

Lead Critical Reading

Purpose

To critically read 2 articles with very different points of view on the lead issue.

Overview

This section will require students to read 2 articles with very different points of view on the lead issue. Then the students are required to identify the “facts” and “opinions” in each article, and then to briefly infer the author’s arguments in a short paragraph. Finally, the student must create an essay expressing his/her own opinion about the lead issue, using citations from these articles and other sources to support their conclusions.

Of note, any of the 3 tasks can be done individually or in the order indicated.

Time

1 two-hour session for the first 2 tasks and then assign the essay as a homework assignment.

Key Concepts

Lead is a contentious environmental, scientific, historical, social, and economic issue with data supporting potentially many different points of view.

The same facts can be used by proponents to support different points of view. Political attitudes and beliefs shape policy, which affects people's lives, such as the children in the scenario.

Skills

This section in its entirety can help in critical reading, inference, or synthesis writing and in the writing of essays with incorporation of facts and citations. It is also useful in developing objectivity in the analysis of scientific and non-scientific writing. Finally, written and verbal communications are stressed.

Materials

The handouts are the only materials needed. The answers can be made into transparencies for instructional purposes. Access to word processing software and Internet would be useful for production of the writing and essay products.

Background

Lead is a contentious environmental, scientific, historical, social, and economic issue with data supporting potentially many different points of view. These 2 articles represent just 2 aspects of this situation.

One view point is that given its historic and economic background with its significant health effects, lead is one of the major environmental issues, particularly for children's health, in the US today. In the case of lead, we have the scientific knowledge to deal with the situation, and therefore significant resources should be directed towards its complete elimination.

Another view point considers that with limited public health monies and resources, not to mention scientific issues as to the validity of stating that lead is the sole cause of problems particularly for children of lower socio-economic class, should we as a society invest these limited resources into lead eradication. Some of the latter people would say that poverty not lead is the real environmental and social issue, and that lead is just a distraction.

Critical Reading – A “Big Idea” – Issues of environmental health often beg the question, “What should be done?” The articles assigned in the reading activity draw very different conclusions on this question. Agreement on the seriousness of a problem and the source of a problem can sometimes be hard to come by, especially when solutions entail huge costs. While sound science is an important part of this process, it remains an essentially political decision. Asking students to critically read articles like this one can help students separate the science from the politics and the facts from the fiction.

Procedure

The following Critical Reading activities can be done in groups or by individual students. Have the students critically read the enclosed **Excerpts** from the 2 articles on lead below. The websites of the original articles are available if students wish to explore these articles further.

- *Excerpt: “An Element of Doubt”* by Ellen Ruppel Shell (The Atlantic Monthly, December 1995; the original article can be found at: <http://www.theatlantic.com/issues/95dec/lead/lead.htm>)
- *Excerpt: “The Secret History of Lead”* by Jamie Lincoln Kitman (The Nation, March 20, 2000; the original article can be found at: <http://past.thenation.com/cgi-bin/framizer.cgi?url=http://past.thenation.com/issue/000320/0320kitman.shtml>)

1. For each Excerpt, review the text and **underline**:

- a) The **facts** about Lead as stated in the Excerpt;
- b) The **opinions** of the author and others about Lead as stated in the Excerpt.

Share the facts and opinions by reading them out loud to the class.

2. Review what you have underlined and write 2 short paragraphs of 3-4 sentences summarizing the argument each author is making in their Excerpt.

3. Write an **essay** summarizing what you believe (**your opinion**) about the Lead issue, incorporating facts and opinions that you have learned from your Lead Research. Use quotes and **citations** to justify your opinion. **Share your opinion** by reading the essay out loud to the class.

Further Investigation

Students can read the entire original articles (which may also be useful for the Lead Debate/Role Play Section), particularly prior to writing their essays. They can search for other articles representing different or supporting points of view. They can adapt their issues as newspaper articles for the School or local Newspaper, incorporating lead facts from their own neighborhood. They can write their Congress people to express their opinion on the lead issue.

Student Assessment

Give the following critical writing components to each student as a guide to their critical writing products:

- ❖ Decide what facts and what are opinions in each excerpt on the Lead issue
- ❖ Briefly summarize these facts and opinions into a paragraph from the point of view of each excerpt
- ❖ Decide on their own opinion on the Lead issue and what facts support this opinion
- ❖ Create an essay with fact citations to support this opinion
- ❖ Practice reading this essay aloud in a convincing manner
- ❖ Be prepared to answer questions concerning the essay point of view and supporting facts

Assign points for the following components of the critical writing products:

- ❖ Were the facts and opinions correctly identified and distinguished in each excerpt?
- ❖ Were these facts and opinions correctly and briefly summarized in a short paragraph for each excerpt?
- ❖ Were proper science terms used?
- ❖ Did the essay demonstrate a distinct point of view?
- ❖ Did the facts cited in the essay support this point of view?
- ❖ Did the essay report its sources/citations?
- ❖ Could the student answer questions from the audience about the facts and defend their point of view?

Excerpt: “An Element of Doubt” by Ellen Ruppel Shell (The Atlantic Monthly, December 1995; the original article can be found at: <http://www.theatlantic.com/issues/95dec/lead/lead.htm>)

“LEAD is among the most revered and the most maligned of elements. Historically its beneficent properties have made it hard to resist, though its virulence is the stuff of legend. Lead was added to cosmetics and eye salves in pre-dynastic Egypt, and prescribed as a cure for fever, rash, indigestion, and lust in ancient Rome. The Roman naturalist Pliny the Elder cautioned that “all the current instructions on the subject of [lead's] employment for medicinal purposes are in my opinion decidedly risky.” But his warning went largely unheeded by the Roman nobility, whose habit of drinking potions sweetened with “sugar of lead” is said to have hastened the toppling of their empire.

Lead acquired new uses in the industrial age with the mass manufacture of lead solder, lead pipe, and lead-tinted pigments for glazes and paints. The mineral's high density made it a natural to be used for bullets and shot, and its malleability rendered it an ideal material for type--in which context it came to the attention of Benjamin Franklin. Citing his own “lead colic,” brought on by frequent encounters with the printing press, Franklin wrote, “The mischievous Effect from lead is at least above Sixty Years old; and you will observe with Concern how long a useful truth may be known, and exist, before it is generally received and practis'd on.”

Franklin was right on the mark. Although some of lead's applications waned with reports of its toxicity (for example, the French banned the manufacture of leaded white pigments in the mid-1800s for fear of poisoning craftsmen), new uses for the mineral continued to pop up well into the twentieth century: lead tubes for toothpaste, lead sheathing for electrical wire, lead shields for x-ray machines, lead plates for batteries, and lead and more lead in paint smeared on everything from boat bottoms to baby carriages. By the early 1930s severe lead poisoning, characterized by convulsions, coma, brain damage, and death, was recognized as a fairly common disease of childhood. The paint industry began voluntarily to reduce the amount of lead in its products in the following decade, but the discovery of tetra-ethyl lead as an anti-knock additive for gasoline increased lead mining worldwide. Sales of leaded gasoline rose steadily through the 1960s, with a resulting dispersion into the environment of millions of tons of lead from car exhaust. Meanwhile, more than 150 clinics were set up nationwide to deal with a steady stream of lead-poisoning cases. Like the Romans, it seemed, we had entered into a devil's wager with lead, using the public health as our stake.

All that, of course, has changed. Over the past quarter century Americans not only have kicked the lead habit but have turned on lead with the zeal of the betrayed. Congress banned lead-based paint for residential use in 1978, and by 1990 the amount of lead in gasoline had dropped 99.8 percent from mid-1970s levels. Also in 1990 cans with lead seams, no longer manufactured in this country, constituted less than one percent of the market; copper or plastic pipes, not lead ones, were standard in plumbing; lead solder had been banned; and lead smelters and industries that used lead had been forced to limit their emissions sharply. Blood-lead levels, measured in micrograms of lead per deciliter of blood, dropped accordingly. In July of last year the results of the first phase of the third National Health and Nutrition Examination Survey, published in the Journal of the American Medical Association, indicated that average blood-lead levels had plummeted. Pockets of lead poisoning remained, mostly in the inner city, but generally

the numbers were cheering: the survey concluded that only one half of one percent of children who were tested had blood-lead levels exceeding the "intervention level" set in 1985 by the Centers for Disease Control and Prevention.

This triumph over lead is widely touted as one of the great public-health success stories of the century, a stunning example of the strength of activism over vested interests. But many are unwilling to declare victory. The Environmental Protection Agency and the Department of Health and Human Services say that lead poisoning continues to be the No. 1 "environmental disease of children, affecting at least ten percent of all preschoolers." The CDC calls lead poisoning the "most common and societally devastating environmental disease of young children." And an influential Washington lobby, the Alliance to End Childhood Lead Poisoning, states as "inescapable fact" that "approximately ten percent of all U.S. preschoolers are lead-poisoned, eclipsing other environmental health hazards and preventable childhood diseases." Other groups and the media have picked up the chant, citing widespread low-level lead poisoning as the trigger for ills ranging from attention-deficit disorder to juvenile violence.

Despite the impressive roster of medical and scientific organizations supporting these claims, however, the characterization of lead poisoning as a "silent epidemic" is not a Scientific truth but a rhetorical pose. Symptomatic lead exposure that causes clear clinical effects of mental or physical impairment is exceedingly rare. Even moderate blood-lead elevations, at the CDC's 1985 intervention level, are also quite uncommon. To get to the "one out of ten preschoolers" figure, regulatory agencies now deem as "poisoned" children whose lead-to-blood ratios fall between 10 and 25 micrograms per deciliter --considered within the acceptable range five years ago. (Children in the early 1960s averaged more than 20 micrograms.) With the stroke of a pen in 1991 the CDC changed "lead poisoning" from a clear diagnosis to a murky condition, thereby enlarging eighteen fold the likely population at risk and encouraging the enactment of sweeping anti-lead legislation. Sanford Weiner, a specialist in risk assessment at the Center for International Studies at the Massachusetts Institute of Technology, puts it this way: "The agencies moved the goalposts."

The CDC justified the new lead threshold by citing "scientific evidence" that "some adverse effects occur at blood-lead levels at least as low as 10 micrograms per deciliter in children," and adding that this evidence is "so overwhelming and compelling that it must be a major force in determining how we approach childhood lead exposure." But the evidence, while provocative, is hardly conclusive. Lead epidemiology is plagued by inconsistencies, largely because exposure to lead correlates so neatly with a number of other factors known to affect children's intelligence and psychological development. Generally speaking, children of lower socioeconomic status are more likely to be exposed to lead than are children of higher socioeconomic status, and they are likely to have higher blood-lead levels. Low socioeconomic status is itself a risk factor for poor performance on intelligence and developmental tests. Therefore it's not clear whether lead is causing deficits or simply acting as a marker for other factors known to affect performance. In a commentary in the March, 1993, issue of the *Physicians for Social Responsibility Quarterly*, the developmental psychologist Sandra Scar, the Commonwealth Professor of Psychology at the University of Virginia, wrote, "The child's heredity and environment are correlated with lead exposure such that it is extremely difficult, if not theoretically impossible, to disentangle the effects of the child's broader biology and ecology from lead exposure." Studies that have attempted to separate out

the factors are, usually by their own authors' admission, imperfect. A review of the scientific literature on lead published in the British Medical Journal last year concluded,

Uncertainty remains as to the real impact that lead makes on children's neuropsychological development. In the face of this doubt, the priority that should be devoted to detection and intervention on children with moderately increased blood lead, compared with other social influences on childhood development, is open to debate.

The Australian scientist Peter Baghurst, one of the authors of that paper, contributed to another study cited by the CDC and other experts as providing proof for the theory that low-level lead is dangerous. One of Baghurst's co-authors on the former paper, the psychologist Marjorie Smith, who is the acting director of the Thomas Coram Research Unit at the Institute of Education at London University, says that comments such as those made by the CDC are typical of the tendency to exaggerate the impact of low-level lead exposure.

"We looked at more than twenty-six epidemiological studies conducted since 1979, and found that the effect of lead at low levels on IQ was consistently the smallest of any of the factors that have been studied," Smith says. Low-level blood lead was linked to slight deficits in some psychometric measures, but these effects were so small (about one IQ point, on average) that it was impossible to determine what caused them, or if they had any real significance. In any case, the effect of lead was swamped by every other variable. For example, birth order and parental education had several times the impact on IQ of low-level blood lead, as did the amount of parental attention.

"What could be concluded was that parents should worry less about low-level blood lead and more about reading their children bedtime stories," Smith says. "But the approach here in Europe has consistently been more measured and much less reactive than it's been in the United States."

Excerpt: “The Secret History of Lead” by Jamie Lincoln Kitman

(The Nation, March 20, 2000; the original article can be found at: <http://past.thenation.com/cgi-bin/framizer.cgi?url=http://past.thenation.com/issue/000320/0320kitman.shtml>)

“The next time you pull the family barge in for a fill-up, check it out: The gas pumps read “Unleaded.” You might reasonably suppose this is because naturally occurring lead has been thoughtfully removed from the gasoline. But you would be wrong. There is no lead in gasoline unless somebody puts it there. And, a little more than seventy-five years ago, some of America's leading corporations--General Motors, Du Pont and Standard Oil of New Jersey (known nowadays as Exxon)--were that somebody. They got together and put lead, a known poison, into gasoline, for profit.

Lead was outlawed as an automotive gasoline additive in this country in 1986--more than sixty years after its introduction--to enable the use of emissions-reducing catalytic converters in cars (which are contaminated and rendered useless by lead) and to address the myriad health and safety concerns that have shadowed the toxic additive from its first, tentative appearance on US roads in the twenties, through a period of international ubiquity only recently ending. Since the virtual disappearance of leaded gas in the United

States (it's still sold for use in propeller airplanes), the mean blood-lead level of the American population has declined more than 75 percent. A 1985 EPA study estimated that as many as 5,000 Americans died annually from lead-related heart disease prior to the country's lead phase-out. According to a 1988 report to Congress on childhood lead poisoning in America by the government's Agency for Toxic Substances and Disease Registry, one can estimate that the blood-lead levels of up to 2 million children were reduced every year to below toxic levels between 1970 and 1987 as leaded gasoline use was reduced. From that report and elsewhere, one can conservatively estimate that a total of about 68 million young children had toxic exposures to lead from gasoline from 1927 to 1987.

* * *

How did lead get into gasoline in the first place? And why is leaded gas still being sold in the Third World, Eastern Europe and elsewhere? Recently uncovered documents from the archives of the aforementioned industrial behemoths and the US government, a new skein of academic research and a careful reading of that long-ago period's historical record, as well as dozens of interviews conducted by The Nation, tell the true story of leaded gasoline, a sad and sordid commercial venture that would tiptoe its way quietly into the black hole of history if the captains of industry were to have their way. But the story must be recounted now. The leaded gas adventurers have profitably polluted the world on a grand scale and, in the process, have provided a model for the asbestos, tobacco, pesticide and nuclear power industries, and other twentieth-century corporate bad actors, for evading clear evidence that their products are harmful by hiding behind the mantle of scientific uncertainty.

This is not just a textbook example of unnecessary environmental degradation, however. Nor is this history important solely as a cautionary retort to those who would doubt the need for aggressive regulation of industry, when commercial interests ask us to sanction genetically modified food on the basis of their own scientific assurances, just

as the merchants of lead once did. The leaded gasoline story must also be read as a call to action, for the lead menace lives.

Consider:

§ the severe health hazards of leaded gasoline were known to its makers and clearly identified by the US public health community more than seventy-five years ago, but were steadfastly denied by the makers, because they couldn't be immediately quantified;

§ other, safer antiknock additives--used to increase gasoline octane and counter engine "knock"--were known and available to oil companies and the makers of lead antiknocks before the lead additive was discovered, but they were covered up and denied, then fought, suppressed and unfairly maligned for decades to follow;

§ the US government was fully apprised of leaded gasoline's potentially hazardous effects and was aware of available alternatives, yet was complicit in the cover-up and even actively assisted the profiteers in spreading the use of leaded gasoline to foreign countries;

§ the benefits of lead antiknock additives were wildly and knowingly overstated in the beginning, and continue to be. Lead is not only bad for the planet and all its life forms, it is actually bad for cars and always was;

§ for more than four decades, all scientific research regarding the health implications of leaded gasoline was underwritten and controlled by the original lead cabal--Du Pont, GM and Standard Oil; such research invariably favored the industry's pro-lead views, but was from the outset fatally flawed; independent scientists who would finally catch up with the earlier work's infirmities and debunk them were--and continue to be--threatened and defamed by the lead interests and their hired hands;

§ confronted in recent years with declining sales in their biggest Western markets, owing to lead phaseouts imposed in the United States and, more recently, Europe, the current sellers of lead additives have successfully stepped up efforts to market their wares in the less-developed world, efforts that persist and have resulted in some countries today placing more lead in their gasoline, per gallon, than was typically used in the West, extra lead that serves no purpose other than profit;

§ faced with lead's demise and their inevitable days of reckoning, these firms have used the extraordinary financial returns that lead additive sales afford to hurriedly fund diversification into less risky, more conventional businesses, while taking a page from the tobacco companies' playbook and simultaneously moving to reorganize their corporate structures to shield ownership and management from liability for blanketing the earth with a deadly heavy metal."

FACT & OPINION Answer KEY

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All that, of course, has changed. Over the past quarter century Americans not only have kicked the lead habit but have turned on lead with the zeal of the betrayed. Congress banned lead-based paint for residential use in 1978, and by 1990 the amount of lead in gasoline had dropped 99.8 percent from mid-1970s levels. Also in 1990 cans with lead seams, no longer manufactured in this country, constituted less than one percent of the market; copper or plastic pipes, not lead ones, were standard in plumbing; lead solder had been banned; and lead smelters and industries that used lead had been forced to limit their emissions sharply. Blood-lead levels, measured in micrograms of lead per deciliter of blood, dropped accordingly. In July of last year the

results of the first phase of the third National Health and Nutrition Examination Survey, published in the Journal of the American Medical Association, indicated that average blood-lead levels had plummeted. Pockets of lead poisoning remained, mostly in the inner city, but generally the numbers were cheering: the survey concluded that only one half of one percent of children who were tested had blood-lead levels exceeding the "intervention level" set in 1985 by the Centers for Disease Control and Prevention.

This triumph over lead is widely touted as one of the great public-health success stories of the century, a stunning example of the strength of activism over vested interests. But many are unwilling to declare victory. The Environmental Protection Agency and the Department of Health and Human Services say that lead poisoning continues to be the No. 1 "environmental disease of children, affecting at least ten percent of all preschoolers." The CDC calls lead poisoning the "most common and societally devastating environmental disease of young children." And an influential Washington lobby, the Alliance to End Childhood Lead Poisoning, states as "inescapable fact" that "approximately ten percent of all U.S. preschoolers are lead-poisoned, eclipsing other environmental health hazards and preventable childhood diseases." **Other groups and the media have picked up the chant, citing widespread low-level lead poisoning as the trigger for ills ranging from attention-deficit disorder to juvenile violence.**

Despite the impressive roster of medical and scientific organizations supporting these claims, however, the characterization of lead poisoning as a "silent epidemic" is not a scientific truth but a rhetorical pose. Symptomatic lead exposure that causes clear clinical effects of mental or physical impairment is exceedingly rare. Even moderate blood-lead elevations, at the CDC's 1985 intervention level, are also quite uncommon. To get to the "one out of ten preschoolers" figure, regulatory agencies now deem as "poisoned" children whose lead-to-blood ratios fall between 10 and 25 micrograms per deciliter --considered within the acceptable range five years ago. (Children in the early 1960s averaged more than 20 micrograms.) **With the stroke of a pen in 1991 the CDC changed "lead poisoning" from a clear diagnosis to a murky condition, thereby enlarging eighteen fold the likely population at risk and encouraging the enactment of sweeping anti-lead legislation. Sanford Weiner, a specialist in risk assessment at the Center for International Studies at the Massachusetts Institute of Technology, puts it this way: "The agencies moved the goalposts."**

The CDC justified the new lead threshold by citing "scientific evidence" that "some adverse effects occur at blood-lead levels at least as low as 10 micrograms per deciliter in children," and adding that this evidence is "so overwhelming and compelling that it must be a major force in determining how we approach childhood lead exposure." **But the evidence, while provocative, is hardly conclusive. Lead epidemiology is plagued by inconsistencies, largely because exposure to lead correlates so neatly with a number of other factors known to affect children's intelligence and psychological development. Generally speaking, children of lower socioeconomic status are more likely to be exposed to lead than are children of higher socioeconomic status, and they are likely to have higher blood-lead levels. Low socioeconomic status is itself a risk factor for poor performance on intelligence and developmental tests. Therefore it's not clear whether lead is causing deficits or simply acting as a marker for other factors known to affect performance. In a commentary in the March, 1993, issue of the Physicians for Social Responsibility Quarterly, the developmental**

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Uncertainty remains as to the real impact that lead makes on children's neuropsychological development. In the face of this doubt, the priority that should be devoted to detection and intervention on children with moderately increased blood lead, compared with other social influences on childhood development, is open to debate.

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"What could be concluded was that parents should worry less about low-level blood lead and more about reading their children bedtime stories," Smith says. "But the approach here in Europe has consistently been more measured and much less reactive than it's been in the United States."

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States (it's still sold for use in propeller airplanes), the mean blood-lead level of the American population has declined more than 75 percent. A 1985 EPA study estimated that as many as 5,000 Americans died annually from lead-related heart disease prior to the country's lead phase out. According to a 1988 report to Congress on childhood lead poisoning in America by the government's Agency for Toxic Substances and Disease Registry, one can estimate that the blood-lead levels of up to 2 million children were reduced every year to below toxic levels between 1970 and 1987 as leaded gasoline use was reduced. From that report and elsewhere, one can conservatively estimate that a total of about 68 million young children had toxic exposures to lead from gasoline from 1927 to 1987.

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interests ask us to sanction genetically modified food on the basis of their own scientific assurances, just as the merchants of lead once did. The leaded gasoline story must also be read as a call to action, for the lead menace lives.

Consider:

§ the severe health hazards of leaded gasoline were known to its makers and clearly identified by the US public health community more than seventy-five years ago, but were steadfastly denied by the makers, because they couldn't be immediately quantified;

§ other, safer antiknock additives--used to increase gasoline octane and counter engine "knock"--were known and available to oil companies and the makers of lead antiknocks before the lead additive was discovered, but they were covered up and denied, then fought, suppressed and unfairly maligned for decades to follow;

§ the US government was fully apprised of leaded gasoline's potentially hazardous effects and was aware of available alternatives, yet was complicit in the cover-up and even actively assisted the profiteers in spreading the use of leaded gasoline to foreign countries;

§ the benefits of lead antiknock additives were wildly and knowingly overstated in the beginning, and continue to be. Lead is not only bad for the planet and all its life forms, it is actually bad for cars and always was;

§ for more than four decades, all scientific research regarding the health implications of leaded gasoline was underwritten and controlled by the original lead cabal--Du Pont, GM and Standard Oil; such research invariably favored the industry's pro-lead views, but was from the outset fatally flawed; independent scientists who would finally catch up with the earlier work's infirmities and debunk them were--and continue to be--threatened and defamed by the lead interests and their hired hands;

§ confronted in recent years with declining sales in their biggest Western markets, owing to lead phaseouts imposed in the United States and, more recently, Europe, the current sellers of lead additives have successfully stepped up efforts to market their wares in the less-developed world, efforts that persist and have resulted in some countries today placing more lead in their gasoline, per gallon, than was typically used in the West, extra lead that serves no purpose other than profit;

§ faced with lead's demise and their inevitable days of reckoning, these firms have used the extraordinary financial returns that lead additive sales afford to hurriedly fund diversification into less risky, more conventional businesses, while taking a page from the tobacco companies' playbook and simultaneously moving to reorganize their corporate structures to shield ownership and management from liability for blanketing the earth with a deadly heavy metal."