

# The Price of Engineering Ethics, a Personal Story

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There are costs for doing the right thing, but regret is not one of those costs. I learned this lesson the hard way throughout a 42-year engineering career. As a young engineer, raising a family, I was more adaptable to management mandates, i.e., I was more willing to be unethical to keep my job to make money and have health insurance for my family. As I grew in age, experience, and stamina, I was less adaptable, i.e., I was more ethical. This article tells this story through events at various times in my engineering career<sup>1</sup>. Ethics define how we do the right thing.

*Keywords:* Engineering Ethics, Fukushima explosions, Three Mile Island explosions, Piper Alpha explosions, San Bruno explosion, Hamaoka explosion, I-40 bridge crack, nuclear waste

## Introduction: An Early Career Decision

I started work as an engineer after going to night-school at Johns Hopkins University to study Mechanical Engineering, while I worked in the construction trades until I was 30 years old (1981). In the trades, my family and I lived near the poverty level due to frequent layoffs. I completed an apprenticeship to become a journeyman sheet metal worker, and I worked in different trades including carpentry<sup>2</sup>.

After graduating from Hopkins, I worked for Westinghouse Defense in Baltimore, Maryland, where I worked on the aircraft radar for the B1 Bomber. A high-level manager—I will call him Mike—demanded that I skip the technical reviews for all drawings to meet schedule. When I raised a concern, I was told that I will do what I am told—period. After all, there are always drawing errors, and skipping the drawing checks would save money on this \$100,0000 per day radar design project. Mike said that we will fix any problems later.

At the same time, a more seasoned engineer was told to do the same thing and skip technical reviews of drawings, which are created by draftsmen at the direction of engineers. He refused. As life would have it, we both finished our projects on the same day, but my path was much rockier than his path.

Of course, there were errors on the drawings that were my responsibility, but there were no errors on his drawings. When I met with Mike and other managers to discuss drawing errors, Mike stated that he never gave me such instructions, and that I made up the entire story. Another manager, Dennis, stepped up and said that I was telling the truth. Dennis heard what Mike said to me. Dennis prevented me from being disciplined for poor work performance, where another engineer was fired about that time for poor design practices.

To correct the drawing problems, I flew to a Westinghouse plant in Texas to fix the problems. I was told about the problem at lunch, and I flew to Texas by the end of the day.

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<sup>1</sup> There is far more to my life than this short story, but those stories are to be told on another day.

<sup>2</sup> See <http://www.leishearengineeringllc.com/resume.html> for extensive credentials of experience and education.

Mike was replaced, and the new manager later said that even though I caused the problem, my poor performance would be overlooked, since I took such crisp action to fly to Texas. I was still falsely blamed for following a management decision.

What I learned was that I should stand against management when they make poor decisions. I also learned that if something was not in writing, the event did not happen at all. In other words, managers and engineers will lie to protect themselves when things go wrong, and if you do not have the event recorded in writing, you will be painfully alone with the facts<sup>3</sup>.

Throughout much of my career, I sent out daily or weekly emails to document management decisions, and such emails were occasionally important documentation of events. Otherwise, those emails also served as good project summaries, which I could include in subsequent project reports and engineering publications.

### **A Little More Lack of Integrity**

Later in my career (1991), I worked at Westinghouse Savannah River Site (SRS) in South Carolina. My first major job was to build an emergency pumping station. Being new to the job, I was the only engineer in the building on New Year's Eve, when water laced with radioactive tritium was learned to have been accidentally released to the Savannah River. I worked so many hours that another employee drove me home so that I did not have a car accident. A high-level manager stood outside my door to ensure that I was not disturbed, as I resolved this national problem that was all over the news and on television.

During the design, I requested an engineer to ensure that a tanker truck was properly fitted to be used for my design. He assumed that the truck was okay and did not bother to check the truck. He came back to my office, he lied to me, said he that he verified that the truck had the required piping installed, and I believed him for a while. How could someone with an "L", or "secret", government clearance lie to me so casually!

I discovered his lie the night before many tanker trucks were going to transfer tritiated water from a nuclear reactor building into an 850,000-gallon radioactive liquid waste tank. I met with an engineering manager, and I suggested that we informally review the project. That manager then said that he saw the truck at the reactor building, and when I asked him about a pipe that was supposed to be installed on the truck, he said the pipe was not there. Without that pipe, tritiated water could not be pumped out of the tanker truck after it drove tritiated water from the reactor to the waste tank, over and over. I immediately went to the reactor building, donned radiation protection clothing, climbed up on top of the truck, and saw for myself that the required pipe was not installed.

In the morning, I was brought before management. About 15 managers and the engineer who lied to me were standing against the wall behind the facility manager, who sat at his desk. I stood facing them all, and I was angrily asked by the facility manager, "Why were you standing on top of that tanker truck last night".

I answered that the drawings showed that the pipe was installed, and during a thorough follow-up review of the project, I learned that the pipe was not installed. I could not prove that the liar had lied, he certainly would not admit his lies to lose his job, but not accusing him was certainly a lapse in ethical behavior on my part. In retrospect, I should have documented his information about the pipe in writing.

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<sup>3</sup> I do not use actual names in this article since I do not have details in writing, and the individuals in question are not the issue. My responses to their actions are the fabric of ethics. Even so, I am prepared to defend all statements made herein, at any time. I am presenting the facts as the facts occurred. Ethics demand that facts are presented accurately.

Management liked my defense so much that I received a promotion not long afterwards. The plant managers paid for a barbecue lunch for more than one hundred people to celebrate the project success. I did not know any of the people who were celebrating my design, except for one manager who jokingly asked me if I knew anything about the design.

Another manager once told me that I would never receive compliments from managers, but if they ask me to work for them again that action is, in itself, a compliment. The success of this project started a 40+ year career of troubleshooting complex mechanical systems, where I picked up where other engineers had failed.

### **A More Seasoned Decision**

A few years later, I was responsible for the installation of a thirty-foot-long vertical pump, which cost more than one million dollars. The pump was to be used to mix radioactive liquid waste to facilitate waste removal for permanent closure of the tank. Management demanded that I skip tests for the pump to meet schedule, where closure of this tank was related to a federal facilities agreement. I refused. I then worked 60-70-hour weeks for a few months—being paid for 40 hours per week. My refusal resulted in the success of the project, and I published that success (Figure 1, Leishear, Lee, Dimenna, & Stefanko, 2004; Stefanko, Leishear, Lee, & Dimenna, 2004; Lee, Dimenna, Stefanko, & Leishear, 2004).

I demanded a transfer from that job as a direct result of conflicts with management. Management never admitted their demand for incompetent research—they simply claimed that there was a misunderstanding. I had the documentation to prove them wrong, and they let me transfer to a different job without question.

About 10 years later, I worked on the same project that was still not complete, where I had been asked to perform incompetent work to meet a fictitious schedule.



*Figure 1.* A 1.3-million-dollar mixing pump at Savannah River Site.

### **An Even More Seasoned Decision**

When I finished my night-school PhD research in Mechanical Engineering at the University of South Carolina, I asked for another job transfer. This time, my transfer was to the Savannah River National Laboratory to be a research engineer. Trouble came again—money was first again.

I was tasked to lead a research project to investigate the mixing of nuclear waste. Also, this research was intended to not only determine the time required to mix a near one-million-gallon tank, but this research was intended to prevent the release of explosive hydrogen from the nuclear waste that required mixing for further processing. Such research had never been performed.

I informed management that costs would be near \$1.5 million to complete a comprehensive project, but management offered \$50,000 for the research. In the project estimate and risk analysis, I asserted that there would be many additional costs, and I listed each of the required steps to success. The first \$50,000 worth of research, and each listed \$50,000 research step that followed, were so successful that management continued to increase the budget until the budget reached \$1 million.

I then met with a conference room full of engineers and managers (about 10 of them), and I was demanded to sign a document that the research was complete. This type of research is referred to as nuclear safety class research, where process systems that prevent or mitigate radioactive hazardous material exposure to the public are defined as safety class systems. I was asked to falsify a safety class document. I refused.

Upper management above those in that meeting finally accepted my technical arguments, and the project went forward to spend the remainder of the \$1.5 million. The results were a resounding success, and I was informed years later that my published reports were a staple for mixing nuclear waste. The results were published in a series of publications (Leishear, 2013a; Leishear, Poirier, & Fowley, 2011; Leishear & Parkinson, 2010).

### **A Final Ethics Decision While Working for Others**

At the end of my career at SRS, I had another conflict about a project schedule. My manager informed me that I would be disciplined for disobedience if I did not immediately complete a project at his command. The facility was amid a condition referred to as Deliberate Operations, where every job that was performed was to be performed carefully. However, I was demanded to perform work that I knew to be incompetent.

I was stuck in the middle of a threat to my job. I came to work on my day off on Friday to complete the needed work to ensure plant safety. My manager was there also. I found myself hiding my work to do a good job.

I came to work on the following Monday, and I resigned. I refused to perform incompetent work<sup>4</sup> on a safety class system. The success of this project was partially documented through the invention of new technology that I published (Leishear & Gavalas, 2015).

A pattern emerged. That is, some of my scientific discoveries were only possible through refusals to follow management demands to perform incompetent research. Most of my scientific discoveries have been marred by ethical conflicts caused by others. I steadfastly faced adversity to overcome those who would stop scientific discovery.

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<sup>4</sup> Currently on my website (<http://www.leishearengineeringllc.com/publications.html>), an email to the Vice President at Savannah River Nuclear Solutions documents this entire sequence of events. In that letter, I wrote that “The reason that I left SRS was a management demand that I perform substandard and incompetent work, when the... facility was in a state of Deliberate Operations”. That Vice President later wrote a very positive reference for me in my attempt to receive a government grant to stop nuclear power plant explosions, where this proposal was unethically declined by the U.S. Department of Energy.

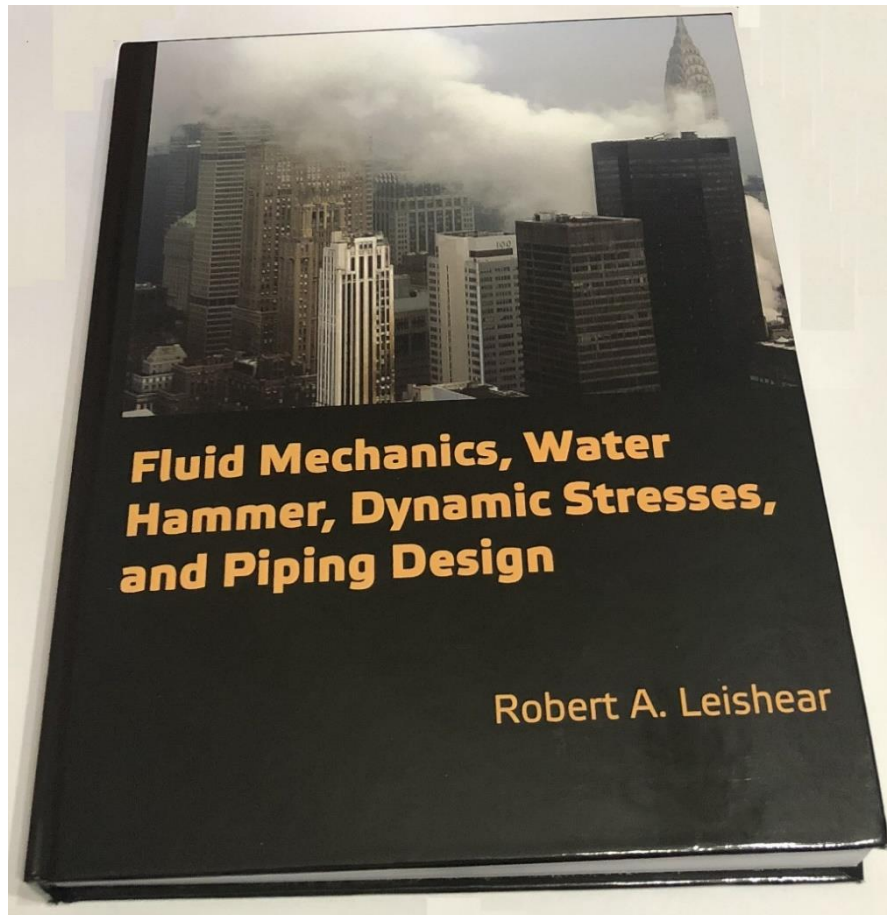


Figure 2. ASME book to stop piping failures.

### Science and Technology Ethical Conflicts

Parallel to working at SRS, I wrote many engineering publications and attended many engineering courses. Ethics issues peppered that research.

While working for my Doctoral degree in engineering, I faced an interesting dilemma. The final exam for a nuclear engineering course was provided, and that exam was similar to a class assignment. In that assignment, some calculus steps were not provided, where the writers of that published article had apparently made a questionable claim that the math worked, when in fact the math could not be apparently performed. To complete the exam, I found an applicable article on the internet, which could be used as a template to complete the exam and earn a good grade. I realized that the only way to pass the exam was to use this article and cheat on the final exam. I was faced with a hard decision. Cheat and earn my PhD or be honest and probably lose my PhD.

I wrote to the professor. "After investing considerable time into the exam, I looked on the internet, and the derivations for problems 1 and 2 are available. I considered the option of adapting those derivations to the exam solutions. Actions like these seem to lack integrity, so I do not plan to submit the exam. A poor grade is preferred to a lack of honor. Perhaps a tough decision, but the right thing to do. If nothing else, this class has certainly been an interesting struggle, where I have invested more time into learning from this class than any class previously taken". Surprisingly, I passed the course based on my efforts, along with an instructor's statement that he appreciated my "honest assessment of [my] situation".

Also, while publishing my new theories, ethics from others have frequently been a challenge. A reviewer for my first publication wrote “Bullshit” 23 times on an official document for the American Society of Mechanical Engineers (ASME). Such a personal attack was a long way from ethical or even decent. I asked the Chair of the ASME Pressure Vessel and Piping Conference to override the session chairman’s decision. As the overall Conference Chairman, he permitted me to publish at the conference.

I then presented this publication of my newly invented theory. The session chairman stated that I did a lot of work, but my work was useless. I quickly suspected who the negative reviewer was.

In short, a commonly used approach to discredit the work of others is to execute a personal attack against that worker. This reviewer/session chairman had no technical argument to present, so I was viciously attacked. This paper was the focal point of my subsequent 2013 ASME engineering book that I have since taught to hundreds of engineers and nuclear plant operators (Figure 2, Leishear, 2013b).

My research is peppered with other similar stories, where reviewers frequently resort to personal attacks since they do not have the ability to respond with technical facts to dispute a new technical theory. Listing this subset of poor-quality engineers seems like a waste of time. I have confronted those engineers in print when needed, and they do not respond.

### **The Freedom to Be Ethical in National Affairs**

Once I left SRS, I was free to act without unethical pressures from managers. I now work for myself. Since 2016, my choice has been to perform research to save lives, property, and the environment. I will not discuss my volunteer research for the past eight years in detail, except to say that I have accused numerous government agencies of incompetence and coverups. Numerous references, both peer reviewed and non-peer reviewed, are available, where an Op Ed provides a thread to those references (Leishear, 2023).

Guilty organizations include:

- The U.S. Nuclear Regulatory Agency covered up Three Mile Island explosions, where the Fukushima nuclear plant explosions could have been prevented had this coverup not been executed against us. Fukushima and Three Mile Island explosion coverups continue today. An incoming, preventable, nuclear plant explosion is expected before 2039 (Leishear, 2021), and the NRC thus allows the next incoming nuclear power plant explosions.
- The U.S. Department of Energy (DOE) allows explosions in nuclear power plants, such as the Hamaoka, Japan nuclear power plant piping explosion.
- That is, DOE refused to provide funding for research to stop nuclear power plant explosions, and the DOE Inspector General unethically upheld the decision that reactor safety should not be funded.
- Cites across the U.S. allow \$60 billion per year in water main breaks.
- The Center for Disease Control allows the spread of disease, illness, and death through breaking water mains to spread E. coli, Listeria, lead poisoning and Legionnaires’ disease.
- The Department of Transportation allows gas pipelines to explode and burn a dozen people to death every year, where explosions such as the San Bruno explosion burned 8 people to death.
- The Bureau of Science and Environmental Engineering allows ongoing explosions of offshore oil rigs and allows the deaths that occur during these explosions, such as the Piper Alpha explosions that killed 167 men.
- The U.S. Department of Transportation refuses to face bridge safety dangers, such as the crack in the I-40 bridge across the Mississippi from Arkansas to Tennessee.

### The Costs of Ethics

To act ethically during business transactions, a person may need to risk losing their job. Such a cost can be difficult to accept. I have accepted that risk on occasion, and I have no regrets. However, I changed job positions due to these decisions, quit my job on one occasion, and received severe, nearly hateful, criticism from managers. There were costs to act ethically in past business transactions.

Today, I have the freedom to act ethically as I choose, but the costs to fight government organizations are high. Over the years, my financial costs have exceeded \$200,000 and my free time dedicated to this public service has exceeded 20,000 hours. I have had many arguments and received many false, and sometimes vicious, accusations against my character and against my drive to help others. Professional organizations fabricated false technical information to argue against my research.

All of these altercations are very unpleasant and stressful. I seem to be much happier when not arguing with others and not working so hard.

Even so, I believe that my work will make our world a little better place to live. To this end, I have a contract in place to write a 2024 technical ASME book, which will provide the physics behind many disasters that can be prevented (Figure 3, Leishear, 2024a, in process). A second politically motivated book is planned to be self-published in 2024 to present many coverups by our government (Figure 4, Leishear, 2024b, in process).

Moreover, I am in the midst of a one-man war against our government. The stakes of this struggle are our lives, our money, and our environment, which is our world around us. Again, there are costs for doing the right thing, but regret is not one of those costs.

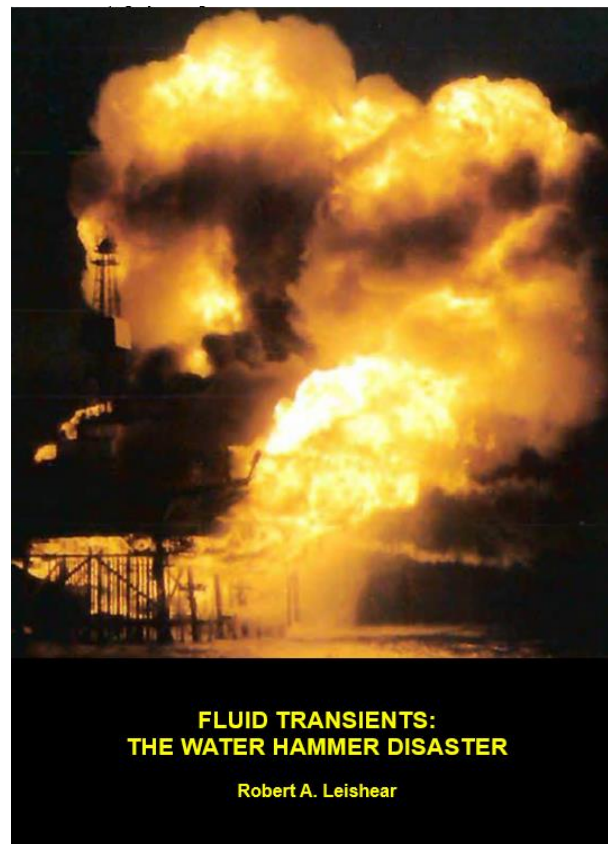


Figure 3. In process, contracted ASME book.

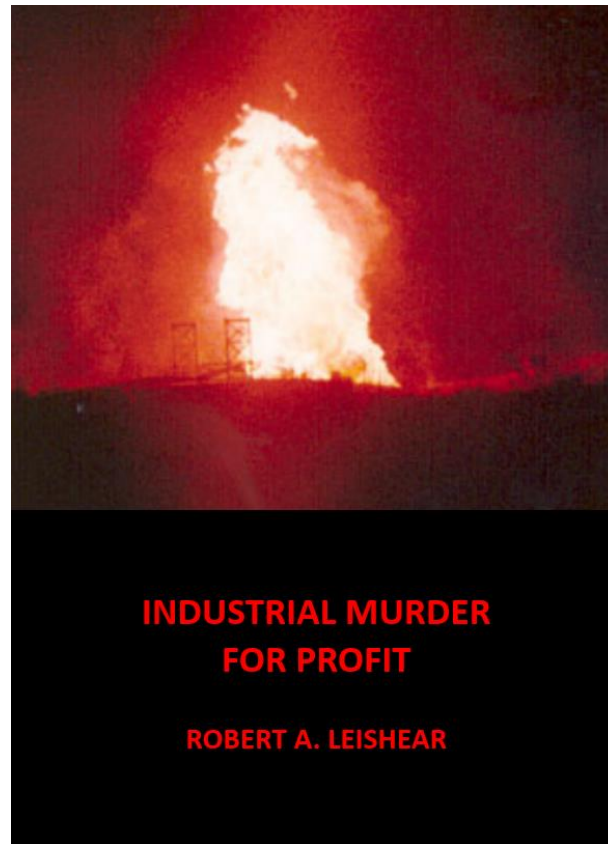


Figure 4. In process, self-published book.

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