MEDACT
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Factsheet on tritium at Aldermaston

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The Aldermaston facilities use tritium – the radioactive isotope of hydrogen – as a trigger and reflector in nuclear weapons. As a consequence, they release large amounts of tritium to the atmosphere and to the river Thames. Tritium is by far the largest and most important of the radionuclides released from Aldermaston. This Q&A sets out plain answers to frequently-asked questions about tritium. More detailed information is also set out in smaller font.

Q.1 What is tritium?

A.1 Radioactive water or water vapour. The water molecules themselves are radioactive - not something dissolved in the water.

Tritium is the radioactive isotope of hydrogen. That means tritium is unstable and gives off radiation when it disintegrates. In the environment, the most common kind of tritium is tritiated water - that is, water molecules in which one of the hydrogen atoms is radioactive.

Q. Is tritium dangerous?

A. Tritium is hazardous when it is inside you. For example, if you drink it in contaminated water, eat it in contaminated food, breathe it in contaminated air, or absorb it through your skin.

Tritium is not considered an external hazard, but it is an internal one. It has a radioactive half life of more than 12 years which means it can stay in the environment for a long time. It has many unusual properties - extremely rapid transport in the environment; avid uptake by humans; fast exchange mechanisms with other hydrogen atoms; and the ability to bind with organic molecules in our bodies during cell formation and cell metabolism. Tritium's ability to bind means that it is unusually hazardous, as it stays in the body longer than tritiated water.

Q. What are tritium's health effects?

A. Cancers, congenital malformations and genetic mutations.

Tritium is a radionuclide and all radionuclides when ingested or inhaled give off radiation inside us. Radiation is a carcinogen, teratogen and mutagen, and these effects are thought to occur down to the very lowest doses.

Q. Why should we be concerned about tritium from Aldermaston?

A. Aldermaston releases large amounts into the air and the river Thames. In 2008, Aldermaston emitted 670 GBq of tritium to the air and discharged 0.86 GBq to the Aldermaston stream leading to the river Thames.

One gigabecquerel (GBq) is a billion becquerels (Bq). A Bq is a unit of radioactivity and means one nuclear disintegration per second. Air releases are more hazardous than water discharges because the radiation doses from contaminated food and air are higher than from contaminated water.

Q. Are nearby residents at risk?

A. They may have raised levels of tritium depending on wind direction, proximity to the factory and how long it has been since the last tritium emissions.

Tritium emissions to air result in all downwind biota becoming tritiated to ambient levels. This is due to drinking, breathing and absorbing tritium-contaminated water, and eating tritium-contaminated food. This means people living downwind nearby are likely to have raised levels of tritium.

Q. What do radiation regulators think?

A. That tritium isn't very hazardous and that the amounts released are well below health limits.

Radiation advisory bodies rely on computer models for estimating the radiation doses from tritium exposures to people. These result in very low doses but may contain serious scientific uncertainties as recognised by the Government's CERRIE Committee on internal radiation risks (www.cerrie.org). This Committee considered whether tritium's risks should be increased 10 fold but was unable to reach a consensus. The Government's radiation advisors are opposed to any increase but Independent scientists consider tritium more dangerous than Government scientists. Over the years, the more scientists have learned about tritium, the more hazardous it has been perceived.

Q. How can I decide between differing scientific views?

A. Independent scientists are likely to give more precautionary advice.

All scientists are concerned about adverse health effects, but there is a tendency for official scientists and regulators who work on radiation matters to be less than straightforward about radiation risks. Conscientious radiation scientists remain concerned about aspects of tritium, but these concerns are rarely publicised.

Q. Does tritium occur naturally?

A. At very low levels, yes, but this does not justify releasing large added amounts.

Background tritium is created in the upper atmosphere by cosmic rays. This means very low background tritium levels (a few Bq per litre) exist around the world. We can't do anything about these, but we can decide not to add to them.

Q. Have any studies shown increased cancers near Aldermaston/Burghfield?

A. Yes. At least four.

In 1987, an increased leukemia incidence was found within 10-km of both Aldermaston and Burghfield primarily in children aged 0-4 years. In 1992, an excess was observed within 16 km of Aldermaston among 0-9 year olds. In 1994, increased leukemias were observed near Burghfield. In 1995, a study of seven districts near Harwell, Aldermaston, and Burghfield found excess leukemia deaths in Newbury and South Oxfordshire.

FURTHER READING

1. An extensive review of tritium by an independent scientist.
Fairlie I. The hazards of tritium revisited. Medicine, Conflict and Survival. Vol 24:4. October 2008. pp 306 -319. http://www.informaworld.com/smpp/content~content=a904743144~db=all~order=page

2. A major report on tritium by UK Government expert committee which recommended doubling tritium's risks. Unfortunately, this was refused by the ICRP and the EU's Article 31 Group of Experts as a result of pressures from the nuclear industry and from some national Governments.
AGIR. Review of Risks from Tritium. Report of the independent Advisory Group on Ionising Radiation (RCE-4) HPA. Oxford. http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb_C/1197382220012

3. Two discussions of the important KiKK study which reveals large increases in cancers near nuclear installations which may be connected with high tritium emissions.
Fairlie I. New evidence of childhood leukaemias near nuclear power stations. Medicine, Conflict and Survival, Vol 24:3, 219 — 227. August 2008 http://www.informaworld.com/smpp/title~content=t713673482
Fairlie I. Commentary: childhood cancer near nuclear power stations. Environmental Health 2009, 8:43. 12 pages. http://www.ehjournal.net/content/pdf/1476-069X-8-43.pdf

4. Discussion of a discredited government study which was established to cast doubt on the KiKK study.
Körblein A and Fairlie I. Commentary on J. F. Bithell, et al Childhood Leukaemia near British Nuclear Installations: Methodological Issues and Recent Results. Radiation Protection Dosimetry (2009) Vol 137, Number 3-4 **doi:10.1093/rpd/ncp206**

5. Discussion of the >60 studies worldwide on cancer incidences near nuclear facilities, the large majority of which found increased cancers.
Fairlie I and Körblein A. Review of epidemiology studies of childhood leukaemia near nuclear facilities: Commentary on Laurier et al. Radiation Protection Dosimetry (2009) Vol 137, Number 3-4 **doi:10.1093/rpd/ncp246**