

John Ainslie

From: Rob Edwards [rob.edwards@blueyonder.co.uk]
Sent: 13 June 2008 14:25
To: John Ainslie
Subject: MoD speak on popcorning

John,

The MoD has at last given me a quote and some background information on popcorning. I've pasted it all below. Please don't pass it on.

Much as expected, I'm thinking, but I would be interested in your thoughts. Monday would be fine.

Rob

--

rob.edwards@blueyonder.co.uk

<http://www.robedwards.com>

--

A spokeswoman for the UK Ministry of Defence said:

"The JSP represents the principles governing the design of any future warhead. 'Popcorning' is a theoretical possibility, and a scenario that is not credible. Even so, the risk of such a highly improbable occurrence is mitigated in Trident through warhead design, and through the facilities and processes for the safe handling, transit and storage of Trident warheads.

"Acceptable and very low levels of risk are achieved through these intrinsic safety features and measures, which apply throughout the life cycle of the Trident warhead."

Background information provided by the MoD:

The safety of any UK nuclear warhead is of paramount importance in authorising a warhead to become part of the UK Stockpile. The safety of the Stockpile is continually reviewed to ensure acceptable levels of safety are maintained. Safety is achieved through a balance of intrinsic safety features, protective features, management procedures and training. JSP538 provides the regulatory framework, aims and guidance to assess the acceptability of nuclear warhead design and processing operations.

Taking the specific issue of popcorning, the effect of detonation of a weapon on nearby weapons during storage and transport, there is a theoretical possibility that popcorning could occur if a number of nuclear warheads were located in close proximity to each other and one suffered an accidental insult causing a partial detonation of its explosive. For popcorning to result, a significant number of specific events would have to occur in a warhead. The likelihood of this sequence of events occurring is incredibly remote.

The risk of popcorning is mitigated in two ways: firstly, the intrinsic features of the warhead design; secondly, the design of processes and facilities to minimise risk of popcorning in handling, transit and storage.

Warheads are designed such that they do not produce nuclear yield without authorisation (JSP538 FNWSA (Fundamental Nuclear Weapons Safety Aim) 1). Many layers of independent defences (Lines of Defence) are built into a warhead to prevent unauthorised yield. These layers are designed and qualified to be effective in normal, as well as abnormal environments.

In being designed to meet FNWSA 1, warheads are also designed to be resistant to insult. The mechanical robustness of the warhead, coupled with the insensitivity of explosives

used and the geometry of the nuclear physics package, all mitigate the likelihood of a nuclear yield response to an insult.

Warhead handling, transit and storage processes are designed to further reduce risk to ALARP levels. For example, warhead storage arrays, in permanent and temporary warhead storage facilities/areas, are designed to eliminate the likelihood of popcorning. All potential storage arrays are assessed, certified and regularly reviewed.

As for the points regarding Multipoint safety (MPS) and Insensitive High Explosives (IHE), they are both characteristics which can improve further the intrinsic safety in a warhead's design and are thus goals for new designs. UK warheads already achieve acceptable and very low levels of risk through a balance of intrinsic warhead design, protection afforded the warhead through its lifecycle and the procedures used when handling them.

The suggestion that a radiation dosage of up to 100 sieverts could result from accidental detonation of one or more missiles in a submarine is taken out of context. The JSP gives guidance on how to categorise events, whilst making it clear that this example is extremely unlikely to occur - the probability is calculated at one in a billion, as shown at Figure F-2 of the same publication.