



## Leaded Gasoline: Knocking out misinformation with valid science

### CASE STUDY

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*This case study highlights four tactics of science misinformation and disinformation efforts: neglect of refuting information, personally attacking scientific experts, deviant criteria of assent for accepting scientific ideas, and putting forth conspiracy theories. See **Characteristics of Science Misinformation/Disinformation Efforts** for more information regarding these tactics and **Leaded Gasoline: Poison Everywhere** for the companion story to this case study.*



Numbered red flags refer to descriptions of misinformation and disinformation provided at the end of the case study.

The year is 1970. Scientific reports regarding evidence of deleterious effects stemming from lead exposure have been trickling out for decades and are leading to calls for industry regulation. William Patriot, the founder and CEO of a successful gasoline producing company, Patriot Brothers Gasoline, is holding a business meeting to discuss the future direction of the company with his business partners, Jackson and Preston. Patriot Brothers Gasoline is nation's largest producer of leaded gasoline, a product which reduces engine knocking.



**William:** We need to address this lead situation. Concern among the public is growing. Jackson, Preston, I need your help deciding the future of P.B. Gas.

**Jackson:** People are upset because gasoline and paint sources have been connected with increased lead exposure.

**William:** Who has been putting that out?

**Jackson:** You know who. It is the Ohio group again - that group of air quality researchers.

**Preston:** It must be so nice for the Ohio group to live in fantasy land where everybody wears flowers in their hair and frolics in nature. While they are considered air quality experts by the scientific community, they have no idea what it takes to run a country, a state, or even a business. If everybody thought that way, the world wouldn't ever get anything accomplished. Can you imagine if the Ohio group were in charge during the war? *Oh, better not use too many ships or tanks because they make the air dirty.* I bet a lawsuit would make them think twice about continuing their research.




**William:** Easy, Press. Think about them what you want, but that does not change the findings. Personal and legal attacks will only distract us from clear thinking. We need to remain focused on the scientific results.

***How can attacking the character of and waging legal battles against scientists and research groups facilitate misinformation and disinformation spread and be used to cast doubt on well-established science ideas?***

**William:** What did they even find this time?

**Jackson:** Just to be clear, our prior research indicated levels of lead exposure. The insight from the Ohio group is that the lead exposure we found was actually *not* within natural levels.

**Preston:** The location of our study in Peru ended up being an outlier. When the Ohio group tested in a lab cleanroom, they found the natural baseline to be a thousand times smaller than previously suspected.

**William:** That can't be right. They need to test their results in all 50 states and multiple countries on every continent to determine what the baseline levels actually are. Without that minimum standard, their claims are unreliable and our baseline levels continue to be a safe and appropriate benchmark. 

**Jackson:** Think about how contradictory you are being. Why would one location be good enough to make our levels true, but a controlled lab room making every effort to avoid outside contamination isn't good enough to make their levels true? Testing in all those locations would create a huge burden and be very time consuming.

***Why is it inappropriate and unnecessary to demand data from all 50 states and multiple countries? Why might it be problematic to dismiss scientists' warnings about lead exposure until this data is collected?***

**Preston:** What exactly is happening to the body with lead exposure anyways? We need to be sure this is a big deal.

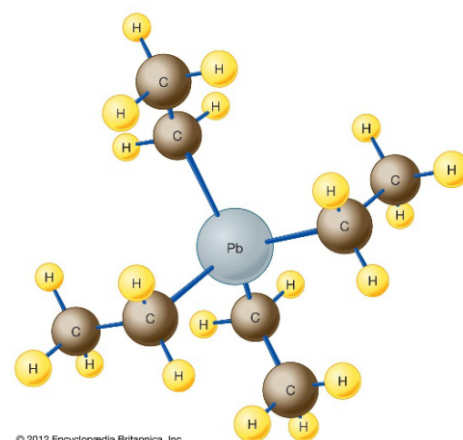
**William:** Well, we have known lead exposure has serious consequences for a long time. Journals have reported on the poisonousness of lead even before the American Civil War. The Romans knew about dangers from lead long before that.

**Jackson:** The elephant in the room is the negative impact on child brain development. The Needleman group is set to begin a major study in the next few years, but the field indicates a connection between lead exposure and mental development (Byers & Lord, 1943).

**William:** Primarily lead enters the body by breathing or swallowing dust. The paint industry has also found lead exposure may be the result of small paint chips similarly breathed in or digested. Once inside, it can persist for decades wreaking havoc on the central nervous system. Children are most susceptible, but it also has serious consequences for unborn babies.

**Jackson:** Our lead is part of a molecule called tetraethyl lead. The lead in that molecule is more reactive in biochemical reactions that typically involve calcium and iron. That means that lead will get into your blood, bones, and teeth, and stick around.

**Preston:** The human health implications do not look good. How certain is this information? Do we know it is coming from us?



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Tetraethyl lead molecule. Retrieved from <https://www.britannica.com/science/tetraethyl-lead>

**Jackson:** Well, there have been rumors spreading of some environmental scientists and media plotting to spread an unfounded anti-lead campaign. Other scientists have been afraid to research and confirm the harmlessness of lead exposure because of the backlash they would get. These voices are being stifled, and we might be able to offer them research funding to speak up.



**Preston:** For that to be true, there would have to be dozens, if not hundreds, of scientists afraid to speak out that lead is harmless. Putting forth conspiracy theories about suppressing certain opinions from being researched or published is a common theme across sources of misinformation and disinformation.

***When global communities of experts and professional organizations concur with and endorse scientific claims, how does that affect the trustworthiness of the claims? How does that affect the feasibility that a widespread conspiracy regarding science can occur?***

**Jackson:** I admit, I do have a lot of concern about environmentalists coming after P.B. Gas. The consequences for the public would be devastating. We are the only product on the market to keep engines running smoothly in America. There are no alternatives to leaded gas! Without us, the economy will stall, and we will be put into another recession!



**William:** Jackson, there are multiple products on the market that can serve as an alternative to P.B. Gas. We have ideas developing in our own R&D department right now. We cannot afford to suggest there are no alternatives when there clearly are.

***Why are people often tempted to reject reliable scientific information that conflicts with their own interests? How can that stall progress toward effectively resolving issues such as leaded gasoline?***

**William:** That brings us to the million-dollar question: What options do we have?

**Preston:** There are lots of factors to consider as a business leader. Economically, we have to consider what any stop to production would do to the company's bottom line and our ability to offer strong jobs. Environmentally and from a human-health standpoint, the long-term effects are undeniable.

**Jackson:** It sounds like we can do anything - from completely halting production to continuing production and sales as-is. If we waited, there might be time to complete our research into a safer alternative, but there's no way of knowing when that might be. If we stop production, we will be forced to find an alternative sooner.

Using the information from the case study and other credible sources (e.g., your course content) answer the following questions.

*How might the features of misinformation and disinformation associated with lead exposure from gasoline emissions impact peoples' thinking and decision-making?*

*How might personal and group-reinforced emotions and biases influence thinking and decision-making regarding this issue?*

*Regulating your own emotions and personal biases and citing multiple lines of credible evidence (scientific, economic) as well as ethical and social considerations, propose a resolution regarding the use of P.B. Gas's leaded gasoline product.*

### RED FLAG GLOSSARY



#### ***Personal attacks on legitimate scientists***

Those promoting misinformation/disinformation will at times mount serious personal and legal attacks on researchers publishing and presenting peer-reviewed studies that debunk or are at odds with the misinformation/disinformation.



#### ***Deviant criteria of assent***

The standards for acceptance of scientific knowledge are multifaceted and nuanced, but reasonable and evenhanded. In contrast, those spreading science misinformation/disinformation establish criteria that are customized in a way that the accepted science is almost impossible to satisfy. At the same time, purveyors of science misinformation/disinformation do not hold the information they spread to such standards.



#### ***Promoting conspiracy theories***

Reference to conspiracy theories is an often-used misinformation/disinformation tactic in an attempt to explain why pseudoscientific ideas and/or articles have not been accepted by the scientific community and/or published in scholarly journals, or why the global community of scientists has adopted the consensus position.



#### ***Neglecting of refuting information***

Even though well-established scientific knowledge is potentially open to revision, this does not mean such knowledge is easily changed. Widely encompassing scientific ideas are often faced with anomalies, but the crux of the matter is that comprehensive ideas are not discarded simply because some pieces do not fit. Misinformation/disinformation sources are different in that they often selectively ignore well-established and comprehensive evidence in order to maintain ideas that have been thoroughly refuted by the

### References

Byers, R. K., & Lord, E. E. (1943). Late effects of lead poisoning on mental development. *American Journal of Diseases of Children*, 66(5), 471-494.