

In a controversial report published this week, a committee of the National Academy of Sciences (NAS) has convincingly demonstrated how little we know about the potential long term consequences of a full-scale nuclear war. The committee attempted to assess the magnitude of physical and biological damage in regions far removed from the target area, decades after a massive nuclear attack. Not surprisingly, it has suggested that there are huge areas of uncertainty—such as the possibility that a significant climatic change could be triggered—but it could predict no single effect serious enough to wipe out human life completely.

The report has raised considerable controversy because, aside from the emotional nature of the subject matter, it is open to a wide range of interpretations. Thus, Dr Philip Handler, President of the NAS, stated in a letter printed as an introduction to the report that the committee has concluded that *Homo sapiens* would survive the "horrendous calamity" of a massive nuclear exchange, while the Federation of American Scientists (FAS) suggested in a commentary on the report that the uncertainties in the calculations render such conclusions unwarranted.

The study, which was carried out for the Arms Control and Disarmament Agency (ACDA), took as its starting point a war resulting in the detonation of about 10,000 megatons of nuclear explosives in the Northern Hemisphere—equivalent to about half the destructive capacity of the world's nuclear arsenals. The committee concentrated its attention on phenomena likely to occur "at distances on the order of continental separations from the detonations", and it made no attempt to analyse possible economic and political consequences from such a holocaust. Findings include:

- Perhaps the most significant worldwide effect may result, not from radioactive fallout, but from massive destruction of the ozone layer. The committee notes that a major nuclear

exchange would inject huge amounts of nitric oxide into the stratosphere, which in turn could destroy between 30 and 70% of the ozone layer in the Northern Hemisphere, and about 20–40% of the layer in the Southern Hemisphere. Although much of that destruction would be repaired by natural processes in three or four

## After the Third World War

by Colin Norman, Washington

years, it may take as long as 40 years for the ozone layer to be restored completely, the committee reckons.

The consequences of such an event would be a very large increase in the amount of ultraviolet radiation reaching the Earth's surface; this would damage plant life and present a severe health hazard to animals, including man. The committee notes, for example, that increased exposure to ultraviolet radiation "might have a significant impact on a great variety of [plant] species . . . and possibly could have serious implications for the ecosystem of which (particularly sensitive species) are a part". As for food crops, the committee suggests that plants such as peas and onions could be killed by large increases in ultraviolet radiation. The effect on man would be to increase the incidence of skin cancer in mid-latitudes by up to 30%, and "incapacitating cases of sunburn in the temperate zones and snow blindness in northern countries" would be expected.

- Radioactive fallout in the Northern Hemisphere would average about 1 Ci km<sup>-2</sup>, but there would probably be "hot spots" where the fallout could be an order or magnitude greater. The committee states that "there would be no widespread effect" on plants from fallout, but in the hot spots, "minimum damage to ecosystems dominated

by radio-sensitive plants might occur". Some foods may become contaminated at levels "approaching the upper limits of present standards", however.

The effect on animals would, on the other hand, be more pronounced. An increase of 2% in the incidence of cancer would be likely, and a similar increase in the incidence of genetic disease would also result.

- As for effects on climate, the committee notes that a large nuclear exchange would inject vast amounts of dust into the atmosphere, which would reduce the amount of solar radiation reaching the Earth and possibly reduce global temperatures as a result. Moreover, destruction of a large part of the ozone layer might also lead to a reduction in temperatures. Even small changes would have serious implications for crop production, and the committee notes that "substantial changes in weather extremes . . . which could be of major importance to agriculture, have also been related plausibly to small changes in global mean climate". The committee said, moreover, that it could not rule out the possibility that a small perturbation in global temperatures "also might lead to major global climatic changes".

What are the implications of such findings for policymaking? Opinions vary. According to Dr Fred Iklé, Director of the ACDA, the committee's findings underline the futility of all-out nuclear war, because they suggest that there may be a serious ecological backlash from a massive nuclear attack.

But the FAS suggested in its statement that the conclusion that mankind might survive a nuclear holocaust has little relevance to public policy.

The committee should have recommended getting rid of all US and Soviet nuclear bombers, which would eliminate about 80% of the world's nuclear megatonnage, thereby reducing potential long-term effects of nuclear war, says FAS. □

in 1968, was expected to cost \$14 million in the present fiscal year, and the chances are that it would have collapsed in a bankrupt heap if five foreign governments hadn't agreed to bail out the project. Very broad hints were dropped during hearings of the House Appropriations Sub-committee last February that Congress might only look favourably on requests for more funds if an international interest could be demonstrated—and demonstrated in dollars and cents. The Soviet Union and Japan have also signed up for \$1 million worth of interest, West Germany is renegotiating an involvement

of two years' standing, and France is also expected to buy in at the going rate, leaving the USA to find the remaining \$9 million.

Since the information gathered by the DSDP in its pre-international phase was fairly readily available to friendly nations at something less than \$1 million a year, it seems reasonable to ask why the UK should bother laying out money. The answer is that if the UK (and the other four volunteers) hadn't, then there wouldn't have been any further information to receive at bargain rates or any other: that the UK would now have immediate access

to results, but that the emphasis in British participation was chiefly on the economic and technological benefits to be gained. This is meant to mean that the UK will be in a better position to exploit seabed resources (if and when the good ship *Glomar Challenger* happens on any) and hard scientific know-how, and that the exercise will develop the nation's deep-sea technology experience, presumably to the benefit of North Sea oil operations. Perhaps it will also provide answers to interesting questions like: "Where is there a nice spot to dump a ton of radioactive waste?" □