**Concerning potential failures for the lights and light cooling system in the Large Hazelnut Computer:**

COB (Chip On Board) LEDs can run at 125C. This means they will continue producing heat until at least 125C, well past the boiling point of water at standard atmospheric conditions. Because of the head pressure inside the cooling loop, it is possible that we have water that is above 100C but still liquid, until a failure causes a sudden drop in pressure and the water turns to steam.

**Potential hazards:**

The light heats up the water, the hose breaks, and hot water is released. Seeing as this water is under head pressure it may turn into steam when the pipe fails, or it may turn into steam and then fail the pipe.

The light enclosure is not grounded, nor are any of the panels making the LHC walls, floor and ceiling, nor is the metal arm holding the lights. The water may be grounded at the pump or chiller.

As of right now, there is no plan to add thermal protection to any of the lights.

If water stops flowing through at least one light, but the loop does not break, it may build up pressure as the water heats up / becomes steam. Presumably, the plastic hose would break and release high pressure hot water with little warning. The light may then catch fire or heat up.

**Failure Scenarios** (incomplete list)

* Pump stops, all lights loose cooling simultaneously, system is pressurized
* Line breaks, one or more lights loose cooling, system is not pressurized
* Water flow is not balanced, one or more lights loose flow, system is pressurized
* Mechanical wear on wires causes short circuit
* Heat from heatsink melts the wire insulation and causes short circuit

**Failure Testing**

Test 1: Run a light, cut the hose to drain the loop, and see what happens.

Light, loop and driver will all be outside and fire extinguisher at the ready.

Test 2: Run a light, stop the pump but leave the loop pressurized and full of water, see what happens.