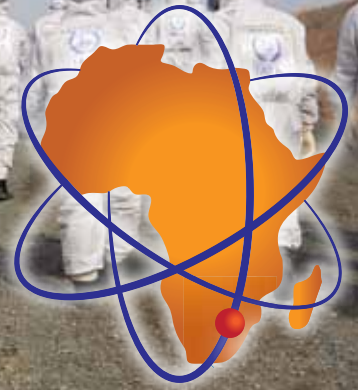


Fukushima: Not a nuclear disaster

by Dr Kelvin Kemm



Nuclear Africa

Produced by Nuclear Africa (Pty) Ltd for general public information

IAEA Inspection team at Fukushima



Dr Kelvin Kemm has a PhD in nuclear physics. He is CEO of Nuclear Africa, a nuclear project management company. He has written two books and over one thousand published articles. He has won a number of awards and is a member of the Ministerial Advisory Council on Energy.

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 creepy insects.

In virtually all cases the contestants later say that the fearful experience was not 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 becomes 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, advances in physics in fields such as quantum mechanics, which is linked to nuclear processes, have 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.

Fukushima

Let us now ponder the Fukushima nuclear incident, which has been constantly in the news since 2011.

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.

UNSCEAR Report

UNSCEAR is the United Nations Scientific Committee on the Effects of Atomic Radiation. On 22 September 2011 the Secretary General of the UN tasked UNSCEAR with examining the after effects of any potential nuclear radiation at Fukushima. He called on member states to assist UNSCEAR in any way possible. Eighteen member states supplied over 80 experts to conduct analytical work. This task was endorsed by UN General Assembly Resolution 66/70 on 9 December 2011. In October 2013 the findings were presented to the UN General Assembly, and all details were published online on 2 April 2014.

The report concluded that any radiation – induced effects would be too small to identify. It stated that generally people had been well protected and had received “low to very low” radiation doses. The report also stated that rates of cancer or hereditary diseases were unlikely to show any discernible rise because the radiation doses that people received were too low.

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.

Number killed by the Tsunami: 15 891

Number still missing (April 2015): 2500+

Number killed or injured by nuclear radiation: 0

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.

In 2013, 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 milliSieverts. 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 late in 2013, 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!



Forced evacuation of people from the Fukushima area, even though radiation levels were too low to warrant such a move

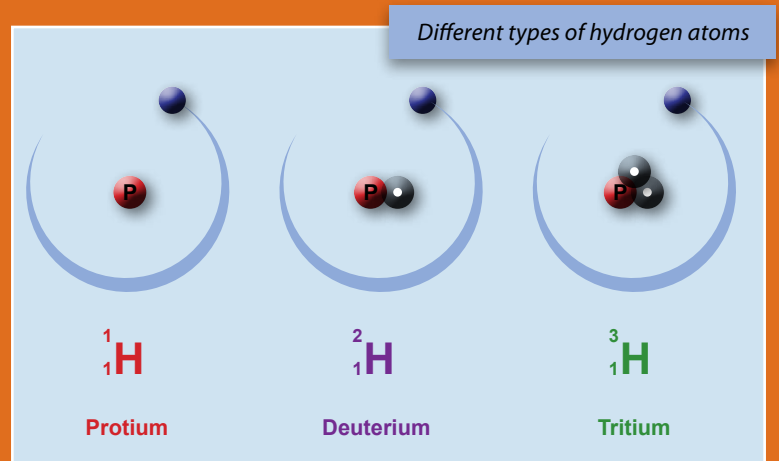
Meantime the Fukushima site now looks like an oil refinery. A large number of storage tanks have been built there to hold water that has been flushed through the damaged reactors to aid in cooling. Quite frankly, scientifically speaking, the best thing to do with the mildly radioactive waste water would be to intentionally pour it into the sea gradually. 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 a naturally occurring water molecule anyway...so what we really have is...well, water in water.

Tritium – “in the water”

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. The chemical symbol for water is H₂O. Water which has been intentionally processed to contain a large quantity of the Deuterium and Tritium isotopes is referred to as ‘Heavy Water’. The Tritium variant of water is still H₂O, it is just that this H is slightly heavier than the common H in normal water. It really is just water, so you can’t filter it out of the normal ‘light water’ like you could remove dust or sugar. Tritium is unstable and is very mildly radioactive. Normal hydrogen is sometimes referred to as Protium.



The Tritium heavy water is very mildly radioactive and is found normally in the sea all over the world, all of the time. The Tritium concentration evident 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 was too afraid to release this water into the sea because of the howl of criticism which no doubt would have followed.

A further complication was that as the crew at Fukushima filled the storage tanks with waste water the press reported further spillage of water. Those reports were such that the operation appeared like a continuous failure of the Fukushima engineers to contain the situation.

That reported spillage was about 400 litres of water, which is about as much liquid as would fill four motor car fuel tanks. What had actually happened was that 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.

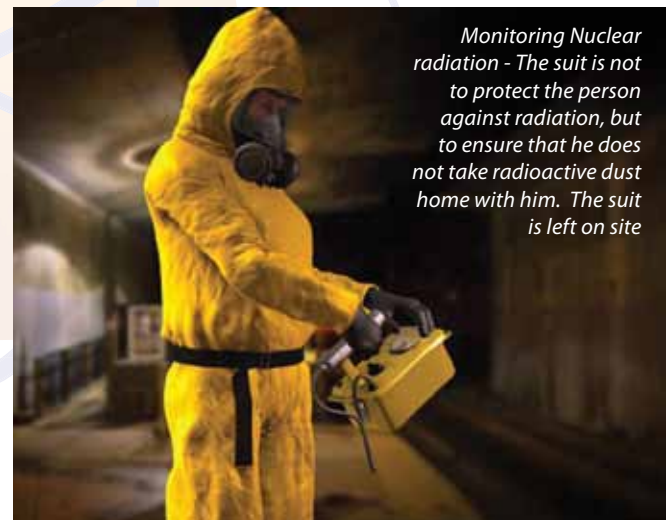
As soon as the spillage occurred they fixed the problem. But the rules require the incident to be reported, even though the spillage was not of any biological consequence to anyone, or to any fauna or flora. This standard spillage report was blown up as if it were a major incident. It was not.

The Fukushima nuclear power plant 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 even suffered a much feared meltdown. Due to the





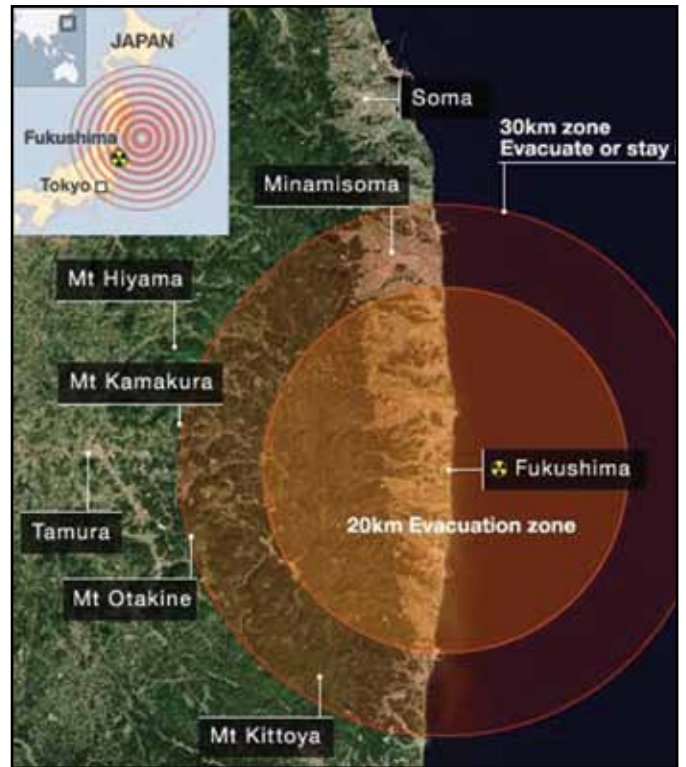
General devastation caused by the tsunami

magnitude of the general tsunami disaster over a vast area, there were no emergency services able to help, they were deployed elsewhere or paralysed because there were no roads or other infrastructure available.

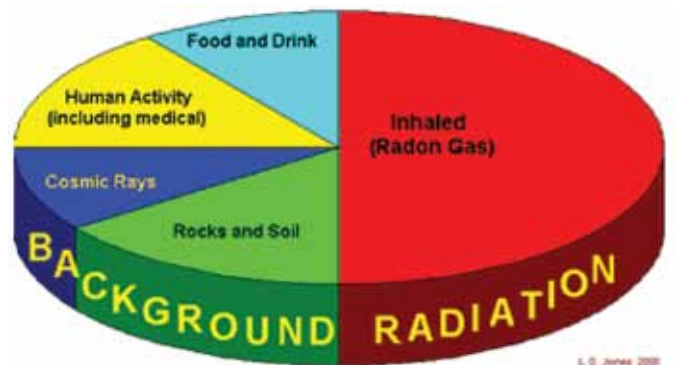
High pressure steam was deliberately vented out of the hot reactors and it carried hydrogen gas. Being lighter than air the hydrogen gas collected under the building roof and then exploded, blowing the roof off in front of the world's TV cameras. Normally this should not have happened because the Fukushima building was equipped with devices called 'recombiners' which were designed to prevent a hydrogen build-up, but they were not working because they needed an external electricity supply...which had been washed away.

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.



Fukushima Evacuation – The compulsory and optional evacuation zones are shown. It later transpired that no people needed to leave at all, there was no radiation hazard. In fact, a number of people died from heart attacks and other medical problems related to the stress of the forced evacuation



Background Radiation – Only the yellow is produced by humans, the rest is naturally present all the time



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