



Physicist: There was no Fukushima nuclear disaster

The terrible toll from Japan's tsunami came from the wave, not radiation.

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I have watched a TV programme called 'Fear Factor.' In the series there are contestants who have to confront their worst fears to see who bails out and who can fight the fear and get through.

People who are afraid of heights are made to Bungee-jump off a high bridge, and people who are scared of spiders or insects are made to get in a bath full of spiders.

In virtually all cases the contestants later say that the fearful experience was not actually as bad as they feared. So the fear of the fear was greater than the fear itself 'when the chips were down.'

This is often the case in life, that the fear of some factor turns out to be worse than the experience itself. The human mind builds a very scary image in the imagination. The imagination then feeds the fear.

If the picture in the imagination is not very specific or clear it is worse, because the fear factor feeds on the unknown.

This is what has happened in the public mind concerning nuclear power over the last half century. Concepts concerning nuclear reactions and nuclear radiation are in themselves complicated and mysterious.

Over the last couple of decades physics advances in fields such as quantum mechanics, which is linked to nuclear processes has compounded matters for the public. The image of strong and mysterious forces and effects is now well entrenched. There are Hollywood movies and TV programmes about space travellers or alien invaders who use time travel and quantum forces, and then battle to evade the dangerous intergalactic nuclear zones.

A consequence of all this is that internationally the public is now really 'spooked' when it comes to the topic of nuclear power. A real 'fear factor' looms over the mere word 'nuclear.' Newspapers love this, and really push imagery like; 'nuclear leak' or 'radiation exposure.'



To a nuclear physicist like me, I look upon such public reaction half with amusement and half with dismay. The amusement comes from the fact that so many people can be scared so easily by so little.

It is like shouting: “Ghost in the bedroom,” and everyone runs and hides in the hills.

The dismay reaction is that there is a body of anti-nuclear activists who do not want the public to know the truth, and the anti-nukes enjoy stoking the fear factor and maintaining public ignorance.

Let us now ponder the Fukushima nuclear incident which has been in the news again lately.

Firstly let us get something clear. There was no Fukushima nuclear disaster. Total number of people killed by nuclear radiation at Fukushima was zero. Total injured by radiation was zero. Total private property damaged by radiation....zero. There was no nuclear disaster. What there was, was a major media feeding frenzy fuelled by the rather remote possibility that there may have been a major radiation leak.

At the time, there was media frenzy that “reactors at Fukushima may suffer a core meltdown.” Dire warnings were issued. Well the reactors did suffer a core meltdown. What happened? Nothing.

Certainly from the ‘disaster’ perspective there was a financial disaster for the owners of the Fukushima plant. The plant overheated, suffered a core meltdown, and is now out of commission for ever. A financial disaster, but no nuclear disaster.



Amazingly the thousands of people killed by the tsunami in the neighbouring areas who were in shops, offices, schools, at the airport, in the harbour and elsewhere are essentially ignored while there is this strange continuing phobia about warning people of 'the dangers of Fukushima.' We need to ask the more general question: did anybody die because of Fukushima? Yes they did. Why?



The Japanese government introduced a forced evacuation of thousands of people living up to a couple of dozen kilometres from the power station. The stress of moving to collection areas induced heart attacks and other medical problems in many people. So people died because of Fukushima hysteria not because of Fukushima radiation.

Recently some water leaked out of the Fukushima plant. It contained a very small amount of radioactive dust. The news media quoted the radiation activity in the physics measure of miliSieverts. The public don't know what a Sievert or a milliSievert is. As it happens a milliSievert is a very small measure.

Doubling a very small amount is still inconsequential. It is like saying: "Yesterday there was a matchstick on the football field; today there are two matchsticks on the football field. Matchstick pollution has increased by a massive 100% in only 24 hours."

The statement is mathematically correct but silly and misleading.

At Fukushima a couple of weeks ago, some mildly radioactive water leaked into the sea.

The volume of water was about equal to a dozen home swimming pools. In the ocean this really is a 'drop in the ocean.'

The radiation content was so little that people could swim in the ocean without the slightest cause for concern. Any ocean naturally contains some radioactivity all of the time anyway. There is natural radiation around us all of the time and has always been there since the birth of the earth.

Understandably the general public do not understand nuclear radiation so the strangest comments occur. On an internet blog some person stated that people on the north coast of Australia must be warned about the radiation in the sea coming from Fukushima. Good grief!

Meantime the Fukushima site now looks like an oil refinery. A lot of storage tanks have been built there to hold water that has been flushed through the damaged reactors to aid in cooling. Quite frankly, scientifically speaking, the best thing to do with the mildly radioactive waste water would be to intentionally pour it into the sea. The water which is currently in the new Fukushima storage tanks has already been filtered to remove radioactive Caesium.

All that is left is a bit of radioactive Tritium. Tritium is actually part of the water molecule anyway...so what we really have is...well, water in water. The Tritium atom is a hydrogen atom, which has two neutrons in its nucleus which is a normal but rare variation in the hydrogen atom. Most hydrogen atoms have only a single proton in the nucleus and no neutrons. A rare hydrogen variation is called Deuterium and such atoms have one proton plus one neutron. Even rarer than Deuterium is the Tritium form of hydrogen which has one proton plus two neutrons. These variants are known as isotopes. Water is H₂O and water molecules in which the Tritium isotope of the hydrogen atom is found are molecules referred to as 'Heavy Water.' It really is just water, so you can't filter it out of the normal 'light water.'



The Tritium heavy water is very mildly radioactive and is found normally in the sea all over the world all of the time. This Tritium concentration in the one thousand storage tanks at Fukushima is higher than that found naturally in the sea, but is still so low as to pose no real danger at all.

No doubt the Japanese government is too scared to release this water into the sea because of the howl of criticism which would no doubt follow.

A further complication is that in the last couple of weeks the press has reported further spillage of water. These reports are such that it looks like a continuous failure of the Fukushima engineers to contain the situation.

The latest spillage was about 400 litres of water, which is about as much liquid as would fill four motor car fuel tanks. Reportedly, one of the one thousand storage tanks was not totally horizontal when it was built so when it was filled to the top some water overflowed on one side.

As soon as the spillage occurred they fixed the problem. But the rules require the incident to be reported, even though the spillage was not of any biological consequence to anyone, or to any fauna or flora.

The Fukushima incident will continue to attract media attention for some time to come, I imagine. It has become such a good story to roll with that it will not just go away. However, in sober reflection and retrospection one has to come to the conclusion that far from being a nuclear disaster the Fukushima incident was actually a wonderful illustration of the safety of nuclear power.

The largest earthquake and consequent tsunami on record struck an ageing nuclear power plant which was built to a now obsolete boiling water reactor technology, and no nuclear damage resulted to people and property in the neighbourhood.

Poor management systems compounded matters and were implicated in the failure of the cooling circuit. The reactor cores suffered a meltdown. Due to the magnitude of the tsunami disaster there were no emergency services able to help, they were deployed elsewhere or paralysed because there were no roads or infrastructure available.



Hydrogen gas leaked out of a reactor, collected under the building's roof and then exploded, blowing the roof off in front of the world's TV cameras. Fukushima had devices called 'recombiners' designed to prevent the hydrogen build-up but they were not working because they needed an external electricity supply.

Financially speaking and operationally speaking the reactors were wrecked, but nobody was killed or injured by any nuclear radiation.

Fukushima showed that a nuclear power plant can take the maximum punch of nature's brutality, and yet the surrounding population does not fry and die as so often dramatically predicted by the fear factor enthusiasts.

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