

Ethics ? Human Case Study (2009) - Energy from Cow Dung

Mon, 2012-02-27 10:49 -- pwhippey

Description of the Project

To construct the bio-digester, I used a large fifty gallon barrel filled one-third of the way with water. A probe and bucket heater were then placed into the barrel because in order to effectively produce bio-gas, the temperature of the manure must be around 37°C. The probe would keep the temperature of the water so that if it was below the thirty-seven degree temperature, it would send a signal to the heater to turn on. This was simply hooked up using a programmable thermostat. I then had a twenty litre oil container filled with fifteen litres of manure. The reasoning behind leaving five litres of space in my manure container is because if not, the top would explode off due to the internal pressures of the gas. A tube was inserted in the top of this container which led to a collection device. This was a 20L oil container flipped upside down with a hole in the bottom. This was then placed into a narrow steel barrel filled approximately halfway with water. I then applied pressure to the oil container which forced the air out of the hole. Eventually, the water would become even inside the container as outside. This would keep the container almost submerged unless I inserted gas. Once the digester was operational, volume graduations were marked on the manure buckets. Every day of biogas production, I measured how high the bucket rose and calculated the volume in millilitres. For each manure sample, I measured three times a day, morning, afternoon, and night for 48 hours.

Advice or Ruling

There is a safety concern because of the build up in pressure due to the gas in the 50 gallon drum. No diagram is supplied in the 5 page report. There is reference to a hole in the drum and to forcing air through a hole. There is a collection device that will relieve the pressure increase in his barrel.

In [Policy 3.1.2.5](#) [1] we find:

A pressure vessel must have a safety valve, rupture disc or similar device to limit internal pressure below the burst pressure of the vessel. The safety valve shall relieve to a safe or remote area.

We had a previous incident in which a student built his own pressure vessel in his basement and raised the internal pressure by several atmospheres - (it may have been tens of atmospheres). An engineer on the judging team explained that he was legally obliged to report this breach of Provincial Laws relating to pressure vessels. He wanted to disqualify the student.

In this project, the student is not pressurizing the drum by pumping air in it. He does have a tube inserted that will prevent a large pressure increase.

The Ethics Committee believes that this project is acceptable for the CWSF.

Your Project

If your proposed science fair project involves the participation of humans or the use of animals,

1. Visit the [Ethics](#) [2] web page so as to become familiar with the policies.
2. Fill in the [Request for Advice or a Ruling](#). [3]
3. Submit it to the Ethics Committee of your Regional Science Fair.

Disclaimer

These case studies summarize interesting examples of science fair projects involving humans or animals submitted to the Youth Science Canada National Ethics Committee for review. A brief description of the proposed project is given, along with the ruling given by the Ethics Committee. Some details may have been changed in the descriptions so that the original source cannot be

identified. The ethical challenges described have not been changed.

Source URL: <http://support.sfiab.ca/blog/ethics-%E2%80%93-human-case-study-2009-energy-cow-dung>

Links

[1] <http://support.sfiab.ca/node/716>

[2] <http://ethics.youthscience.ca/>

[3] http://main.youthscience.ca/sites/default/files/documents/cwsi/request_for_ethics_ruling_en.doc