

The Glacier Trust

Fireballs - Biomass Briquettes or Beehive Briquettes. (BBs). Potentially serious problems from fumes.

The Glacier Trust is a small NGO set up with the help of Southampton University in the UK. We are committed to promoting and developing scientific adaptation strategies for climate change in the Himalayas by supporting programmes submitted to us by Nepali NGOs.

One of our first projects was with Eco Himal Nepal, to introduce biomass briquette technology to part of the Solu Khumbu. However, while there is published information as to the very effective heat/cost ratio of BBs, we could not find anything published about their Carbon Monoxide (CO) yields. We were helped by laboratory experiments carried out by the Faculty of Engineering at Nottingham University UK.

The results showed that burning a briquette in an unventilated room of 30 cubic meters (say 3 x 4m, 2.5m high) yielded **108 parts per million (PPM) after one hour.**

Table: The effects of Carbon Monoxide on the human body

PPM	Time	Comments
35 – 50	8 hours	The maximum allowable concentration for continuous exposure in any 8 hour period, according to OSHA ⁱ
200	2 – 3 hrs.	Headache (mild)
400	1 – 2 hrs.	Headache (mild)
800	10 – 15 min.	Dizziness, nausea
1600	20 min.	Headache, dizziness, death within 1 hour
3200	5 – 10 min.	Headache, dizziness, death within 1 hour
6400	1 – 2 min.	Headache, dizziness, death within 1 hour
6000 – 8000	5 min.	Incapacitation
12,800	2 – 3 breaths	Unconsciousness
12,800	1 – 3 min.	Death

Source: <http://www.hutchinsonutilities.com/pdf/coexposure.pdf>

While the high levels of CO can produce fatalities, **exposure to low levels for an extended period is also extremely dangerous.** The burning of a BB for any extended period of time in a normal sized unventilated room can easily produce **double** the levels above what OSHA considers safe. Many Nepali rooms are very poorly ventilated. Ventilation does not mean having a window open, which can merely cause the air to circulate within the room. It means having a continuous through draft of air. Extended exposure will allow CO to build up in the body which is can have very serious consequences. It has been observed by J P Kandpal and others (1995)ⁱⁱ that certain levels within the room (*e.g.* standing height) accumulate higher CO levels than other levels.

BBs are an excellent heat source, generating heat of 1000°C within the briquette. We have no desire to impede anything other than their proper use. They are certainly not smoke or fume free and if not used correctly (for example in a ventilated oven) it is possible that deaths will result.

ⁱ US Department of Labor: Occupational Health & Safety Organisation

ⁱⁱ See Kandpal J., Maheshwari, J. & Kandpal T. 1995 Indoor air pollution from domestic cookstoves, kerosene and LPG, *Energy Conversion and Management* 36, 11, 1067 – 1072.