Conversion of Municipal Solid Waste to Energy
(Technical Report)

The Moral of Virtue Ethics Perspective to The Union Carbide Disaster In Bhopal India
(STS Research Paper)

An Undergraduate Thesis Portfolio

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My technical project and my STS research paper have a loose topical and a tight thematic relationship. While my technical project focuses on an environmentally friendly alternative to reduce the growing landfill crisis, my STS research paper examines the ethical behavior of various groups of engineers involved in the Union Carbide incident in Bhopal, India. Although my technical project and STS research paper have a loose topical relationship, both topics can be coupled thematically because the STS research paper could be used as guidance for understanding the ethical implications and responsibilities engineers have on society, especially for those who are involved in environmentalism. If this project is to be implemented by engineers in the future, it is important that those engineers be morally responsible for every decision and action being made during the process.

My technical project focuses on designing a process to reduce municipal solid waste (MSW) in landfills and produce energy as an outcome. As the population continues to grow, the demand for energy and environmental problems are expected to increase. Thus, repurposing waste to energy is a resourceful approach to address the landfill crisis. The process design includes a transfer of municipal solid waste to hydrocarbon fuel cells, termed syngas, using multiple-unit processes such as gasification, solid oxide fuel cell, and carbon capture technologies. The process employs Boulder's MSW, as their goal is to recycle 85% of their waste materials by the year of 2025.

My STS research paper focuses on evaluating the morality of various groups of engineers involved in the Union Carbide incident in Bhopal, India. Most research papers related to finding the root cause of an incident focuses on the technical deficiencies aspect of the problem and never at the morality of groups involved in these accidents. Drawing on virtue ethics, I argue that

the engineers of Union Carbide and the Indian Inspection agency acted immorally because they failed to practice virtue characteristics for responsible engineering that was developed by Pritchard: the ability to communicate clearly and informatively, and seeing the “big picture” as well as the details of smaller domains.

While preparing my technical project and my STS paper, I was able to understand the importance of my future work and the impact that it implies to the world around me. Through my technical project, I learned how my engineering skills can help solve critical problems such as the environmental crisis that we are facing now. On the other hand, through my STS research paper, I was able to view ethical dilemmas regarding engineering design from a new perspective. By evaluating the engineers’ decisions and actions, I understand the importance of ethical implications and responsibilities engineers must have to review daily.