:** Those who manufacture and market DDT want to promote its use. **Evidence**: Lots of examples of DDT marketing as useful and present in agriculture, in kitchens and gardens, in food. "We had all been made so well aware of the benefits of these pest controls." "They'd made our farming efficient and profitable."
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:** Carson is humanized when presented by an actress who appears in a familiar setting as a middle-aged woman with whom many viewers could relate.
4.) How might one further research the credibility of the conflicting perspectives that are referenced in this clip?	**Possible Answer:** One could research the writer's script to verify that Carson actually said and believed what she says in the performance. One could research the uses for DDT in the time period to see if in fact it was used for so many varied purposes.

FURTHER QUESTIONS

- **Why do you suppose the answers to these simple questions were so different?**
- **Whose perspective is being offered in each case?**
- **What essential information was left out in each source?**
- **What do scientists or chemists look like? What visual images impress us with the authority of science?**
- **Is there such a thing as "fair and balanced reporting" in what you've seen?**
- **What kind of actions might you take in response to these film clips?**

CONNECTIONS

See lesson 1 PowerPoint slides #10, 14, 32, 33 (History of Chemicals in the Environment & Case study lesson 3 (Rachel Carson—Print Documents)

Lesson #2 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 Rachel Carson's position on the use of DDT? Give evidence to support your answer.

2. Who oppose Rachel Carson's views and what is their message? 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. How might one further research the credibility of the conflicting perspectives that are referenced in this clip?

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Lesson #3: Case Study: Rachel Carson (Print Documents)

LESSON PLAN

Case Study: Rachel Carson

Printed Document

Lesson Objectives:

- Students will analyze articles on Rachel Carson and DDT from magazine, newspaper, websites and scholarly journals
- Students will study and present different 21st century views on Rachel Carson's role in shaping the public perception of DDT
- Students will evaluate and discuss how economic interest and political perspective have shaped arguments about chemicals in the environment
- Students will evaluate and discuss the media representation of Rachel Carson's legacy

Vocabulary:

Rachel Carson, Silent Spring, DDT, pesticide, carcinogen, malaria, malariologist, chemophobia, Industry Cooperative Program, thalidomide, Environmental Protection Agency, pyrethroid, petrochemical industry, androcentrism, ecofeminism, Agri-chemical

Media

Handouts with excerpts from four opinion/analysis articles from *The New York Times*, *FAIR* (Fairness and Accuracy in Reporting), *American Thinker* and *Feminist Studies*.

Materials Needed:

- Teacher guide: Case Study—Rachel Carson
- Two-page Student reading #1: "Fateful Voice of a Generation Still Drowns Out Real Science"
- Two-page Student reading #2: "Rachel Carson, Mass Murderer? The creation of an anti-environmental myth"
- Two-page Student reading #3: "Rachel Carson and the Deaths of Millions"
- Two-page Student reading #4: "Silence, Miss Carson!"
- One-page Lesson # 3 Case Study Student Worksheet

Time

50 Minutes

Lesson Procedures:

1. Present *Background Information* to the class
2. Divide the class into four groups and distribute the *Student Readings*, one article per group
3. Use the *Teacher Answer Sheet* Teacher Guide to help facilitate the four presentations
4. Help students to articulate and evaluate their own thinking about how economic interest and political perspective have shaped arguments about chemicals in the environment and how the media has represented Rachel Carson's legacy

TEACHER GUIDE

Case Study: Rachel Carson

Printed Document

1. Organize and make copies for the class activities.
2. Provide background information.

Background Information

Rachel Carson wrote *Silent Spring* in 1962. At the time the book was published it brought forth a great storm of media response. Articles, advertisements, books and television programs flooded the marketplace. Among her supporters were many who later would be called environmentalists who recognized Carson as a spokesperson for their views on nature and humans living in balance. Among her critics were many in the chemical industry who believed that new chemical discoveries like DDT were good for the country and good for their profits. Within the scientific community there were some who embraced Carson's views on humanity's place in the natural world and others who disputed these views and the science behind them. More than 40 years after the initial publication of her book and her death Rachel Carson was again in the news when a new era of media controversy erupted regarding DDT's role in suppressing malaria and Carson's role in initiating the public perception of DDT.

3. Introduce lesson.

Lesson Information

This lesson explores the contemporary legacy of Rachel Carson as seen from a variety of perspectives. You will read excerpts from four different articles on the subject from these sources*: The New York Times*, *Fairness and Accuracy in Reporting* (FAIR*), American Thinker* and *Feminist Studies*.

For this lesson, you will break into four groups, each with a different article to read. As your group reads the handout, look for the answers to four basic questions about Rachel Carson, DDT and malaria: 1) What claims do Carson's critics make regarding the substance of her arguments? 2) What does the article say Carson deserves credit for? 3) What is the author's opinion concerning Carson's reputation? 4) What does the article say about the causes for the increase in malaria incidence in Africa?

Also, note any passages in the article that illustrate those points. You will then present your document to the entire class with each student sharing a different answer. After all four groups have presented, we will discuss your reactions to the various perspectives presented.

4. Distribute among the four groups one student reading and one student worksheet.
5. Give students time to complete the assignment. Review the possible answers using the Teacher Answer Sheet.
6. Bring the class back together for the presentations.
7. Ask each group to report their author's analysis and conclusions, question by question – using excerpts from the text to illustrate their points.

Teacher Answer Sheet

Questions, Possible Answers & Evidence

1.) What claims do Carson's critics make regarding the substance of her arguments? Give evidence to support your answer.

Possible Answers	Evidence
Doc. 1: *The New York Times* (NYT) – Critics claim that she exaggerates, lies and disregards alternative views.	**Doc. 1**: *The New York Times* (NYT) – hodgepodge of science and junk science; used dubious statistics and anecdote; she wildly imagined a mass "biocide"; She cited scary figures; refused to acknowledge what (DDT) had accomplished.
Doc. 2: *Fairness and Accuracy in Reporting* (FAIR) – Critics claim that by using non-scientific arguments she has caused the banning of DDT, which in turn has caused malaria to spread and many African children to die.	**Doc. 2**: *Fairness and Accuracy in Reporting* (FAIR) – Who's Ignoring Science Now; To the critics, the solution seems simple: Forget Carson's emotional arguments about dead birds and start spraying DDT again so we can save human lives; *Silent Spring* is now killing African children because of its persistence in the public mind.
Doc. 3: *American Thinker* – Critics claim she was weak on scientific understanding, that she left out or misrepresented some important points, was wrong about others and that she greatly exaggerated the dangers of DDT.	**Doc. 3**: *American Thinker* – Carson's book was rife with omissions, misrepresentations, and errors. The fact that DDT had eliminated malaria in the northern hemisphere went unnoted. The threat of cancer…was overemphasized—to put it mildly—on no scientific basis. But far worse was the tone of hysteria permeating the entire work. Serious scientific analysis of Carson's claims overthrew virtually all of them. DDT did not cause cancer. It had no health effects whatsoever on humans, mammals, or any other higher animals.
Doc 4: *Feminist Studies* – Critics attacked her scientific understanding as well as her credentials and her writing style.	**Doc 4**: *Feminist Studies* –Her use of metaphors about a balance of nature—precisely the language that so incensed many of her critics. She was attacked by critics of *Silent Spring* for both her science and her training.

Teacher Answer Sheet

Questions, Possible Answers & Evidence

2.) What does the article say Carson deserves credit for?

Possible Answers	Evidence
Doc. 1: *The New York Times* (NYT) – She was a good writer with an admirable desire to protect wildlife.	**Doc. 1**: *The New York Times (*NYT) –She rightly noted threats to some birds, like eagles and other raptors; praised Ms. Carson's literary skills and her desire to protect nature.
Doc. 2: *Fairness and Accuracy in Reporting* (FAIR) - She raised awareness of ecosystem interactivity and raised important questions regarding risk benefit analysis.	**Doc. 2**: *Fairness and Accuracy in Reporting* (FAIR) – discussed how pesticides and pollutants moved up the food chain, threatening the ecosystems for many animals, especially birds; (raised the) question that has now urgently presented itself…whether it is either wise or responsible to attack the problem by methods that are rapidly making it worse.
Doc. 3: *American Thinker* – She meant no harm.	**Doc. 3**: *American Thinker* – No malice was involved in this case, no hatred, no hostility.
Doc 4: *Feminist Studies* – She used sound scientific argument to oppose the indiscriminate use of chemicals and challenged the view that humans could control nature. She was an honored scholar, researcher and author.	**Doc 4**: *Feminist Studies* – She had marshaled a scientifically sound indictment of the indiscriminate use of chemicals in the United States and the world (with) her account of how illusory humanity's control of nature really was, a most dangerous kind of self-deception. Her degree, her well-respected research for a government agency, and two best selling books on ocean biology in the 1950s.

Teacher Answer Sheet

Questions, Possible Answers & Evidence

3.) What is the author's opinion concerning Carson's reputation?

Possible Answers	Evidence
Doc. 1: *The New York Times* (NYT) – He is cynical toward Carson's reputation, which he considers to be based on her exaggerated rhetoric and appeals to fear that have resulted in wasted lives and money.	**Doc. 1**: *The New York Times* (NYT) – celebrating the centennial of her birthday with paeans to her saintliness; chemophobia inspired by Ms. Carson's book; scientists like him were no match for Ms. Carson's rhetoric; obsession with eliminating minute risks from synthetic chemicals has wasted vast sums of money; human costs have been horrific in the poor countries where malaria returned after DDT spraying was abandoned.
Doc. 2: *Fairness and Accuracy in Reporting* (FAIR) – She was a humble person who launched a worldwide movement.	**Doc. 2**: *Fairness and Accuracy in Reporting* (FAIR) – She was, by all accounts, a mild-mannered writer for the U.S. Fish and Wildlife Service; widely credited with launching the modern environmental movement; the resulting movement succeeded in getting DDT banned in the U.S.—a ban that later spread to other nations.
Doc. 3: *American Thinker* – She is unfortunately recognized as a moral icon when in fact she was indirectly responsible for the deaths of many African children.	**Doc. 3**: *American Thinker* – She is an archetype now, something of a goddess-figure embodying human decency and right action. Rachel Carson lit the fuse, and no reinterpretation can ever change that. You do not pass resolutions in favor of people who were involved in the deaths of millions, however inadvertently.
Doc 4: *Feminist Studies* – She was a visionary eco-feminist, a catalyst for the environmental movement and a role model for women activist scholars.	**Doc 4**: *Feminist Studies* – Carson crafted a vision of nature that would resonate well with the philosophy of eco-feminism that began to develop a decade after *Silent Spring* was published. Carson had a vision of the world as an organic system, a living organism that insofar as humans needed to exploit it required a delicate balancing act. She also proved to be a catalyst for the then embryonic environmental movement, a movement that has had a disproportionate number of women as its motive force.

Teacher Answer Sheet

Questions, Possible Answers & Evidence

4.) What does the article say about the causes for the increase in malaria incidence in Africa?

Possible Answers	Evidence
Doc. 1: *The New York Times* (NYT) – Carson's disciples who urged a ban on DDT are responsible.	**Doc. 1**: *The New York Times* (NYT) – Malariologists have made a little headway recently in restoring this weapon against the disease, but they've had to fight against Ms. Carson's disciples who still divide the world into good and bad chemicals, with DDT in their fearsome "dirty dozen."
Doc. 2: *Fairness and Accuracy in Reporting* (FAIR) – Mosquitoes' evolutionary development of natural resistance to pesticides is responsible.	**Doc. 2**: *Fairness and Accuracy in Reporting* (FAIR) – Mosquito populations rapidly develop resistance to DDT; resistance continues to spread even after DDT spraying has stopped, lowering the effectiveness not only of DDT but also other pesticides.
Doc. 3: *American Thinker* – The ban on DDT caused malaria to increase.	**Doc. 3**: *American Thinker* – South Africa was persuaded in 1995 to abandon DDT in favor of the more expensive pyrethroid. Within three years, resistant mosquitoes appeared. By 2000, malaria cases had shot up by more than 1200%, to 62,000.
Doc 4: *Feminist Studies* – It does not address this issue.	**Doc 4**: *Feminist Studies* – No references to this topic.

» After all four groups have presented, lead a discussion about how economic interest and political perspective have shaped arguments about chemicals in the environment in the case of DDT and Rachel Carson.
» Make sure that all students have an opportunity to express their agreement and disagreement with the reasoning of the various authors.

FURTHER QUESTIONS

» **Who are the target audiences for each source? Might those audiences steer the nature of the reporting?**
» **How are the authors' impressions shaped by their perceptions of Rachel Carson's experience as a woman, as a scientist and as a writer?**
» **How can you distinguish between fact and opinion in an article about Rachel Carson?**
» **How can you select the widest range of information sources? Why might this be helpful as you discuss DDT and Rachel Carson with others?**
» **How relevant is Rachel Carson's work today? Why?**

CONNECTIONS

See Lesson 1 History of Chemicals in the Environment slides #10, 14, 32, 33, and Lesson 2: Case Study—Rachel Carson (Video Clips)

"Fateful Voice of a Generation Still Drowns Out Real Science"

John Tierney
New York Times

Document Excerpt #1

For Rachel Carson admirers, it has not been a silent spring. They've been celebrating the centennial of her birthday with paeans to her saintliness. A new generation is reading her book in school — and mostly learning the wrong lesson from it. If students are going to read "Silent Spring" in science classes, I wish it were paired with another work from that same year, 1962, titled "Chemicals and Pests." It was a review of "Silent Spring" in the journal *Science* written by I. L. Baldwin, a professor of agricultural bacteriology at the University of Wisconsin.

He didn't have Ms. Carson's literary flair, but his science has held up much better. He didn't make Ms. Carson's fundamental mistake, which is evident in the opening sentence of her book: "There was once a town in the heart of America where all life seemed to live in harmony with its surroundings," she wrote, extolling the peace that had reigned "since the first settlers raised their houses." Lately, though, a "strange blight" had cast an "evil spell" that killed the flora and fauna, sickened humans and "silenced the rebirth of new life." This "Fable for Tomorrow," as she called it, set the tone for the hodgepodge of science and junk science in the rest of the book. Nature was good; traditional agriculture was all right; modern pesticides were an unprecedented evil. It was a Disneyfied version of Eden.

Ms. Carson used dubious statistics and anecdotes (like the improbable story of a woman who instantly developed cancer after spraying her basement with DDT) to warn of a cancer epidemic that never came to pass. She rightly noted threats to some birds, like eagles and other raptors, but she wildly imagined a mass "biocide." She warned that one of the most common American birds, the robin, was "on the verge of extinction" — an especially odd claim given the large numbers of robins recorded in Audubon bird counts before her book.

Ms. Carson's many defenders, ecologists as well as other scientists, often excuse her errors by pointing to the primitive state of environmental and cancer research in her day. They argue that she got the big picture right: without her passion and pioneering work, people wouldn't have recognized the perils of pesticides. But those arguments are hard to square with Dr. Baldwin's review. Dr. Baldwin led a committee at the National Academy of Sciences studying the impact of pesticides on wildlife. (Yes, scientists were worrying about pesticide dangers long before "Silent Spring.") In his review, he praised Ms. Carsons's literary skills and her desire to protect nature. But, he wrote, "Mankind has been engaged in the process of upsetting the balance of nature since the dawn of civilization."

While Ms. Carson imagined life in harmony before DDT, Dr. Baldwin saw that civilization depended on farmers and doctors fighting "an unrelenting war" against insects, parasites and disease. He complained that "Silent Spring" was not a scientific balancing of costs and benefits but rather a "prosecuting attorney's impassioned plea for action." Ms. Carson presented DDT as a dangerous human carcinogen, but Dr. Baldwin said the question was open and noted that most scientists "feel that the danger of damage is slight." He acknowledged that pesticides were sometimes badly misused, but he also quoted an adage: "There are no harmless chemicals, only harmless use of chemicals."

Ms. Carson, though, considered new chemicals to be inherently different. "For the first time in the history of the world," she wrote, "every human being is now subjected to contact with dangerous chemicals, from the moment of conception until death." She briefly acknowledged that nature manufactured its own carcinogens, but she said they were "few in number and they belong to that ancient array of forces to which life has been accustomed from the beginning." The new pesticides, by contrast, were "elixirs of death," dangerous even in tiny quantities because humans had evolved "no protection" against them and there was "no 'safe' dose."

She cited scary figures showing a recent rise in deaths from cancer, but she didn't consider one of the chief causes: fewer people were dying at young ages from other diseases (including the malaria that persisted in the American South until DDT). When that longevity factor as well as the impact of smoking are removed, the cancer death rate was falling in the decade before "Silent Spring," and it kept falling in the rest of the century.

Why weren't all of the new poisons killing people? An important clue emerged in the 1980s when the biochemist Bruce Ames tested thousands of chemicals and found that natural compounds were as likely to be carcinogenic as synthetic ones. Dr. Ames found that 99.99 percent of the carcinogens in our diet were natural, which doesn't mean that we are being poisoned by the natural pesticides in spinach and lettuce. We ingest most carcinogens, natural or synthetic, in such small quantities that they don't hurt us. Dosage matters, not whether a chemical is natural, just as Dr. Baldwin realized.

But scientists like him were no match for Ms. Carson's rhetoric. DDT became taboo even though there wasn't evidence that it was carcinogenic (and subsequent studies repeatedly failed to prove harm to humans).
It's often asserted that the severe restrictions on DDT and other pesticides were justified in rich countries like America simply to protect wildlife. But even that is debatable (see www.tierneylab.com), and in any case, the chemophobia inspired by Ms. Carson's book has been harmful in various ways. The obsession with eliminating minute risks from synthetic chemicals has wasted vast sums of money: environmental experts complain that the billions spent cleaning up Superfund sites would be better spent on more serious dangers.

The human costs have been horrific in the poor countries where malaria returned after DDT spraying was abandoned. Malariologists have made a little headway recently in restoring this weapon against the disease, but they've had to fight against Ms. Carson's disciples who still divide the world into good and bad chemicals, with DDT in their fearsome "dirty dozen."

Ms. Carson didn't urge an outright ban on DDT, but she tried to downplay its effectiveness against malaria and refused to acknowledge what it had accomplished. As Dr. Baldwin wrote, "No estimates are made of the countless lives that have been saved because of the destruction of insect vectors of disease." He predicted correctly that people in poor countries would suffer from hunger and disease if they were denied the pesticides that had enabled wealthy nations to increase food production and eliminate scourges.

But Dr. Baldwin did make one mistake. After expressing the hope "that someone with Rachel Carson's ability will write a companion volume dramatizing the improvements in human health and welfare derived from the use of pesticides," he predicted that "such a story would be far more dramatic than the one told by Miss Carson in 'Silent Spring.' " That never happened, and I can't imagine any writer turning such good news into a story more dramatic than Ms. Carson's apocalypse in Eden. A best seller titled "Happy Spring"? I don't think so.

Tierney, John. " Fateful Voice of a Generation Still Drowns Out Real Science." *New York Times* 5 June 2007.

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"Rachel Carson, Mass Murderer? The creation of an anti-environmental myth"

Aaron Schwartz
Fairness and Accuracy in Reporting (fair.org)

Document Excerpt #2

Sometimes you find mass murderers in the most unlikely places. Take Rachel Carson. She was, by all accounts, a mild-mannered writer for the U.S. Fish and Wildlife Service—hardly a sociopath's breeding ground. And yet, according to many in the media, Carson has more blood on her hands than Hitler. The problems started in the 1940s, when Carson left the Service to begin writing full-time. In 1962, she published a series of articles in the New Yorker, resulting in the book *Silent Spring*—widely credited with launching the modern environmental movement. The book discussed how pesticides and pollutants moved up the food chain, threatening the ecosystems for many animals, especially birds. Without them, it warned, we might face the title's *Silent Spring*.

Farmers used vast quantities of DDT to protect their crops against insects—80 million pounds were sprayed in 1959 alone—but from there it quickly climbed up the food chain. Bald eagles, eating fish that had concentrated DDT in their tissues, headed toward extinction. Humans, likewise accumulating DDT in our systems, appeared to get cancer as a result. Mothers passed the chemical on to their children through breast milk. *Silent Spring* drew attention to these concerns and, in 1972, the resulting movement succeeded in getting DDT banned in the U.S.—a ban that later spread to other nations. And that, according to Carson's critics, is where the trouble started. DDT had been sprayed heavily on houses in developing countries to protect against malaria-carrying mosquitoes. Without it, malaria rates in developing countries skyrocketed. Over 1 million people die from it each year. To the critics, the solution seems simple: Forget Carson's emotional arguments about dead birds and start spraying DDT again so we can save human lives.

"What the World Needs Now Is DDT" asserted the headline of a lengthy feature in the *New York Times* Magazine (4/11/04). "No one concerned about the environmental damage of DDT set out to kill African children," reporter Tina Rosenberg generously allowed. Nonetheless, *Silent Spring* is now killing African children because of its persistence in the public mind." It's a common theme—echoed by two more articles in the *Times* by the same author (3/29/06, 10/5/06), and by *Times* columnists Nicholas Kristof (3/12/05) and John Tierney (6/05/07). The same refrain appears in a *Washington Post* op-ed by columnist Sebastian Mallaby, gleefully headlined "Look Who's Ignoring Science Now" (10/09/05). And again in the *Baltimore Sun* ("Ms. Carson's views [came] at a cost of many thousands of lives worldwide"—5/27/07), *New York Sun* ("millions of Africans died . . . thanks to Rachel Carson's junk science classic"—4/21/06), the *Hill* ("millions die on the altar of politically correct ideologies"—11/02/05), *San Francisco Examiner* ("Carson was wrong, and millions of people continue to pay the price"—5/28/07) and *Wall Street Journal* ("environmental controls were more important than the lives of human beings"—2/21/07).

Even novelists have gotten in on the game. "Banning DDT killed more people than Hitler, Ted," explains a character in Michael Crichton's 2004 bestseller, *State of Fear* (p. 487). "[DDT] was so safe you could eat it." That fictional comment not only inspired a column on the same theme in Australia's *Sydney Morning Herald* (6/18/05), it led Senator James Inhofe (R-Ok.) to invite Crichton and Dr. Donald R. Roberts, a longtime pro-DDT activist, to testify before the Senate Committee on Environment and Public Works. But other attacks only seem like fiction. A web page on junkscience.com features a live Malaria Death Clock next to a photo of Rachel Carson, holding her responsible for more deaths than malaria has caused in total. ("DDT allows [Africans to] climb out of the poverty/subsistence hole in which 'caring greens' apparently wish to keep them trapped," it helpfully explains.) And a new website from the Competitive Enterprise Institute, RachelWasWrong.org, features photos of deceased African children along the side of every page.

At one level, these articles send a comforting message to the developed world: Saving African children is easy.

We don't need to build large aid programs or fund major health initiatives, let alone develop Third-World infrastructure or think about larger issues of fairness. No, to save African lives from malaria, we just need to put our wallets away and work to stop the evil environmentalists. Unfortunately, it's not so easy. For one thing, there is no global DDT ban. DDT is indeed banned in the U.S., but malaria isn't exactly a pressing issue here. If it ever were, the ban contains an exception for matters of public health. Meanwhile, it's perfectly legal—and indeed, used—in many other countries: 10 out of the 17 African nations that currently conduct indoor spraying use DDT (*New York Times*, 9/16/06).

DDT use has decreased enormously, but not because of a ban. The real reason is simple, although not one conservatives are particularly fond of: evolution. Mosquito populations rapidly develop resistance to DDT, creating enzymes to detoxify it, modifying their nervous systems to avoid its effects, and avoiding areas where DDT is sprayed — and recent research finds that that resistance continues to spread even after DDT spraying has stopped, lowering the effectiveness not only of DDT but also other pesticides (Current Biology, 8/9/05). "No responsible person contends that insect-borne disease should be ignored," Carson wrote in *Silent Spring*. "The question that has now urgently presented itself is whether it is either wise or responsible to attack the problem by methods that are rapidly making it worse. . . . Resistance to insecticides by mosquitoes . . . has surged upwards at an astounding rate."

Unfortunately, her words were ignored. Africa didn't cut back on pesticides because, through a system called the "Industry Cooperative Program," the pesticide companies themselves got to participate in the United Nations agency that provided advice on pest control. Not surprisingly, it continued to recommend significant pesticide usage. When *Silent Spring* came out in 1962, it seemed as if this strategy was working. To take the most extreme case, Sri Lanka counted only 17 cases of malaria in 1963. But by 1969, things had once again gotten out of hand: 537,700 cases were counted. Naturally, the rise had many causes: Political and financial pressure led to cutbacks on spraying, stockpiles of supplies had been used up, low rainfall and high temperatures encouraged mosquitoes, a backlog of diagnostic tests to detect malaria was processed and testing standards became more stringent. But even with renewed effort, the problem did not go away.

Records uncovered by entomologist Andrew Spielman hint at why (Mosquito, p. 177). For years, Sri Lanka had run test programs to verify DDT's effectiveness at killing mosquitoes. But halfway through the program, their standards were dramatically lowered. "Though the reason was not recorded," Spielman writes, "it was obvious that some mosquitoes were developing resistance and the change was made to justify continued spraying." But further spraying led only to further resistance, and the problem became much harder to control. DDT use was scaled back and other pesticides were introduced—more cautiously this time—but the epidemic was never again brought under control, with the deadly legacy that continues to this day.

Instead of apologizing, the chemical companies went on the attack. They funded front groups and think tanks to claim the epidemic started because countries "stopped" using their products. In their version of the story, environmentalists forced Africans to stop using DDT, causing the increase in malaria. "It's like a hit-and-run driver who, instead of admitting responsibility for the accident, frames the person who tried to prevent the accident," complains Tim Lambert, whose weblog, Deltoid, tracks the DDT myth and other scientific misinformation in the media.

Schwartz, Aaron. "Rachel Carson, Mass Murderer?" *Extra* Sept./Oct. 2007.
< http://www.fair.org/index.php?page=3186>

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"Rachel Carson and the Deaths of Millions"

J.R. Dunn
American Thinker

Document Excerpt #3

Silent Spring was published in September 1962 to immediate and near-universal acclaim. It was a strange time in American history - the public had only recently endured scares over radioactive fallout from nuclear testing and a horrifying incident involving the pregnancy drug thalidomide, which led to gross birth defects. *Silent Spring* rode this wave of paranoia as if designed for it. Along with a thirty-week run on *The New York Times* bestseller list, the book was discussed in the Senate, debated by Congressional committees, analyzed by the presidential Science Advisory Committee and widely covered on television. All of which was a deep pity, because *Silent Spring* was an extremely dishonest and flawed piece of work.

Carson's book was rife with omissions, misrepresentations, and errors. She neglected to mention that the spraying of Huckin's bird sanctuary was accompanied by fuel oil, which would have harmed the birds in and of itself. The fact that DDT had eliminated malaria in the northern hemisphere went unnoted. The threat of cancer (Carson herself had been diagnosed with breast cancer while at work on the book) was overemphasized—to put it mildly—on no scientific basis. But far worse was the tone of hysteria permeating the entire work. DDT was not simply a chemical compound, to be analyzed dispassionately like any other. No—it was representation of absolute evil, a demonic threat to all forms of life, one that had to be ousted from the environment at all costs. Such an overwrought treatment is perhaps understandable from a woman effectively writing under the gun of cancer, but it's scarcely acceptable in a work purporting to be a serious scientific study.

This attitude of Carson's was imported into environmentalism whole, becoming the standard for dealing with environmental matters of all kinds. DDT became target number one for the new environmental movement (one organization, the World Wildlife Fund, was founded with no other goal than its elimination).
It was an uphill battle for several years, since serious serious scientific analysis of Carson's claims overthrew virtually all of them. DDT did not cause cancer. It had no health effects whatsoever on humans, mammals, or any other higher animals. The sole deleterious effect involved the eggs of raptors, where ambiguous evidence of shell-thinning was discovered.

Even the Environmental Protection Agency, founded in answer to the uproar generated by *Silent Spring*, dismissed claims against DDT. The environmentalists solved that one by going straight to the top. The EPA's head, William D. Ruckelshaus, was a committed environmentalist and a member of several environmental organizations, with widespread connections throughout the movement. On June 14, 1972, Ruckelshaus rescinded the registration for DDT, effectively banning the compound. (Many sources, such as this site, claim that there never was any such ban, a contention easily answered by this EPA release.) Ruckelshaus later worked for the World Wildlife Federation, a fact that may or may not be relevant.

With the Ruckelshaus ban, the DDT story deepens into tragedy. One thing unmentioned throughout the debate was the fact that DDT had effectively eliminated malaria in the developed world. Though not as fearful as diseases such as plague or tuberculosis, malaria was a greater killer than any of them, perhaps responsible for up to 300 million deaths in the 20th century alone. Malaria was a slow killer, a parasite that debilitated and weakened over years of repeated attacks. Even when it didn't kill, it reduced its victims to lives of unending misery. DDT had ended its reign throughout Europe, the American South, and Latin America, one of the greatest humanitarian advances in recorded history, and one effectively forgotten by the 1970s. Also forgotten was the fact that one more challenge remained. Africa had been left out of previous international efforts due both to its vastness and the fact that the anopheles mosquito and the malaria parasite differed slightly from the species of other regions, seriously complicating any eradication campaign. Consideration was being given to overcoming those problems when the DDT ban undercut all such efforts.

Environmentalists and aid bureaucrats insisted that DDT could be replaced by other pesticides and procedures such as "integrated vector management." But mosquitoes quickly developed resistance to newer pesticides, and vector management was a gimcrack theory that failed everywhere it was tried. Malaria rates began soaring worldwide, not only in Africa but in areas which a few years earlier had been malaria-free. Only a small number of nations with the financial ability to fund their own programs, such as Ecuador, Mexico, and South Africa, continued DDT use. In all cases, these countries remained healthy.

Despite clear evidence as to the effects, international aid groups such as the World Health Organization (WHO) and USAid ceased supporting DDT operations. By the mid-80s, malaria had reached and surpassed previous levels. Up to 500 million people were suffering attacks each year. Two to three million of them died as a result. Up to nine-tenths of the dead were children under five. So it continued for a quarter of a century. The tide began to turn when South Africa was persuaded in 1995 to abandon DDT in favor of the more expensive pyrethroid. Within three years, resistant mosquitoes appeared. By 2000, malaria cases had shot up by more than 1200%, to 62,000. The government resumed DDT spraying, and within months the disease rate dropped by four-fifths.

Other African nations began pleading for DDT. The UN had been attempting to ban the pesticide worldwide, but could not ignore evidence of such magnitude. An exception was made for spraying for health purposes, and aid organizations encouraged to begin financing such programs. Even so, it took another five years (and ten to fifteen million-odd deaths) to overcome bureaucratic inertia. It was only last September that the WHO acquiesced to such programs. Environmental organizations such as the World Wildlife Fund and Greenpeace all applauded the decision. It was what they'd wanted all along, so they said.

One of the crucial figures in the fight for DDT was Sen. Tom Coburn, who spent a decade or more fighting alone against Greens, international aid bureaucrats, and the media on behalf of the wretched of the earth. Coburn spent those years contemplating armies of children dead for an empty ideology.

So it's no surprise that it was he who stepped in to put a halt to Sen. Benjamin Cardin's resolution honoring Rachel Carson for her great work on the occasion of her centennial this Sunday.

Carson was not directly responsible. She is far from the equivalent of Hitler or Pol Pot that some overheated individuals claim to see in her. Neither are Ruckelshaus or the faceless aid bureaucrats, though we're getting closer to the bone there. No malice was involved in this case, no hatred, no hostility. We are simply confronted with the terrible mystery of human stupidity rendering the highest intentions more murderous than the worst. But Rachel Carson lit the fuse, and no reinterpretation can ever change that. As Coburn is well aware, you do not pass resolutions in favor of people who were involved in the deaths of millions, however inadvertently. Neither do you name bridges after them, or institutes, or office buildings, or schools. In particular the schools, since you do not want to give naive children any notion at all that Carson's way is the way that things ought to be done.

It's doubtful that Sen. Coburn or anyone else will ever make any real impression on Carson's reputation. She is an archetype now, something of a goddess-figure embodying human decency and right action. People will sacrifice at her altar despite everything. But that doesn't mean that such gestures as the senator's are empty - at the very least, they embody a statement that the truth is there for those who want it. That counts for quite a bit.

Dunn, JR. “Rachel Carson and the Deaths of Millions.” *American Thinker* 25 May 2007. 15 Jan. 2008 <http://www.americanthinker.com/2007/05/rachel_carson_and_the_deaths_o.html>

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"Silence, Miss Carson!"

Michael Smith
Feminist Studies

Document Excerpt #4

The "control of nature" is a phrase conceived in arrogance, born of the Neanderthal age of biology and philosophy, when it was supposed that nature exists for the convenience of man. The concepts and practices of applied entomology for the most part date from that Stone Age of science. It is our alarming misfortune that so primitive a science has armed itself with the most modern and terrible weapons, and that in turning them against the insects it has also turned them against the earth. --*Silent Spring*

Thus did Rachel Carson conclude her most controversial work, a book that has since been compared to Harriet Beecher Stowe's *Uncle Tom's Cabin* for its capacity to awaken Americans out of ethical and moral somnolence and to Darwin's *On the Origin of Species* for its challenge to the dominant scientific paradigm. Despite being largely a synthesis of studies showing the ecological toll pesticides and other agri-chemicals were exacting, *Silent Spring*--first appearing in an abridged serialization in the *New Yorker* in the summer of 1962--and its conclusions came as a shocking revelation to most Americans. Following on the heels of the thalidomide debacle and recent publicity about the danger of nuclear fall-out, *Silent Spring* reached an audience already anxious about the brave new world of chemicals and atomic energy. Carson's invocation of Albert Schweitzer's epitaph to humanity in the introduction to her book--"Man has lost the capacity to foresee and to forestall. He will end by destroying the earth."--powerfully primed readers for her account of how illusory humanity's control of nature really was, a most dangerous kind of self-deception. And readers responded. The mailbox at the *New Yorker* received a deluge of letters in support of Carson, as did the mailrooms on Capitol Hill and the White House.

Carson's broadside against the petrochemical industry, the United States Department of Agriculture, and research universities, and the public support it generated posed a grave and immediate threat to the economic interests and institutional integrity of these entities. Collectively they mounted a frantic public relations campaign to denounce Carson and her collaborators, bringing to bear all the nefarious machinery of the public relations industry. The history of this effort to discredit Carson is already well-covered scholarly terrain. But although these studies have probed the virulent and ad hominem rhetoric of the attacks against Carson, no one has really scrutinized the gendered nature of these criticisms of both Carson as a person and scientist and of her vision for the praxis of science. The story of how Rachel Carson and her work were received by her mostly male critics is important for both the history of science and the history of women, for this reception illuminates quite starkly the gendered ways Western culture has constructed science. Sandra Harding and Evelyn Fox Keller, have led the way in identifying and offering correctives to the androcentrism inherent in the evolution of Western science and the effect this has had on women practitioners of science in Western culture. The criticism of Rachel Carson's work as a scientist serves as a important case study for exploring the very cultural dynamics philosophers of science such as Harding and Keller have been urging scholars to address. Moreover, through her use of metaphors about a balance of nature—precisely the language that so incensed many of her critics—Carson crafted a vision of nature that would resonate well with the philosophy of ecofeminism that began to develop a decade after *Silent Spring* was published.

Through an examination of the avalanche of press coverage that followed the publication of *Silent Spring*, I will argue that Carson posed a threat to her detractors not merely because she had marshaled a scientifically sound indictment of the indiscriminate use of chemicals in the United States and the world. Carson was also threatening because she was a woman, an independent scholar whose sex and lack of institutional ties placed her outside the nexus of the production and application of conventional scientific knowledge. In an insightful observation about the plight of women scientists in the Cold War era,

Margaret Rossiter describes how well-trained women scientists "were, to use some military terms of the period, 'camouflaged' as housewives, mothers, and 'other' and 'stockpiled' in cities and college towns across America . . . ready but uncalled for the big emergency that never came.

Carson, in a sense, called herself to address a big emergency. Her scientific credentials included a master's degree in marine biology from Johns Hopkins University and considerable work toward a Ph.D. Her family's financial circumstances in the Depression obliged Carson to abandon her doctoral work in favor of a job with the Fish and Wildlife Service. Despite her degree, her well-respected research for a government agency, and two best selling books on ocean biology in the 1950s, she was attacked by critics of *Silent Spring* for both her science and her training.

The gendered language used to discredit Carson was really quite extraordinary, as we shall see. In order to assess why *Silent Spring*--considered apart from its author--proved to be such a provocative book, I will also examine some of the rhetorical flourishes Carson employed. As the epigraph to this paper illustrates, Carson had a vision of the world as an organic system, a living organism that insofar as humans needed to exploit it required a delicate balancing act, a tenderness, if you will. As Carolyn Merchant and others have pointed out, the scientific revolution of the sixteenth and seventeenth centuries reordered the human perception of the natural world in mechanistic terms. "The world we have lost was organic," Merchant begins The Death of Nature, her pioneering work on the shift in attitudes toward nature in early modern Europe. Merchant's organic model of relations between humans and nature included the perception of nature as a living, feminine organism requiring a special kind of stewardship, one that demanded full reciprocity in human-nature interactions. For Merchant, the most problematic result of the scientific revolution was the fundamental reconstruction of nature as a machine comprised of discrete, comprehensible, controllable bits. Male scientists came to conceive of nature as an unpredictable harridan in need of constraint and mastery, and the notion of nature as a partner eroded. The quest to dominate a female nature paralleled and reinforced the cultural trend toward the increased subordination of women in society.

This, indeed, is the position eco-feminists have staked out in the cultural debates over ecological consciousness: as the "lost world" of a more reciprocal relationship between humans and nature and between men and women has succumbed to various forms of domination by men and male-constructed science, women and nature have suffered together. By positing that women are innately more connected to the natural world (retaining the construction of nature as female) and instinctively conceptualize the world in organic terms, eco-feminists have argued that reestablishing the old notions of reciprocity is a task that should fall predominately to women. While the tacit assumption that women are biologically (rather than merely culturally) ordained to be better stewards of nature remains a controversial tenet of eco-feminism, the eco-feminist critique of culture helps us see that the roots of the oppression of women are more than economic. Although the label of eco-feminist would be an anachronistic one for Carson, she clearly evinced a reverence for the natural world that falls under Merchant's rubric of a lost perspective. She also proved to be a catalyst for the then embryonic environmental movement, a movement that has had a disproportionate number of women as its motive force.

Smith, Michael B. "Silence, Miss Carson! Science, gender and the reception of *Silent Spring*." *Feminist Studies* 27.3 (Fall 2001)

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Lesson #3 Case Study Student Worksheet

NAME_____**DATE:**_____

Read over the questions below before reading your article. For each question summarize in a sentence or two the perspective of that article's author. You may want to underline the sections of the article that are pertinent to each question in order to give examples from the text to back up your conclusion.

Title of Article: _____

1.) What claims do Carson's critics make regarding the substance of her arguments?

2.) What does the article say Carson deserves credit for?

3.) What is the author's opinion concerning Carson's reputation?

4.) What does the article say about the causes for the increase in malaria incidence in Africa?

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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.

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Lesson #5: Case Study— Depleted Uranium (Print Documents)

LESSON PLAN

Case Study: Depleted Uranium

Printed Document

Lesson Objectives:

- Students will study and present different views on the uses for and the health and environmental effects of depleted uranium (DU) as a weapon in war
- Students will analyze articles on DU from magazine, newspaper and website sources
- Students will evaluate and discuss the uses of chemical weapons in war

Vocabulary:

Uranium, depleted uranium, enriched uranium, radioactivity, penetrator, heavy metal, isotope, millirad, millirem

Media

Handouts with excerpts from four opinion/analysis articles from the Department of Defense and the World Health Organization websites, the *Christian Science Monitor* daily newspaper and *Rolling Stone* magazine.

Materials Needed:

- Teacher Guide: Case Study—Depleted Uranium
- One-page Background Reading: "Chemicals and War"
- Two-page Student Reading #1*:* Department of Defense (DoD) Depleted Uranium Information
- Two-page Student Reading #2*:* "Is the Pentagon giving our soldiers cancer"
- Two-page Student Reading #3: World Health Organization Media Centre DU Website
- Two-page Student Reading #4 "Remains of toxic bullets litter Iraq"
- One-page Lesson #5 Case Study Student Worksheet

Time

50 Minutes

Lesson Procedures:

1. Present *Background Information* to the class
2. Divide the class into four groups and distribute the Student Reading handouts, one article per group.
3. Use the *Teacher Answer Sheet* Teacher Guide to help facilitate the four presentations.
4. Help students to articulate and evaluate their own thinking about the use of depleted uranium as a weapon in war and about the media representation of depleted uranium.

TEACHER GUIDE

Case Study: Depleted Uranium

Printed Document

1. Organize and make copies for the class activities.
2. Provide background information.

Background Information

Read or ask students to summarize the background reading, "Chemicals and War" which is located after the Teacher Guide.

3. Introduce lesson.

Lesson Information

This lesson explores the wartime use of depleted uranium or DU as seen from a variety of perspectives and sources. You will read excerpts from four different articles on the subject from Web sites of the Department of Defense and the World Health Organization and from the daily newspaper *Christian Science Monitor* and from *Rolling Stone* magazine.

For this lesson, you will break into four groups, each with a different article to read. As your group reads the handout, look for the answers to four basic questions about DU: 1) What is DU? 2) What are the uses of DU? 3) What are the health effects of DU? 4) What are the environmental effects of DU?

Also, note any passages in the article that illustrate those points. You will then present your Document to the entire class with each student sharing a different answer. After all four groups have presented we will discuss your reactions to the various perspectives presented.

4. Distribute among the four groups one student reading and one student worksheet.
5. Give students time to complete the assignment. Review the possible answers using the *Teacher Answer Sheet*.
6. Bring the class back together for the presentations.
7. Ask each group to report their author's analysis and conclusions, question by question – using excerpts from the text to illustrate their points.

Teacher Answer Sheet

Questions, Possible Answers & Evidence

1.) What is DU?

Possible Answers

Doc. 1: The Department of Defense (DOD) website: a by-product of the process by which uranium is enriched to produce reactor fuel and nuclear weapons components.

Doc. 2: The *Rolling Stone* (RS) article: radioactive waste left over from nuclear bombs and reactors.

Doc. 3: The World Health Organization (WHO) website: The uranium remaining after the removal of the enriched fraction contains at least three times less 235U than enriched uranium.

Doc 4: The *Christian Science Monitor* (CSM) article: low-level radioactive nuclear-waste material, left over from the making of nuclear fuel and weapons.

Possible Answers
Optional Follow-up Question

What are the differences in word choice and emphasis between the different sources?

Doc. 1: The Department of Defense (DOD) website stresses that DU is "40% less radioactive than natural uranium".

Doc. 2: The *Rolling Stone* (RS) article uses the phrase "nuclear bombs" in its definition.

Doc. 3: The WHO site is very technical with lots of percentages and mass numbers.

Doc 4: The *Christian Science Monitor* (CSM) article defines DU at the end of the excerpt in simple language similar to that of the DOD.

Teacher Answer Sheet

Questions, Possible Answers & Evidence

2.) What are the uses of DU?

Possible Answers

Doc. 1: DOD – "DU can be used to engage the enemy at greater distances than (other munitions) because of improved ballistic properties… U.S. forces also use DU to enhance their tanks' armor protection… Depleted uranium is also used in numerous commercial applications requiring a very dense material."

Doc. 2: RS – "DU is used to incinerate tanks on impact…Whenever US troops go to war, depleted uranium supplies the shock and awe. US military used depleted uranium to inflict enormous harm on the enemy. "We want to be able to strike the target from farther away than we can be hit back, and we want the target to be destroyed when we shoot at it," Col. James Naughton told reporters at a Pentagon briefing last March. "We don't want to see rounds bouncing off. We don't want to fight even. We want to be ahead. And DU gives us that advantage."

Doc. 3: WHO – "Due to its high density, about twice that of lead, the main civilian uses of DU include counterweights in aircraft, radiation shields in medical radiation therapy machines and containers for the transport of radioactive materials. The military uses DU for defensive armour plate…DU is used in armour penetrating military ordnance because of its high density, and also because DU can ignite on impact if the temperature exceeds 600°C."

Doc 4: CSM – "No other armor-piercing round is as effective against enemy tanks."

Possible Answers: Optional Follow-up Question

What are the differences in word choice and emphasis between the different sources?

Doc. 1: The Department of Defense devotes a paragraph to the commercial (civilian) uses of DU. It uses non-combative language like "engage" and "enhance".

Doc. 2: *Rolling Stone* uses exclamatory language: "incinerate tanks", "shock and awe", "enormous harm". It quotes a US officer who suggests that DU is a tool to avoid fighting via total destruction of enemy forces.

Doc. 3: The WHO is more technical than the other sources. It focuses both on commercial and military uses of DU.

Doc 4: The *Christian Science Monitor* only offers one sentence about the effectiveness of DU in piercing tank armor.

Teacher Answer Sheet

Questions, Possible Answers & Evidence

3.) What are the health effects of DU?

Possible Answers	Evidence
Doc. 1: The Department of Defense says that there are no negative health effects associated with DU. It references follow-up studies of Gulf and Balkan War veterans.	**Doc. 1**: DOD – "no radiological health effects are expected because the radioactivity of uranium and depleted uranium are so low…the medical community has yet to identify any untoward health consequences associated with depleted uranium exposures on the battlefield.
Doc. 2: *Rolling Stone* acknowledges the Pentagon position. It says that Doctors scientists, environmentalists, human rights activists and US Gulf War veterans are concerned with "mounting evidence" that DU may cause cancer, suffering and death.	**Doc. 2**: RS – "The Pentagon insists that the weapons pose no threat to US soldiers or to non-combatants…Some Doctors fear that long-term exposure to such radiation could eventually prove as deadly as a blast from a nuclear bomb… a broad consortium of scientists, environmentalists, and human-rights activists…cite mounting evidence that depleted uranium will cause death and suffering among civilians and soldiers."
Doc. 3: The WHO focuses on concerns relating to kidney function and the possibility of lung cancer. It is generally cautious in its conclusions suggesting that DU does not pose a great health risk.	**Doc. 3**: WHO - "In the kidneys, the proximal tubules (the main filtering component of the kidney) are considered to be the main site of potential damage from chemical toxicity of uranium… In a number of studies on uranium miners, an increased risk of lung cancer was demonstrate…because DU is only weakly radioactive, very large amounts of dust (on the order of grams) would have to be inhaled for the additional risk of lung cancer to be detectable in an exposed group."
Doc 4: The *Christian Science Monitor* offers conflicting perspectives. It quotes a Swedish scientist as saying that health risks are low and an anonymous U.S. soldier who says that he was told DU could cause cancer.	**Doc 4**: CSM – "When the DU material burns (usually on impact; or as a dust, it can spontaneously ignite) protective shields disappear, and dangerous radioactive oxides are created that can be inhaled or ingested"…[The risk] depends so very much on how you handle it," says Jan Olof Snihs, of Sweden's Radiation Protection Authority in Stockholm. In most cases dangers are low, he says, unless children eat toxic and radioactive soil, or get DU oxides on their hand…."After we shoot something with DU, we're not supposed to go around it, due to the fact that it could cause cancer," says a sergeant in Baghdad from New York, assigned to a Bradley, who asked not to be further identified."

Teacher Answer Sheet

Questions, Possible Answers & Evidence

4.) What are the environmental effects of DU?

Possible Answers	Evidence
Doc. 1: DOD underscores the existence of uranium as an element present in the natural environment and thus in our bodies. The author suggests that perhaps we should not be too concerned with a substance which is present everywhere anyway.	**Doc. 1**: DOD – "Uranium is a weakly radioactive element that occurs naturally in the environment…. Each of us ingests and inhales natural uranium every day from our air, water, food, and soil."
Doc. 2: RS focuses on the nearly eternal nature of radiation released by DU particles and on the image of a radioactive "Highway of Death".	**Doc. 2**: RS – "DU projectiles spew clouds of microscopic dust particles into the atmosphere (which) will emit low-level radiation for 4.5 billion years -- the age of the solar system itself….To imagine the carnage, one need only recall Iraq's infamous "Highway of Death".. .strewn with radioactive trucks, cars, and tanks."
Doc. 3: WHO suggests that DU levels will be extremely low and localized only where it is released. They also suggest that people living near contaminated areas, especially children, may face a greater than normal risk for inhaling or ingesting DU	**Doc. 3**: WHO - "Under most circumstances, use of DU will make a negligible contribution to the overall natural background levels of uranium in the environment. Probably the greatest potential for DU exposure will follow conflict where DU munitions are used…. People living or working in affected areas may inhale contaminated dusts or consume contaminated food and drinking water…Ingestion of small amounts of DU contaminated soil by small children may occur while playing."
Doc 4: CSM gives the most attention to concern of environmental contamination, beginning with its headline: "Remains of toxic bullets litter Iraq: The *Monitor* finds high levels of radiation left by US armor-piercing shells". Although it quotes US officers as dismissing these concerns it spends the majority of the article recounting its findings that extremely high levels of radiation exist in areas of Iraq where DU was used and quoting officials who share these concerns.	**Doc 4**: CSM –"There is not really any danger, at least that we know about, for the people of Iraq," said Lt. Col. Michael Sigmon, "But there is a growing chorus of concern among United Nations and relief officials, along with some Western scientific experts, who are calling for sites contaminated with DU be marked off and made safe…(DU) leaves a trail of contamination that has half-life of 4.5 billion years - the age of our solar system".

FURTHER QUESTIONS

- **Why do you suppose the answers to these simple questions were so different?**
- **Whose perspective is being offered in each case?**
- **Who are the target audiences for each source? Might those audiences steer the nature of the reporting?**
- **What essential information was left out in each source?**
- **How can you distinguish between fact and opinion in an article about DU?**
- **Is there such a thing as "fair and balanced reporting" in what you've read?**
- **How can you select the widest range of sources? Why might this be helpful as you discuss DU with others?**

NOTE: This lesson was first posted in a different form on the "Discussion and education materials" page of the Christian Peacemaker Team's Stop DU Web site. (Discussion)

BACKGROUND READING

CHEMICALS AND WAR

Chemistry and war making were deeply interconnected in the twentieth century. Many of the "modern miracles" of the postwar years had their beginnings in chemistry labs devoted to war research. DDT was developed as an insecticide to reduce the many wartime casualties caused by mosquito–borne diseases like typhus and malaria. Nylon was created as a material for parachutes and flak jackets after silk became unavailable during the war. In the immediate postwar years these chemical discoveries were marketed as new necessities for the housewife who needed to kill pests during the day and wear elegant stockings in the evening.

Much of the wartime chemical research, however, had more deadly consequences. German chemist Franz Haber had pioneered the process whereby nitrogen is turned to ammonia, opening the door for modern nitrogen-based fertilizer and dramatic increases in crop yields worldwide. As a chemist he also pioneered the first use of poison gas in modern warfare when during World War 1 he oversaw the German army's release of chlorine gas on British and French troops with deadly results. The Geneva Protocols following World War One established an international agreement banning chemical weapons.

Some countries have subsequently used chemical weapons in regional wars in spite of these agreements, notably Italy in Ethiopia, Japan in China and Iraq during the Iran Iraq war. Despite the ban on use of chemical weapons, research into chemical weapons continued, resulting in the development of a new generation of poisonous nerve gases such as sarin by both the United States and the Soviet Union during World War 2 (Federation of American Scientists).

At the end of World War Two the United States developed and used the only large-scale nuclear weapons ever used in wartime when atomic bombs were dropped on the Japanese cities of Hiroshima and Nagasaki. Although not technically "chemical weapons" nuclear weapons technology has chemical applications in both the uranium enrichment process and the ignition process for nuclear fission reactions.

One of the major consequences of chemical use in wartime has to do with the long-term after effects on the environment and on human health as a result of chemical use during war. For example in 2004 the U.S. military reported increased cancer rates among Air Force veterans who were exposed to Agent Orange, a chemical herbicide and defoliant used during the Vietnam War. (MSNBC) Subsequent studies have shown that exposure to dioxin, a chemical ingredient of Agent Orange, can cause cancer. (Science Daily) Since dioxins can remain in the environment after initial application such chemical residues can cause health problems for civilians long after the fighting has ended. Many survivors of the initial Hiroshima and Nagasaki bomb attacks subsequently fell ill and died of radiation poisoning, another example of chemical effects reverberating after war is over.

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Department of Defense (DoD) Depleted Uranium Information Website

Document Excerpt #1

WHAT IS IT?

Uranium is a weakly radioactive element that occurs naturally in the environment. The Agency for Toxic Substances and Disease Registry (ATSDR) for the Department of Health and Human Services estimates there are an average of 4 tons of uranium in the top foot of soil in every square mile of land. A heavy metal similar to tungsten and lead, uranium occurs in soils in typical concentrations of a few parts per million (equivalent to about half a teaspoon of uranium in a typical 8-cubic yard dump truck-load of dirt). Each of us ingests and inhales natural uranium every day from our air, water, food, and soil. The amount varies depending on the amount found where you live, and where the food you eat and the water you drink are produced. Consequently, each of us has some uranium in our body, and we eliminate some in our urine every day.

Depleted Uranium - This very dense metal (1.7 times as dense as lead) is a by-product of the process by which uranium is enriched to produce reactor fuel and nuclear weapons components. The leftover uranium, 40% less radioactive than natural uranium, is called "depleted uranium," or DU. The Department of Energy (DOE) recently reported that the DU it provided to DoD for manufacturing armor plates and munitions may contain trace levels (a few parts per billion) of contaminants including neptunium, plutonium, americium, technitium-99 and uranium-236. From a radiological perspective, these contaminants in DU add less than one percent to the radioactivity of DU itself. Medical scientists consider this insignificant.

HOW AND WHY IS DEPLETED URANIUM USED?

DU can be used by DoD to engage the enemy at greater distances than tungsten penetrators or high explosive anti-tank (HEAT) rounds because of improved ballistic properties. When they strike a target, tungsten penetrators blunt while DU has a self-sharpening property. DU ammunition routinely provides a 25 percent increase in effective range over traditional kinetic energy rounds. The illustration below is an artist's depiction of the sharpening effect of DU versus the mushrooming effect with a tungsten penetrator.

Depleted uranium is also used in numerous commercial applications requiring a very dense material. These include: ballast and counterweights; balancing control devices on aircraft; balancing and vibration damping on aircraft; machinery ballast and counterweights; gyrorotors and other electromechanical counterweights; shielding for medicine and industry; shipping container shielding for radiopharmaceuticals; chemical catalyst; pigments; and, x-ray tubes.

DU – HEALTH CONCERNS

Chemical - The major health concerns about DU relate to its chemical properties as a heavy metal rather than to its radioactivity, which is very low. As with all chemicals, the hazard depends mainly upon the amount taken into the body. Medical science recognizes that uranium at high doses can cause kidney damage. However, those levels are far above levels soldiers would have encountered in the Gulf or the Balkans.

Radiation - Because depleted uranium emits primarily alpha radiation, it is not considered a serious external radiation hazard. The depleted uranium in armor and rounds is covered, further reducing the radiation dose. When breathed or eaten, small amounts of depleted uranium are carried in the blood to body tissues and organs; much the same as the more radioactive natural uranium.

Despite this, no radiological health effects are expected because the radioactivity of uranium and depleted uranium are so low.

WHAT DO THE EXPERTS SAY ON CANCER RISK?

RAND, 1999. "(N)o evidence is documented in the literature of cancer or any other negative health effect related to the radiation received from exposure to natural uranium, whether inhaled or ingested, even at very high doses."

Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR) in 1999 Toxicological Profile for Uranium. "No human cancer of any type has ever been seen as a result of exposure to natural or depleted uranium."

United Kingdom Royal Society in May 2001. "Even if the estimates of risk are one hundred times too low, it is unlikely that any excess of fatal cancer would be detected within a group of 10,000 soldiers followed over 50 years."

European Commission March, 2001 report. "Taking into account the pathways and realistic scenarios of human exposure, radiological exposure to depleted uranium could not cause a detectable effect on human health (e.g. cancer)."

World Health Organization April, 2001 report. "The radiological hazard is likely to be very small. No increase of leukemia or other cancers has been established following exposure to uranium or DU."

Swedish Military Headquarters Medical Department Study, January 2003. "Questionnaires, analysis of uranium in the urine and matching with the cancer register at the National Board of Health and Welfare failed to reveal any link between service on the Balkans and cancer or any other illness." In fact, average urine uranium levels in two separate groups troops deployed for six months to the Balkans decreased by 75 percent and 90 percent during their deployment. The study attributed this decrease to the high natural uranium levels in Swedish drinking water supplies.

in the Veterans Affairs depleted uranium medical follow-up program, the medical community has yet to identify any untoward health consequences associated with depleted uranium exposures on the battlefield. Still, it is important to implement

DU MEDICAL FOLLOW UP POLICY

On May 30, 2003, new guidance was issued by OSD/Health Affairs that clarifies who, why, when, and how the military should test for possible depleted uranium during and after deployment and combat operations. The purpose of the testing is to identify those who may have been exposed to significant levels of depleted uranium while deployed. After a decade of closely following many depleted-uranium exposed Gulf War veterans who were enrolled these new guidelines which standardizes the way depleted uranium tests are performed; directs the compliance with an approved medical protocol following sound clinical practices; and helps DoD meet its obligations for ensuring the health of our deployed personnel.

"DU" Department of Defense. 20 Aug. 2006.
http://deploymentlink.osd.mil/du_library/what.shtml
http://deploymentlink.osd.mil/du_library/health.shtml
http://deploymentlink.osd.mil/du_library/how.shtml

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"Is the Pentagon Giving our Soldiers Cancer?"

Hillary Johnson
Rolling Stone

Document Excerpt #2

US military relies on depleted uranium, which incinerates tanks on impact. But soldiers and civilians alike say the radioactive ammo is making them sick.

The weapons of war are quietly changing. The US military's deadliest ammunition is now packed with depleted uranium -- radioactive waste left over from nuclear bombs and reactors. These so-called "hot rounds" penetrate armored tanks like a needle pierces burlap, vaporizing steel in hell-fires of 5,000 degrees Celsius. Unlike tungsten, the armor-piercing metal used since World War II that "mushrooms" when it hits a target, depleted uranium actually sharpens itself like a pencil as it bores into tanks. Flaming radioactive particles shear off in every direction on impact, igniting fuel tanks and whatever explosives the target might be carrying. With virtually no public oversight, radioactive weapons have replaced conventional weapons as the cornerstone of American military might. Whenever US troops go to war, depleted uranium supplies the shock and awe.

In the annals of warfare, there has been nothing like DU, as it is often shorthanded. In both Iraq wars, and in Afghanistan, the US military used depleted uranium to inflict enormous harm on the enemy while incurring almost none itself. During the first Gulf War, in 1991, "tank-killing" DU rounds brought Saddam Hussein's Republican Guard to its knees in only four days. Military experts estimate that at least 10,000 Iraqis were killed, compared with 147 Americans. In the corridors of the Pentagon, DU munitions quickly earned the nickname "silver bullet", and the Defense Department turned its attention to creating even faster, more powerful weapons systems fueled by depleted uranium. "We want to be able to strike the target from farther away than we can be hit back, and we want the target to be destroyed when we shoot at it," Col. James Naughton told reporters at a Pentagon briefing last March. "We don't want to see rounds bouncing off. We don't want to fight even. We want to be ahead. And DU gives us that advantage."

Five days after the briefing, US forces launched the second war on Iraq. This time around, however, DU projectiles were exploded not only in uninhabited deserts but in urban centers such as Baghdad -- a city the size of Detroit. Stabilized in steel casings called "sabots", the shells were fired from airships, gunships, Abrams tanks and Bradley troop carriers, striking targets 1.5 miles away in a fraction of a second. The weapons contained traces of plutonium and americium, which are far more radioactive than depleted uranium.

The Pentagon insists that the weapons pose no threat to US soldiers or to non-combatants. "DU is not any more dangerous than dirt," declares Naughton, who recently retired after years as director of Army munitions. But a broad consortium of scientists, environmentalists, and human-rights activists -- as well as thousands of US soldiers who served in the Gulf in 1991 -- cite mounting evidence that depleted uranium will cause death and suffering among civilians and soldiers alike long after the war's end. DU projectiles spew clouds of microscopic dust particles into the atmosphere when they collide with their targets. These particles, lofted far from the battlefield on the wind, will emit low-level radiation for 4.5 billion years -- the age of the solar system itself. Some doctors fear that long-term exposure to such radiation could eventually prove as deadly as a blast from a nuclear bomb -- causing lung and bone cancer, leukemia, and lymphoma (a cancer of the immune system known in medical circles as the "white death").

"This is a war crime beyond comprehension," says Helen Caldicott, a pediatrician who has campaigned against nuclear weapons for years. "This is creating radioactive battlefields for the end of time."

Others are more measured but equally concerned. "There are medical nuances I don't fully grasp," says Chris Hellman, a senior analyst at the Center for Arms Control and Non-proliferation, in Washington, D.C. "But if you're going to be fighting wars for the goal of winning hearts and minds and bringing democracy and the altruistic things we associate with the campaigns in Afghanistan and Iraq, the last thing you want to be doing is poisoning the people you're trying to help."

Military scientists became intrigued by depleted uranium in the 1940s, at the very advent of the nuclear age. But it wasn't until the 1960s that American weapons designers began inventing ways to use DU in battle. Depleted uranium is what remains after "enriched" uranium, a crucial component in nuclear bombs and reactors, is processed from uranium ore. Although its radioactive properties have diminished by forty per cent, it's hardly safe. The Nuclear Regulatory Commission has strict rules pertaining to the handling and transporting of DU in this country -- rules that don't apply to the military during battle.

Depleted uranium has long been used as ballast in military and commercial planes, but the introduction of DU onto the battlefield began modestly, without fanfare. According to a Pentagon official, US troops carried DU "penetrators" into both Grenada and Panama. "It wouldn't have been very much, because there wasn't much to shoot at," says Naughton. "The first large-scale use was Desert Storm."

By its own estimates, the military exploded as many as 320 tons of DU in sabot-encased projectiles in the deserts of Iraq and Kuwait. Gunners shot DU rounds from the cannons of Abrams tanks or from airships such as the A-10 "Warthog". Depleted uranium is the heaviest of metals, which results in its superior penetrating abilities; it is also highly pyrophoric, bursting into flames at temperatures of 170 degrees Celsius. To imagine the carnage, one need only recall Iraq's infamous "Highway of Death", a desert road between Basra and Kuwait's border that remains strewn with radioactive trucks, cars, and tanks. US soldiers found bodies inside those vehicles that were burned in such astonishing ways that they dubbed the remains "crispy critters".

Johnson, Hillary. "Is the Pentagon Giving Our Soldiers Cancer?" *Rolling Stone* 2 Oct 2003. 12 Oct. 2008. <http://www.noduhawaii.com/DU_Rolling_Stone.html>

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World Health Organization Media
Centre DU Web site

Document Excerpt #3

URANIUM
Metallic uranium (U) is a silver-white, lustrous, dense, weakly radioactive element. It is ubiquitous throughout the natural environment, and is found in varying but small amounts in rocks, soils, water, air, plants, animals and in all human beings. Natural uranium consists of a mixture of three radioactive isotopes which are identified by the mass numbers 238U (99.27% by mass), 235U (0.72%) and 234U (0.0054%). On average, approximately 90 µg (micrograms) of uranium exists in the human body from normal intakes of water, food and air. About 66% is found in the skeleton, 16% in the liver, 8% in the kidneys and 10% in other tissues. Uranium is used primarily in nuclear power plants. However, most reactors require uranium in which the 235U content is enriched from 0.72% to about 1.5-3%.

DEPLETED URANIUM
The uranium remaining after removal of the enriched fraction contains about 99.8% 238U, 0.2% 235U and 0.001% 234U by mass; this is referred to as depleted uranium or DU. The main difference between DU and natural uranium is that the former contains at least three times less 235U than the latter. DU, consequently, is weakly radioactive and a radiation dose from it would be about 60% of that from purified natural uranium with the same mass.

The behavior of DU in the body is identical to that of natural uranium. Spent uranium fuel from nuclear reactors is sometimes reprocessed in plants for natural uranium enrichment. Some reactor-created radioisotopes can consequently contaminate the reprocessing equipment and the DU. Under these conditions another uranium isotope, 236U, may be present in the DU together with very small amounts of the transuranic elements plutonium, americium and neptunium and the fission product technetium-99. However, the additional radiation dose following intake of DU into the human body from these isotopes would be less than 1%.

APPLICATIONS OF DEPLETED URANIUM
Due to its high density, about twice that of lead, the main civilian uses of DU include counterweights in aircraft, radiation shields in medical radiation therapy machines and containers for the transport of radioactive materials. The military uses DU for defensive armour plate. DU is used in armour penetrating military ordnance because of its high density, and also because DU can ignite on impact if the temperature exceeds 600°C.

EXPOSURE TO URANIUM AND DEPLETED URANIUM
Under most circumstances, use of DU will make a negligible contribution to the overall natural background levels of uranium in the environment. Probably the greatest potential for DU exposure will follow conflict where DU munitions are used. A recent United Nations Environment Programme (UNEP) report giving field measurements taken around selected impact sites in Kosovo (Federal Republic of Yugoslavia) indicates that contamination by DU in the environment was localized to a few tens of metres around impact sites. Contamination by DU dusts of local vegetation and water supplies was found to be extremely low. Thus, the probability of significant exposure to local populations was considered to be very low.

A UN expert team reported in November 2002 that they found traces of DU in three locations among 14 sites investigated in Bosnia following NATO airstrikes in 1995. A full report is expected to be published by UNEP in March 2003. Levels of DU may exceed background levels of uranium close to DU contaminating events. Over the days and years following such an event, the contamination normally becomes dispersed into the wider natural environment by wind and rain. People living or working in affected areas may inhale contaminated dusts or consume contaminated food and drinking water.

People near an aircraft crash may be exposed to DU dusts if counterweights are exposed to prolonged intense heat. Significant exposure would be rare, as large masses of DU counterweights are unlikely to ignite and would oxidize only slowly. Exposures of clean-up and emergency workers to DU following aircraft accidents are possible, but normal occupational protection measures would prevent any significant exposure.

INTAKE OF DEPLETED URANIUM

Average annual intakes of uranium by adults are estimated to be about 0.5mg (500 µg) from ingestion of food and water and 0.6 µg from breathing air. Ingestion of small amounts of DU contaminated soil by small children may occur while playing. Contact exposure of DU through the skin is normally very low and unimportant. Intake from wound contamination or embedded fragments in skin tissues may allow DU to enter the systemic circulation.

ABSORPTION OF DEPLETED URANIUM

About 98% of uranium entering the body via ingestion is not absorbed, but is eliminated via the feces. Typical gut absorption rates for uranium in food and water are about 2% for soluble and about 0.2% for insoluble uranium compounds. The fraction of uranium absorbed into the blood is generally greater following inhalation than following ingestion of the same chemical form. The fraction will also depend on the particle size distribution. For some soluble forms, more than 20% of the inhaled material could be absorbed into blood. Of the uranium that is absorbed into the blood, approximately 70% will be filtered by the kidney and excreted in the urine within 24 hours; this amount increases to 90% within a few days.

POTENTIAL HEALTH EFFECTS OF EXPOSURE TO DEPLETED URANIUM

In the kidneys, the proximal tubules (the main filtering component of the kidney) are considered to be the main site of potential damage from chemical toxicity of uranium. There is limited information from human studies indicating that the severity of effects on kidney function and the time taken for renal function to return to normal both increase with the level of uranium exposure.

In a number of studies on uranium miners, an increased risk of lung cancer was demonstrated, but this has been attributed to exposure from radon decay products. Lung tissue damage is possible leading to a risk of lung cancer that increases with increasing radiation dose. However, because DU is only weakly radioactive, very large amounts of dust (on the order of grams) would have to be inhaled for the additional risk of lung cancer to be detectable in an exposed group. Risks for other radiation-induced cancers, including leukemia, are considered to be very much lower than for lung cancer. Erythema (superficial inflammation of the skin) or other effects on the skin are unlikely to occur even if DU is held against the skin for long periods (weeks). No consistent or confirmed adverse chemical effects of uranium have been reported for the skeleton or liver. No reproductive or developmental effects have been reported in humans. Although uranium released from embedded fragments may accumulate in the central nervous system (CNS) tissue, and some animal and human studies are suggestive of effects on CNS function, it is difficult to draw firm conclusions from the few studies reported.

"Depleted Uranium." World Health Organization. 20 Aug. 2006. http://www.who.int/mediacentre/factsheets/fs257/en/

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"Remains of Toxic Bullets Litter Iraq"

Scott Peterson
Christian Science Monitor

Document Excerpt #4

BAGHDAD – At a roadside produce stand on the outskirts of Baghdad, business is brisk for Latifa Khalaf Hamid. Iraqi drivers pull up and snap up fresh bunches of parsley, mint leaves, dill, and onion stalks. But Ms. Hamid's stand is just four paces away from a burnt-out Iraqi tank, destroyed by - and contaminated with - controversial American depleted-uranium (DU) bullets. Local children play "throughout the day" on the tank, Hamid says, and on another one across the road.

No one has warned the vendor in the faded, threadbare black gown to keep the toxic and radioactive dust off her produce. The children haven't been told not to play with the radioactive debris. They gather around as a Geiger counter carried by a visiting reporter starts singing when it nears a DU bullet fragment no bigger than a pencil eraser. It registers nearly 1,000 times normal background radiation levels on the digital readout.
The Monitor visited four sites in the city - including two randomly chosen destroyed Iraqi armored vehicles, a clutch of burned American ammunition trucks, and the downtown planning ministry - and found significant levels of radioactive contamination from the US battle for Baghdad.

In the first partial Pentagon disclosure of the amount of DU used in Iraq, a US Central Command spokesman told the Monitor that A-10 Warthog aircraft - the same planes that shot at the Iraqi planning ministry - fired 300,000 bullets. The normal combat mix for these 30-mm rounds is five DU bullets to 1 - a mix that would have left about 75 tons of DU in Iraq. The Monitor saw only one site where US troops had put up handwritten warnings in Arabic for Iraqis to stay away. There, a 3-foot-long DU dart from a 120 mm tank shell, was found producing radiation at more than 1,300 times background levels. It made the instrument's staccato bursts turn into a steady whine.

"If you have pieces or even whole [DU] penetrators around, this is not an acute health hazard, but it is for sure above radiation protection dose levels," says Werner Burkart, the German deputy director general for Nuclear Sciences and Applications at the UN's International Atomic Energy Agency (IAEA) in Vienna. "The important thing in any battlefield - especially in populated urban areas - is somebody has to clean up these sites." Fresh-from-the-factory DU tank shells are normally handled with gloves, to minimize the health risk, and shielded with a thin coating. The alpha particle radiation emitted by DU travels less than an inch and can be stopped by cloth or even tissue paper. But when the DU material burns (usually on impact; or as a dust, it can spontaneously ignite) protective shields disappear, and dangerous radioactive oxides are created that can be inhaled or ingested. "[The risk] depends so very much on how you handle it," says Jan Olof Snihs, of Sweden's Radiation Protection Authority in Stockholm. In most cases dangers are low, he says, unless children eat toxic and radioactive soil, or get DU oxides on their hands. Radioactive particles are a "special risk associated with a war," Mr. Snihs says. "The authorities should be aware of this, and try to decontaminate places like this, just to avoid unnecessary risk."

Pentagon officials say that DU is relatively harmless and a necessary part of modern warfare. They say that pre-Gulf War studies that indicated a risk of cancer and of causing harm to local populations through permanent contamination have been superseded by newer reports. "There is not really any danger, at least that we know about, for the people of Iraq," said Lt. Col. Michael Sigmon, deputy surgeon for the US Army's V Corps, told journalists in Baghdad last week. He asserted that children playing with expended tank shells would have to eat and then practically suffocate on DU residue to cause harm.

But there is a growing chorus of concern among United Nations and relief officials, along with some Western scientific experts, who are calling for sites contaminated with DU be marked off and made safe. "The soil around the impact sites of [DU] penetrators may be heavily contaminated, and could be harmful if swallowed by children," says Brian Spratt, chair of the working group on DU at The Royal Society, Britain's

premier scientific institution. Fragments and penetrators should be removed, since "children find them fascinating objects, and can pocket them," says Professor Spratt. "The science says there is some danger - not perhaps a huge danger - of these objects. ... We certainly do not say that these things are safe; we say that cleanup is important." The British Ministry of Defense says it will offer screening to soldiers suspected of DU exposure, and will publish details about locations and quantities of DU that British troops used in Iraq - a tiny fraction of that fired by US forces.

The Pentagon has traditionally been tight-lipped about DU: Official figures on the amount used were not released for years after the 1991 Gulf War and Bosnia conflicts, and nearly a year after the 1999 Kosovo campaign. No US official contacted could provide DU use estimates from the latest war in Iraq. "The first thing we should ask [the US military] is to remove that immediately," says Carel de Rooy, head of the UN Children's Fund in Baghdad, adding that senior UN officials need urgent advice on avoiding exposure.

The UN Environment Program last month called for field tests. DU "is still an issue of great concern for the general public," said UNEP chief Klaus Töpfer. "An early study in Iraq could either lay these fears to rest or confirm that there are indeed potential risks." During the latest Iraq conflict Abrams tanks, Bradley fighting vehicles and A-10 Warthog aircraft, among other military platforms, all fired the DU bullets from desert war zones to the heart of Baghdad. No other armor-piercing round is as effective against enemy tanks. While the Pentagon says there's no risk to Baghdad residents, US soldiers are taking their own precautions in Iraq, and in some cases have handed out warning leaflets and put up signs.

Despite the troops' bulldozing of contaminated earth away from the burnt vehicles, black piles of pure DU ash and particles are still present at the site. The toxic residue, if inhaled or ingested, is considered by scientists to be the most dangerous form of DU. One pile of jet-black dust yielded a digital readout of 9,839 radioactive emissions in one minute, more than 300 times average background levels registered by the Geiger counter. Another pile of dust reached 11,585 emissions in a minute. Western journalists who spent a night nearby on April 10, the day after Baghdad fell, were warned by US soldiers not to cross the road to this site, because bodies and unexploded ordnance remained, along with DU contamination. It was here that the Monitor found the "hot" DU tank round. This burned dart pushed the radiation meter to the far edge of the "red zone" limit. A similar DU tank round recovered in Saudi Arabia in 1991, that was found by a US Army radiological team to be emitting 260 to 270 millirads of radiation per hour. Their safety memo noted that the "current [US Nuclear Regulatory Commission] limit for non-radiation workers is 100 millirads per year."

The normal public dose limit in the US, and recognized around much of the world, is 100 millirems per year. Nuclear workers have guidelines 20 to 30 times as high as that. The depleted-uranium bullets are made of low-level radioactive nuclear-waste material, left over from the making of nuclear fuel and weapons. It is 1.7 times as dense as lead, and burns its way easily through armor. But it is controversial because it leaves a trail of contamination that has half-life of 4.5 billion years - the age of our solar system.

Peterson, Scott. “Remains of toxic bullets litter Iraq.” *Christian Science Monitor* 15 May 2003. <http://www.csmonitor.com/2003/0515/p01s02a-woiq.htm>

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Lesson #5 Case Study Student Worksheet

NAME_____ **DATE** _____

Read over the questions below before reading your article. For each question summarize in a sentence or two the perspective of that article's author. You may want to underline the sections of the article that are pertinent to each question in order to give examples from the text to back up your conclusion.

Title of Article _____

1) What is DU?

2) What are the uses of DU?

3) What are the health effects of DU?

4) What are the environmental effects of DU?

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Assessments

Document-Based Question:
Changing Public Attitudes Toward DDT

Write a well-organized essay that includes an introduction, several paragraphs, and a conclusion. Use evidence from at least three documents in your essay. Support your response with relevant facts, examples, and details. Include additional outside information.

Discuss how public knowledge and attitudes about DDT have changed over time.

In your essay:

- Explain how public attitudes toward the chemical have changed over time.
- Reference public knowledge of the costs and benefits of DDT.
- Incorporate information from at least three of the documents.
- Explain how media reflects public attitudes and perspectives.
- Incorporate relevant outside information.
- Support the theme with relevant facts, examples and details.
- Use a logical and clear plan of organization that includes an introduction and conclusion that goes beyond a restatement of the theme.

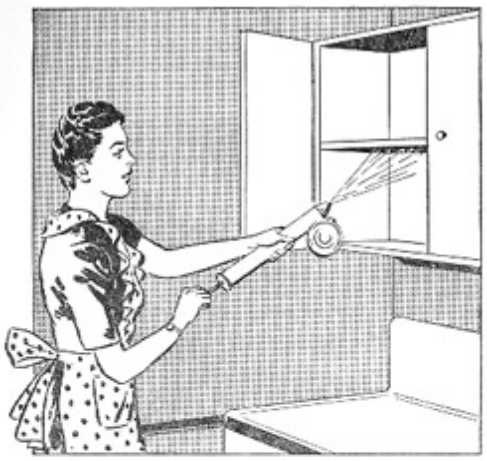
Document #1: 1949 *Webster's Collegiate Dictionary*

DDT:
A colorless, odorless, water-insoluble crystalline insecticide used especially against body lice, houseflies, mosquitoes and agricultural pests.

Document #2: 2001 *American Heritage Dictionary*

DDT:
An insecticide banned since 1972 from U.S. agricultural use for its persistent toxicity in the environment.

Document #3: 1947 U.S. Dept of Agriculture Pamphlet "DDT For Control of Household Pests"



DDT...FOR CONTROL OF HOUSEHOLD PESTS

Prepared by the
Bureau of Entomology and Plant Quarantine
Agricultural Research Administration
United States Department of Agriculture, and
the United States Public Health Service
Federal Security Agency
Washington, D. C. · Issued March 1947

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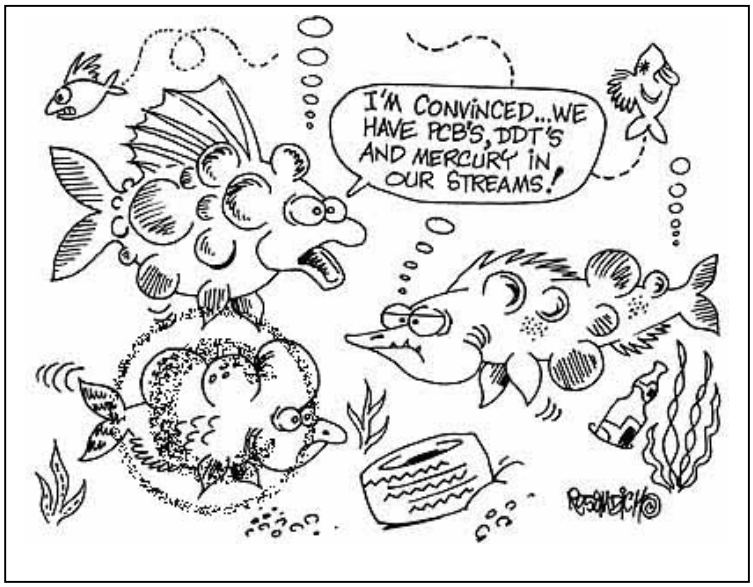
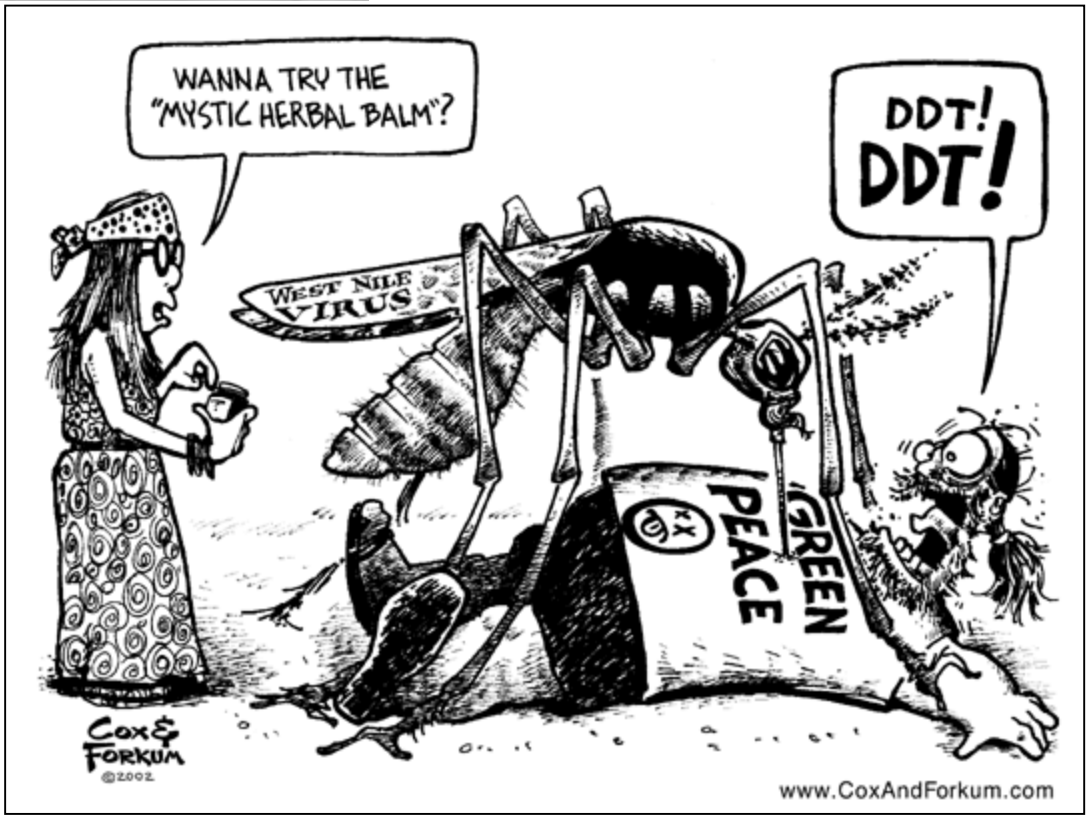
Document #4: 1962
Book Cover
Silent Spring by Rachel Carson

Document #5: Editorial Cartoonist:
Dan Rosandich



Document #6: 2001
Cartoon by Cox & Forkum



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Short Answer Questions

Changing Public Attitudes Towards DDT

NAME_____ **DATE** _____

1. According to documents #1 and #2, what was the primary use for DDT when it was first released to the public?

2. What new information about DDT and its environmental impact was revealed in Rachel Carson's 1962 book, *Silent Spring* (Document #4)?

3. Using documents #3 and #5 as examples, explain the impact of *Silent Spring* on public attitudes toward DDT.

4. Using Document #6 as an example, describe the cartoonists' point of view regarding the public health impact of the ban on DDT.

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Lesson 1: History of Chemicals in the Environment (PowerPoint)

Student Reading

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