UK response

In the wake of the nuclear suppliers group meeting and the two major summit meetings in London the UK Foreign Secretary, Dr David Owen, last week outlined the British response to the efforts of the United States to tighten controls over international trade in nuclear technology. Asking a series of questions relating to dependence on

foreign uranium supplies, uranium enrichment as a source of weapons, development of international reprocessing facilities and storage of unreprocessed fuel, he was apparently serving notice that the political battle to win a consensus could be drawn out.

Dr Owen was also reported to have called for an enlargement of the 15member nuclear suppliers group.

UKAEA plans

Apparently in response to fears expressed by critics of nuclear power over the threat of plutonium diversion, the UK Atomic Energy Authority (UKAEA) is planning to demonstrate two methods of combating the problem. Speaking last week, the UKAEA chairman, Sir John Hill, said that the UKAEA was proposing to build a

have not announced a major break-

THE Soviet Union's latest frightful weapon, as presented to the West by General Keegan, a former head of US Air Force intelligence, and described in the greatest detail yet by Aviation Week, consists of a proton beam produced either on land or from a satellite and capable of destroying incoming nuclear warheads. General Keegan's evidence that the Soviet is developing weapon is of two sorts: observation of sites in the Soviet Union where testing is apparently going on and analysis of Russian capabilities in the component technologies.

The test site that is crucial to General Keegan's thesis is at Semipalatinsk near the Tibetan border. Aviation Week describes in detail a large building containing two steel spheres and states that since November 1975 seven tests "that may be related to development of a chargedparticle beam device" have been carried out. The only evidence for the tests cited, however, is the hydrogen with traces of tritium in the upper atmosphere—which could almost anything.

According to Aviation Week the Russians have made advances in explosive or pulsed power generation, flux compression, pressurised and cryogenically cooled power cabling, very large capacitator construction, energy switching, electron injection and collective acceleration. Together these advances would give them the ability to produce a proton beam intense enough to be used as a weapon. It is claimed that for some of those technologies the Russians are farther advanced that the Americans: in others General Keegan says the Russians have access to US advances which they were previously believed not to know about.

Perhaps the most startling claims are made with respect to fusion. Generation of power to accelerate the beam by both fission and fusion is said to be under investigation and the Russians are said to have advanced much further than the United States in controlled fusion by inertial confinement. Aviation Week cites the revelations by the Soviet physicist Leonid Rudakov last summer during a tour of US fusion laboratories. Rudakov, "in response to a taunt by a western scientist", revealed that

through since Rudakov's visit, there has not been one.

Another aspect of the technology Aviation Week touches on is accelerator design. For a land-based beam there is the perhaps insurmountable problem of propagation through the atmosphere without losing all its energy. A satellite-based beam is therefore an attractive proposition but would limit the size of the extremely powerful accelerator that would have to be carried on board. Theoretically there are several ways of decreasing the size of an accelerator; they include the idea (originating in the Soviet Union) of a collective accelerator in which the protons that will form the beam are initially surrounded by electrons which drag them along and are more easily accelerated; the electrons are then blown off to leave the beam.

This concept has received considerable attention both in the Soviet Union and in the United States but has now been largely discarded. The 'smoke ring' collective accelerator experiments at Berkeley, for example, have stopped because of enormous problems in creating a stable, suffiintense electron ciently beam. Interestingly, Aviation Week fails to discuss any evidence of Soviet progress in that area. It seems therefore that at least one crucial component of a satellite-based beam weapon is not yet technologically feasible.

Even if General Keegan's assessment of Soviet technology in most areas is substantially right, there remains the claim of whether the ultimate aim is a beam weapon. The interesting thing about Aviation Week's list of technologies is that they are all equally crucial for the development of fusion by an electron or laser beam. The location that General Keegan interprets as a beam weapon test site is equally likely to be used for fusion experiments. And being first with fusion would confer a good deal more power than ownership of a decidedly cumbersome and delicate weapon.

Deadly beams



BACKGROUNDER

"the USSR can convert electron beam energy to compress fusionable material to release maximum fusion

But this is far from the description of the event given by other high energy physicists, who say that Rudakov merely gave technical details (which happened to be classified in the US at that time—hence the fuss) of a Russian experiment that had been widely reported in the West several months earlier. True, in that experiment the Russians had for the first time produced some neutrons in an attempt at electron beam fusion, an achievement that the Americans have not yet matched. It is doubtful that Rudakov blurted out his secrets by accident; he stood to gain much more in international prestige than he lost by indiscretion. For the same reason high energy physicists believe that, as the Russians