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FOR ENGINEERING AND SCIENCE

# Love Canal

Ethics in the Science Classroom Case Study #6

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## Description

This historical case study looks at the infamous Love Canal dumpsite and discusses the ethical issues associated with efforts to protect the public from environmental pollution.

## Abstract

This is one of six cases from Michael Pritchard and Theodore Golding's instructor guide, "Ethics in the Science Classroom."

**Categories of Ethics/Values Issues Illustrated by This Case:** Issues related to individual, corporate and governmental responses to environmental and ecological concerns.

## Body

# 1. Introduction

Degradation of the environment resulting from human activity is certainly not a phenomenon of recent origin. As early as the fifteenth century, long before the beginning of the industrial revolution, London was already being plagued by noxious air pollution resulting from the burning of coal and wood. However the extent of the effect of environmental pollution was greatly increased following the end of World War II by the exponential expansion of industrial activity in developed nations, employing vast quantities of fossil fuels and synthetic chemicals. Today's environmental concerns are regional, national and global, as well as local.

The ongoing educational, social and political movement which has raised the consciousness of people in the United States and throughout the world about environmental concerns, began in the early 1960s. Its initiation is often attributed to the popular response to the *Silent Spring*, the eloquent book by marine biologist Rachel Carson about the dire effects of the overuse of pesticides and other chemical poisons, published in 1962. The ensuing environmental movement has spawned numerous local, regional, national and international organizations, many rather militant, which have used numerous tactics to press their demands for the preservation of clean air, pure water and unspoiled land. In response to these demands, legislative bodies have enacted all manner of regulations and numerous agencies have been charged with the task of environmental protection.

This increase in environmental activity has been accompanied by much controversy. Entrepreneurs, property owners, industrial workers, politicians, scientists and people in all other walks of life differ with regard to the relative value they accord to the benefits and costs associated with restrictions on freedom of action designed to protect the environment. A wide variety of ethics and values issues arise in the attempt to balance such demands as property rights and the entrepreneurial freedom to pursue profits against the ecological need to curtail those rights and restrict that freedom.

One of the most contentious environmental issues has been how to respond to the discovery of many thousands of hazardous toxic dumps that have resulted from decades of virtually unrestricted disposal of toxic industrial waste. This issue was first widely publicized as a result of the health emergency declared by the New York

State Department of Health in 1978 in response to shocking revelations about the problems caused by improper waste disposal in the now infamous Love Canal dump site. The actions and reactions of the corporation that had disposed of the waste in question, the public officials, the residents, the media and the scientists involved in the Love Canal controversy serve as excellent illustrations of many of the ethics issues associated with efforts to protect the public from environmental pollution.

## **2. Background**

Toward the end of the nineteenth century, entrepreneurs built numerous canals to unify waterways into efficient shipping systems. One such canal was begun in 1894 by venture capitalist William Love in the Niagara Falls area of New York State. Within a few years, an economic depression undermined Love's financial plans, and the partially completed project was abandoned.

Dubbed "Love Canal" by the local residents, it was used as a swimming hole and an ice rink. In 1942, faced with the need for a place to dispose of toxic waste from the manufacture of chlorinated hydrocarbons and caustics, the Hooker Electrochemical Corporation (presently Hooker Chemical and Plastics, a subsidiary of Occidental Petroleum Corporation) leased the canal as a waste dump. In 1947, Hooker bought the canal and the surrounding land. Between 1942 and 1950, more than 21,000 tons of chemicals, including such potent toxins as benzene, the pesticide Lindane, polychlorinated dioxins, PCBs and phosphorous were deposited in the canal, which Hooker had lined with cement. Having exhausted the canal's potential as a waste dump, Hooker then installed an impermeable cap that was supposed to prevent water from entering and promoting seepage of the toxins, and the former canal disappeared from view beneath a layer of fill.

In the early 1950s the local School Board was confronted with the need to build a new school to accommodate an increasing population of children. The Board knew that Hooker was anxious to get rid of the Love Canal property and began making inquiries. Hooker has claimed that it resisted and warned the Board of Education that the buried chemicals made the site inappropriate for school construction. The property sale was consummated for \$1.00 in 1953--but the company asserts that it gave in because the Board would otherwise have taken the land by eminent domain. Whether Hooker was as reluctant as it says it was and as assertive in cautioning the

Board about the hazards is impossible to determine. Existing minutes of the meetings in question do not fully support Hooker's version of the proceedings, and none of the Board members are still alive. What is clear is that the deed that was negotiated contains a clause exempting Hooker from any "claim, suit or action" due to future human exposure to the buried chemicals.

An elementary school was built in the middle of the property and the surrounding land was sold by the School Board to developers who built 98 homes along the former canal banks and about a thousand additional houses in the Love Canal neighborhood. The construction of the school, houses and associated utilities resulted in the breaching of parts of the canal's cap and its cement walls.

### **3. The Case**

The first known case of exposure to the buried toxins occurred in 1958, when three children suffered chemical burns from wastes that had resurfaced at the former canal site. Both Hooker Chemical and city officials were officially informed, but neither the Niagara Falls Health Department nor any other public agency took any action in response to that event or to numerous other complaints during the next twenty years. Hooker's records reveal that the company investigated the initial incident and several other reports, and quickly became convinced that the very large reservoir of toxins was not likely to be contained. Hooker did nothing to convey this knowledge to the Love Canal homeowners, who had never been informed about the nature of the potential hazard. In testimony two decades later, Hooker acknowledged that its failure to issue a warning was due to concern that this might be interpreted as liability for possible harm despite the clause in its property sales deed.

By 1978 occupants of the homes in the area had begun to organize what was to become the Love Canal Homeowners Association (LCHA), under the highly competent and aggressive leadership of Lois Gibbs. Investigative newspaper reporter Michael Brown helped to publicize the plight of the many deeply concerned local residents who had encountered evidence of toxins resurfacing in or around their property. Chemicals had been observed in the form of viscous fluids seeping into both yards and basements, pervasive odors in homes and the stench emanating from storm-sewer openings.

Love Canal soon became the first hazardous waste site to be featured in TV news reports and to get front page, headline billing in newspapers and magazines in New York State and nationally. Embarrassed by the past failure of officials to respond to the clear indications of a serious problem, both the New York State Department of Health (NYSDH) and the U.S. Environmental Protection Agency (EPA) quickly became involved. Tests soon revealed a wide variety of noxious chemicals in the air in Love Canal homes and an excessive frequency of miscarriages among women living in homes adjacent to the former canal site. A public health emergency was declared on August 2, 1978, by the New York State Commissioner of Health. A few days later, Governor Hugh Carey announced that New York State would purchase the 239 homes nearest to the canal and assist the displaced families in relocating. These abandoned homes were fenced in, and work was soon begun on a plan to construct an elaborate drainage system, including trenches, wells and pumping station, to prevent further outward migration of the toxins.

The cost of these initial actions, which rapidly followed the emergence of Love Canal as a national "cause célèbre" ultimately cost the state and federal governments in excess of \$42 million. Public officials quickly recognized that a continued preemptive response to potential health problems at Love Canal was likely to exceed available emergency funds in the state's coffers. Furthermore, it was known that thousands of other toxic waste sites existed throughout the country that might pose similar threats to numerous other communities. Thus it is not surprising that the concerns and demands of the owners of the 850 homes outside the inner evacuated circle were not to be satisfied by either state or federal officials in a similar fashion.

The NYSDH did conduct a survey study of the residents in the remaining homes, which led to an announcement in early fall that the rest of the neighborhood was safe, posing no increased health risk. As was subsequently revealed, this assurance had been based on only one health issue examined by the survey. The Department had concluded that the miscarriage rate in the homes beyond the fence did not exceed normal rates--a conclusion based on a methodology that was subsequently seriously questioned. The many other possible health effects of chemical exposure had not entered into the NYSDH evaluation.

Citing the fact that chemical seepage was evident beyond the evacuated area and that families living there appeared to be experiencing unusual health problems,

members of the LCHA rejected the Department's assurances. They demanded more definitive studies and, when they did not get a satisfactory response from either the NYSDH or the EPA, they sought scientific aid from outside the government's environmental health establishment.

Beverly Paigen, a cancer research scientist who worked for the NYSD Roswell Park Memorial Institute in nearby Buffalo, agreed to volunteer her services in an unofficial capacity. Her professional interests included the variation among individuals in their responses to chemical toxins, and she anticipated that, in addition to helping the Love Canal residents, her involvement might also result in identifying appropriate subjects for her research work. Dr. Paigen designed a survey aimed at investigating several potential effects of exposure to chemicals. She used a different set of assumptions about the mechanism and likely path of the flow of the dissolved toxins that seeped out of the canal. Based on her model, Dr. Paigen found that miscarriages were significantly higher among women living in homes most likely to be in the path of the chemical plume. She also found much larger than normal rates of birth defects and evidence of serious nervous-system toxicity, as well as elevated incidences of asthma and urologic problems for residents of these homes.

In early November 1978 Dr. Paigen, presented the results of her "unofficial" research to her NYSDH superiors. After a delay of three months the new New York State Commissioner of Health publicly announced that after reevaluating its own data, the Department had also found excess, miscarriages and birth defects in homes in previously "wet" regions of the Love Canal neighborhood, promised additional studies of Dr. Paigen's other findings. However, the action taken in response to these results puzzled and dismayed both the residents and Dr. Paigen. Families with children less than two years of age or with women who could prove they were pregnant were to be relocated at state expense--but only until the youngest child reached the age of two. Women who were trying to become pregnant, or those who thought they were in the early stages of pregnancy, when the fetus is most sensitive to toxins, but who could not yet prove they were pregnant with tests available at that time, were denied permission to join the group that was evacuated.

During the next year and a half, the frustration and the militancy of the LCHA members increased as the additional studies promised by the commissioner failed to materialize. On the federal level, EPA lawyers had become convinced--by media reports and public appeals from Love Canal residents claiming a variety of toxin-

related illnesses--that hundreds of additional families should be moved away. They sought a court order from the Department of Justice requiring Hooker Chemical to pay for the relocations. When the Justice Department responded by demanding evidence that the inhabitants who remained in the Love Canal neighborhood were at risk, the EPA commissioned a quick "pilot" study to determine whether residents had suffered chromosome damage that could be attributed to chemical exposure. This study, which was to subsequently receive much criticism from the scientific community--both because of its specific design and because, at the time, chromosome studies were notoriously difficult to interpret, did provide the type of evidence EPA was seeking. On the basis of finding "rare chromosomal aberrations" in 11 out of 36 subjects tested, the scientist who performed the study concluded that inhabitants of the area were at increased risk for a variety of adverse health outcomes.

On May 19, 1980, when two EPA representatives went to the LCHA office in one of the evacuated homes to announce the results of the chromosome study they were greeted by irate homeowners who proceeded to lock them in the office for five hours until FBI agents showed up and demanded their release. This tactic, which received the anticipated media coverage, had the desired effect. With the intervention of high-ranking officials in the Executive Branch, and undoubtedly with the support of then-president Carter, funds were made available for the relocation of several hundred additional Love Canal families.

A conclusion that can clearly be drawn from this and many subsequent environmental controversies is that politics, public pressure and economic considerations all take precedence over scientific evidence in determining the outcome. Another aspect of the Love Canal case that is characteristic of such events is that the victims, although hostile to Hooker Chemical, directed most of their rage at an indecisive, aloof, often secretive and inconsistent public health establishment.

Lawsuits against Occidental Petroleum Corporation, which bought Hooker chemical in 1968, were initiated by both the State of New York and the U.S. Justice department to cover costs of the cleanup and the relocation programs and by over 2000 people who claimed to have been personally injured by the buried chemicals. In 1994 Occidental agreed to pay \$94 million to New York in an out-of-court settlement and the following year the federal case was settled for \$129 million. Individual victims have thus far won in excess of \$20 million from the corporation.

In early 1994 it was announced that the cleanup of the condemned homes in Love Canal had been completed and it was safe to move back to the area. The real estate company offering the inexpensive refurbished homes for sale had chosen to rename the area "Sunrise City."

## 4. Readings and Resources

A wealth of written and audiovisual material is available on Love Canal and other environmental controversies. Searching the electronic catalogue of any public or academic library or using an Internet search engine should prove very fruitful.

For a colorful discussion of the early events in the Love Canal case by the investigative reporter who initiated the media coverage of the issue, and for a personal version of the events by the woman who organized the Love Canal Homeowners Association and went on to become a national leader of citizen's toxic waste organizing, see:

- Brown , Michael. 1979. *Laying Waste*, New York: Pantheon Books.
- Lois Gibbs; as told to Levin, Murray. 1981. *Love Canal: My Story*, Albany, NY: State Univ. of New York Press.

For a thought-provoking article that focuses on the political and ethical dimensions of the case by the scientist who volunteered her services to the Love Canal residents see:



- Paigen, Beverly. 1982. Controversy at Love Canal. *The Hastings Center Report*, June, 29-37.

For a report written by the public health, transportation and environmental agencies of New York State see:

- Love Canal, a special report to the governor and legislature, by *New York State Department of Health, Office of Public Health*. 1981; with assistance of the New York State Department of Transportation and New York State Department of Environmental Conservation, NY: The Office.

For two additional perspectives on the controversy see:

- Levine, Adeline. 1982. *Love Canal: science, politics and people*, by Lexington Mass.: Lexington Books.
- Shaw, L. Gardner. 1983. *Citizen Participation in Government Decision Making: the toxic waste threat at Love Canal, Niagara Falls, New York*, Albany, NY: Nelson A. Rockefeller Institute of Government, State University of New York.

For articles published in science news journals see:

- Culliton, Barbara J. 1980 "Continuing Confusion over Love canal," *Science* #209:002-1003.
- Uncertain Science Pushes Love canal Solutions to Political, Legal Arenas. 1980 *Chemical Engineering News*, August 11, 22-29.

**For comments on the plan to rehabilitate, rename and repopulate the Love Canal neighborhood see:**

- *Rachel's Hazardous Waste News*. #133, June 13, 1989.

For an Internet site that contains a summary discussion of the Love Canal case with links to additional Love Canal sites use this URL:

- <https://onlineethics.org/cases/resources-engineering-and-science-ethics/love-canal-introduction>

For a highly informative collection of essays, comments and analysis on a wide variety of issues in environmental ethics see:

- VanDeVeer, D. and Pierce, C. 1994. *The Environmental Ethics and Policy Book*, California: Wadsworth Publishing Co., 1994.

## 5. The Issues

Significant questions of ethics and values raised by this case:

- Beverly Paigen, the research scientist who volunteered her services to the Love Canal Residents, (commented) in reference to her differences with her superiors in the NYSDH, "...I thought our differences could be resolved in the traditional scientific manner by examining protocols, experimental design and statistical analysis. But I was to learn that actual facts made little difference in resolving our disagreements--the Love Canal controversy was predominantly

political in nature, and it raised a series of questions that had more to do with values than science." Consider the differences in the values that might be of greatest importance to: a Love Canal resident; the New York State Commissioner of Health; a scientist doing research sanctioned by either the New York State Department of Environmental Conservation or the EPA; an independent scientist (like Dr. Paigen) who was doing volunteer research for the residents; a typical citizen of the State of New York. In what respects might these values differences lead them to conflicting decisions about what should be done in response to the Love Canal disaster and how to do it?

- Is it reasonable to demand that the ethical duty of public officials is to respond to an environmental problem by objectively examining the scientific facts and the potential hazards to local residents, independent of economic and political considerations?
- One of the charges raised against the NYSDH and the Health Commissioner was that the public health establishment would not divulge the details of the studies that led to its decisions, held many closed meetings and even refused to reveal the names of members who served on consultation panels it had established. Do you think that there might be an ethical justification for such public agencies to refuse public access to such information? If so, does this seem to apply to the Love Canal situation?
- Another accusation was that state employees sympathetic to the Love Canal residents were harassed and punished. For example: Dr. Paigen's ability to raise funds for her research work was curtailed by the Roswell Park Memorial Institute - causing the professional staff to charge the administration with scientific censorship. Her mail arrived opened and taped; shut her office was searched; and when she was subjected to a state income tax audit, she discovered newspaper clippings about her Love Canal activities in the auditor's file. When William Friedman, who had been the Department of Environmental Conservation's Regional Director, pressed state officials to take a less conservative approach to protecting the health of Love Canal residents, he was promptly demoted to staff engineer. This kind of response by the political power structure seems morally indefensible, but it is by no means unique to the Love Canal case.
- Another values issue is the extent of evidence needed to justify action to protect public health. In order for the scientific community to accept as fact research showing that a specific health effect is caused by a particular agent, the statistical analysis of the data must indicate with more than 95% certainty

that the observed effect could not occur by chance. This high, but clearly arbitrary, standard has been adopted to protect the integrity of the body of accepted scientific facts. But should public health officials demand, as they often do, the same standard before taking action? For example, if evidence shows that there is an 80% chance that exposure to some chemical in the environment may cause a serious adverse health effect, should the health officials refuse to inform the public of the risk or take action to prevent exposure until further studies -- which may take months, or even years -- raise the certainty of the causal relationship to 95%?

- It is common in environmental controversies for those who believe they are at risk to become distrustful of public officials in charge of investigating their concerns. This was certainly the case in the Love Canal controversy. It is unusual for a citizens' group to be able to obtain the volunteer services of an independent expert with qualifications like those of Dr. Paigen, and they are not likely to have the necessary financial resources to hire their own consultant. Furthermore, although Dr. Paigen was able to provide valuable scientific services, she was unable to gain access to and assess much of the evidence that the public officials had used as the basis for their decisions. Dr. Paigen and others have suggested that the ethical solution to this problem is to provide public funds to groups like the LCHA with which they can hire their own experts, and which they can use to hire a qualified advocate who will be given access to all public data and a voice in the decision-making process.
- The Hooker Chemical Company did not violate any then-existing specific environmental regulations by disposing of toxic waste in Love Canal, or in selling the land to the School Board. However, the courts have found Hooker financially liable for the harm that was the ultimate result of their disposal practices. This decision was based largely on the judgment that Hooker had possessed the scientific expertise to be able to anticipate that dumping waste chemicals in the canal was likely to result in a public health threat. It was also argued that Hooker acted irresponsibly by not informing the public of the risks it discovered in 1958. Should corporations be required to use their knowledge to avoid activities that may cause public harm?
- In recent years, the issues of environmental justice and equity have been raised within the environmental movement. Minority populations, and poor people in general, have produced persuasive data showing that they are far more likely to be exposed to environmental pollution from factories or waste disposal facilities than more affluent white people. In the Love Canal case, the

initial population of the neighborhood was not poor nor did it have a high percentage of minority members. Of course, those who chose to live there were not aware of the pollution risk. It is likely, however, that the inexpensive houses now being offered to induce people to move back into the area, after remediation is supposed to have made it safe, will attract primarily the poor. One proposal that has been put forth in response to demands for environmental justice is to provide some form of reward to those who live in neighborhoods where exposure to environmental toxins is significantly higher than average. Would this be an ethical practice? What other steps might be taken to promote environmental equity in an ethical manner?

- In our society environmental risks are generally evaluated in economic terms. However, the assignment of economic value to human health, a pristine forest or a smog-free vista is surely not an objective exercise. What other means might be used to evaluate environmental risks and benefits?
- We generally assign value to things in anthropological terms. We consider how humans will be affected by an activity that will cause pollution or degrade an ecosystem. Some environmental ethicists have proposed that we should adopt a biocentric perspective in which living things and natural objects are assigned intrinsic value independent of human concerns. How do you respond to the assertion that nature does not exist solely for the purpose of being exploited by humans?

## **Resource Type**

Case Study / Scenario

## **Parent Collection**

Ethics in the Science Classroom

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