

public education and for a strengthening of screening tests to armed forces personnel because more than 5,000 personnel a year are removed from nuclear weapons handling duty because of drug abuse, alcoholism or psychological problems. The problem is likely also to be large in the Soviet Union, where alcoholism is a health problem of "epidemic proportions", he said.

The reluctance of the United States to consider the "biological" effects of nuclear war has been criticized by Dr Carl Sagan of Cornell University. Although the government in theory is providing \$50 million over 5 years to investigate the physical effects, no money is spent on biological research. One of the first studies on the ecological effects of a nuclear winter-like environment on plants is planned by Lawrence Livermore National Laboratory and the University of Wisconsin. But Dr Lynn Anspaugh of the former institute stressed the need for considerable resources to produce and continuously update an interactive model.

Maxine Clarke

Japanese exposition

Tsukuba Expo strikes camp

Tokyo

THE Tsukuba International Exposition, Japan's great high-technology extravaganza, has now closed its gates, having just squeezed past its self-declared target of 20 million visitors in its six-month run. Approximately one-sixth of the entire population of Japan — 20,334,727 people — made the effort to go and see the wonders that science has in store for them (see *Nature* 314, 213–220; 1985).

In setting the 20 million goal the Expo planners, with no experience of how popular the science theme might prove, took the view that the theme probably did not matter too much: it was simply assumed that attendance would be proportional to the size of the site. The 1970 Expo held near Osaka attracted 60 million visitors, so the Tsukuba Expo, on a site just one-third of its size, should attract 20 million.

Cynics might say that it is no wonder

that attendance turned out to be proportional to the size of the site — it was simply a matter of the physical limits of how many people can be packed into one space. But there may be a better explanation for why the 20 million goal was reached so neatly. Expo organizers knew they might otherwise come out in the red and in the past few weeks public enthusiasm has been whipped up with feverish campaigns. In a tremendous closing rally, one-third of a million people turned up on Sunday, breaking all previous records and pushing attendance to the 20 million mark.

For the Expo organizers, the attendance figures mean that they may end up with around ¥1,000 million (US \$4 million) in profits, which is not so bad. Things have not been so profitable, however, for the hundreds of small shops set up in the Expo grounds to sell souvenirs and food. Many have lost money heavily. Angry shopholders blame poor siting and bad organization, some are refusing to pay their rent and others are taking legal action.

The Expo's biggest hit was Fujitsu's three-dimensional computer-generated film which included an astonishing sequence of a DNA molecule being wound and rewound and packed into a chromosome. The theatre was completely full for almost every showing throughout the whole run. Biggest attendance figures of all were claimed by the Matsushita pavilion with more than five million visitors coming to see the portrait-drawing robot, which numbered Prime Minister Nakasone among its sitters.

Many foreign visitors were disappointed that there was so little substance to the Expo and so much spectacle; its aim sometimes seemed to be merely to accustom the Japanese people to a high-tech future whose coming had already been decided for them. But not only foreigners were critical: a group with considerable distrust of the intentions of the commercial electronics makers whose pavilions dominated the Expo launched their own alternative "AXPO 85" on a site nearby.

The Expo site is now to be cleared of its accumulated pyramids, cones, spheres and other fantastic structures in order to be turned into an industrial park. But some bits of the Expo will live on. The Chinese government is rumoured to be interested in buying some of the high-tech exhibits for a fair that will give the Chinese people a vision of what they are striving for. The Volvo articulated double shuttle buses are to go to Australia. And the Fuyo theatre's robots are likely to be bound for Disneyland in Florida. There, no doubt, they will feel much happier than they ever were at a science Expo. **Alun Anderson**

UK atomic energy

Business not as usual

"WE'RE not just bench R&D; we have to be building things, getting things working". With this attitude the UK Atomic Energy Authority (UKAEA) moves into the final stages of negotiation over its reorganization into a trading fund, a change due to take effect at the start of its financial year in April 1986.

As chairman Arnold Allen announced at the presentation of the UKAEA annual report last week, trading fund status entails being run "as far as possible under the conditions of a normal commercial business" with payment for contracted work performance targets. Moreover, there will be an end to reliance on government grants to balance the books; this year UKAEA spent £399.7 million (up from £380 million) and was paid £174.4 million for its services (up from £169.6 million) with the difference provided by parliamentary vote. Remaining questions centre on "the precise financial regime" within which UKAEA will operate — the initial capital debt, borrowing ceiling and financing of basic research.

Contracts are an index of the authority's ability to get things working, according to Mr Allen. Those given to UKAEA comprise both nuclear contracts, including the supply of fuel and reactor insulation testing for the overseas market; and non-nuclear contracts, 13 per cent of UKAEA activity, which generated £30 million last year (up £2 million). Contracts worth £60 million were placed last year by the UKAEA Northern Division.

The authority's commitment to breeder reactors is evinced by its recent acquisition of a 49 per cent shareholding in Fast

Reactor Technology (Fastec), a company set up to explore the commercial exploitation of the technology. The remaining shares are owned by National Nuclear Corporation. Fastec's prospects look particularly good because fast breeder reactors seem set to be less expensive than was assumed three years ago. The capital costs alone, said Dr Tom Marsham, a UKAEA board member, could be 20 per cent less than originally forecast. After start-up costs, the reactors are predicted to become "broadly competitive" with other sources of electricity.

UKAEA's research into fast reactor technology, centred at the Dounreay facility in Caithness, is now reaching fever pitch. Both the government and the authority hope that Dounreay will receive the European reactor club's nod of approval to reprocess spent plutonium from the demonstration reactors in France and West Germany. Britain's strongest case lies in its experience with reprocessing technology, one example of which is the £650,000 "pulsed column" rig at Dounreay for solvent extraction, said to be the largest sealed glovebox in the world.

Planning permission would have to come first and the Scottish Secretary, Mr George Younger, echoed the need for haste by limiting the inquiry, planned for early next year, to local issues. According to Dr David Locke of the Northern Division, an environmental assessment will be presented at the inquiry; but environmentalists see the move as preempting any concern besides that of the UKAEA to stay on top. **Elizabeth Collins**