

Love Canal: Failure of Chemical Engineering Ethics

It is a chemical engineer's responsibility to be aware of ethical dilemmas that are often encountered in professional practice. The notorious Love Canal disaster serves as a reminder of the need for ethics in engineering practice.

Love Canal is a one mile stretch of water heading north from the Niagara River, located between Lake Ontario and Lake Erie in New York. Originally it was envisioned by William T. Love to be a canal to connect the upper and lower levels of the Niagara river separated by the Niagara falls. The canal was never realized due to limitations of direct-current electrical lines, lack of sponsorship during the Panic of 1893, and regulation from Congress to preserve the Niagara Falls. Love decided to change his plan for the canal to make it instead a shipping lane from Lake Ontario to the Niagara River, but funding only allowed a one-mile stretch, fifty feet wide, and ten to forty-feet deep. The canal became a home for nine hundred families by the 1970's making the population approximately three thousand people [1].

In 1942, Hooker and Plastics Corporation bought a fifteen acre plot of land in the Love Canal neighborhood near Niagara Falls. Shortly after the purchase, Hooker began dumping toxic chemicals into the ground because it was the cheapest and easiest method for disposing waste. Love Canal had roughly two thousand inhabitants at the time. Over the eleven years that Hooker remained in operation at Love Canal, approximately 22,000 tons of various chemical wastes had been dumped into the canal [2]. When the area was completely filled with waste, in response to demands from the local school board, Hooker ceased use of the site. After several disputes over the ownership of land, in 1953, Hooker sold the land to the school board for one dollar with

a disclaimer indicating that Hooker was not responsible for any permanent environmental damage or for any danger to public health [3]. However, it soon became apparent that much damage had been done to the area and to its residents.

In 1975, after periods of high groundwater levels, parts of the landfill that contained the waste began to subside, allowing barrels to begin surfacing and contaminating ponds that formed around the canal. The air began to smell of noxious chemicals and house basements began to seep an oily substance [4]. Initially, Hooker and the government turned a blind eye to the concerns of the local residents, even after the Environmental Protection Agency released several disturbing reports about the region. Eckardt C. Beck, an EPA administrator, had a particularly disturbing report [5]:

Corroding waste-disposal drums could be seen breaking up through the grounds of backyards. Trees and gardens were turning black and dying.

Everywhere the air had a faint, choking smell. Children returned from play with burns on their hands and faces.

The EPA also reported increased numbers of miscarriages in women and a disturbingly high number of people that developed cancer. By 1978, Love Canal had finally received national attention and President Jimmy Carter declared it to be a federal health emergency. 800 families were relocated from the area and Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act which held polluters responsible for damages caused by waste. However, in 1994, Federal District

Judge John Curtin ruled that, although Hooker was negligent, Hooker was not reckless in its waste management [6].

By 1980, fewer than a hundred of the nine hundred families chose to remain at the Love Canal. The other eight hundred were all relocated and reimbursed for their homes by the United States government. The EPA announced that after blood tests were conducted on all residents, 33% were reported to have chromosomal damage, a likely precursor to leukemia. For chromosomal damage, the normal percentage in the United States at the time was 1% [7]. Hooker never directly paid for the damages it caused to Love Canal, but in 1995, Occidental Petroleum, which had bought Hooker, was sued by the EPA and paid \$129 million [8]. Several families pursued more lawsuits against Occidental Petroleum; they were settled several years after 1995.

How did the chemical engineers at Hooker allow such a blatant disregard of safety by disposing toxic waste so poorly? Were economic factors dominant or did negligence play a greater role? Maybe fear of losing a job for speaking out against a boss? Perhaps it was truly negligence that allowed for this disaster to occur. In any case, the Love Canal disaster was a significant event that marked a turning point for industrial corporations towards a heightened awareness of their impact on the environment. Chemical engineering practice also shifted from a sole emphasis on efficiency and cost-effectiveness to creating clean processes as well. When the American Institute of Chemical Engineering was established in 1908, it adopted a code of ethics to establish a strict standard of excellence with regard to safety and waste disposal. Every chemical engineer should [9]:

- To hold paramount the safety and welfare of the public
- To formally advise employers he or she perceives that a consequence of his or her duty will adversely affect the present or future health or safety of colleagues or the public
- To accept responsibility for one's actions.

The Love Canal disaster was a blatant disregard of these rules, perhaps because they had not been properly communicated by the company's management and by the university that prepare young people for a professional career.

It is surprising that many universities do not have an ethics requirement in the chemical engineering curriculum. It is unfortunate that chemical engineering students do not receive education toward preventing a violation of the code of ethics given by AIChE. The Love Canal disaster was one of the worst environmental debacles in American history arising from failure to exercise ethical chemical engineering. To prevent future disasters, it will be helpful to teach young chemical engineers ethical principles as part of their college training.

References

1. Elizabeth D. Blum, Love Canal Revisited, Kansas: University Press of Kansas, 2008, p.22
2. Website: "Love Canal Collections," University at Buffalo Libraries, <http://library.buffalo.edu/specialcollections/lovecanal/about/background.php>
3. Same as [1].
4. Same as [2].
5. Eckardt C. Beck, "The Love Canal Tragedy," EPA Journal. January, 1979.
6. "U.S. v. Hooker and Plastics Corp.", 850 Federal Supplement, 993 (W.D.N.Y., 1994)
7. "Data from the New York Cancer Registry show no evidence for higher cancer rates associated with residence near the Love Canal toxic waste burial site in comparison with the entire state outside of New York City." Cancer incidence in the Love Canal area. Science, v. 212, June 19, 1981: 1404-1407.
8. "Occidental to pay \$129 Million in Love Canal Settlement". U.S. Department of Justice. December 21, 1995.
9. Website: "Code of Ethics," American Institute of Chemical Engineers, <http://www.aiche.org/About/Code.aspx>