Star wars

True cost still growing

Washington

INITIAL research and development on the Star Wars ballistic missile defence programme will probably cost more than \$70,000 million, according to a coalition of arms control groups opposed to the programme. The group, called the National Campaign to Save the ABM [Anti-ballistic Missile] Treaty, said last week that the usual description of the Strategic Defense Initiative (SDI) as a five-year, \$26,000-million research project is merely an artefact of the Pentagon's five-year planning window, and does not reflect the true extent of the effort.

With the release of the proposed 1986 budget, the programme has already become a six-year, \$33,000-million research effort; the arms control groups said that the ten-year research phase called for in SDI plans could reach as much as \$100,000 million, and drag on an extra three years, if cost overruns characteristic of Pentagon weapons-system development programmes occur.

SDI plans call for a decision on deployment to be made in 1983. The arms control groups' report, prepared by John Pike of the Federation of American Scientists, notes, however, that the SDI office may be unable to spend its money as quickly as it hopes to receive it. While most Department of Defense programmes manage in any given year to disburse about half of the funds appropriated in that year (and about a quarter in the following year), the SDI programme has been able actually to spend only one-third of its money in the year it was appropriated.

The costs of the US Strategic Defense Initiative and predecessor programmes, expressed in "constant" dollars at fiscal year 1986 price levels. The "deployment" costs refer to the deployment during the early 1970s of the US anti-ballistic missile system.

The arms control groups' emphasis on the budgetary consequences of Star Wars appears to be a shift in strategy. Until now, the arguments against Star Wars have centred on its technical unfeasibility and its destabilizing effects on the balance of strategic power. The budgetary argument appears designed in part to counter the Reagan administration's argument that the programme is only a research effort. "Its

massive budget will create pressures for deployment", Pike said. The report also charges that the programme will involve testing of actual anti-missile prototypes, possibly violating the ABM treaty (which forbids any testing of space-based, air-

based, sea-based or mobile land-based systems or components). According to the report, the following hardware is scheduled for testing during the research and development phase:

- **Booster surveillance and tracking system.** Components of this mid-wavelength infrared system are due to be tested on early-warning satellites in the mid-1980s; operational testing, in which the system would be used to track missiles in their boost phase, is planned for the early 1990s.

- **Space surveillance and tracking system.** Operational capability is scheduled for the early 1990s for this long-wavelength infrared sensing system, which may be able to detect thermal "signatures" of missiles in mid-course.

- **Terminal imaging radar.** A demonstration of this X-band radar, designed to discriminate between decoys and warheads, is planned for the late 1990s.

- **Lasers and neutral particle beams.** Space-based and ground tests will take place in the 1990s.

- **Pointing and tracking mechanism for nuclear-pumped X-ray lasers.** A space-based test of the pointing and tracking component is planned.

- **Ground-based rocket interceptors.** Tests are planned of the High Endo-Atmospheric Defense System (HEDS) as well as a follow-on to the Homing Overlay Experiment using smaller interceptors.

- **Rail guns.** Space-based tests of a hypervelocity launcher are planned for early 1990s.

- **Rocket-propelled space-based launchers.** Tests in space of this system, which follows the lines proposed by the High Frontier organization, are expected in early 1990s.

Stephen Budiansky

Feedstuff hormones

Europe to ban without proof?

Brussels

POLITICAL pressure from member states of the European Community on the use of synthetic hormones in farm livestock may mean that scientific opinion is overridden. While European consumer groups, led by the Bureau of European Consumers' Unions (BEUC), prepare another veal boycott over the use of growth hormones (which increase the weight of calves and beef cattle and make them more manageable), the Commission is alarmed that a scientific report on growth promoters that it has commissioned will be preempted.

In February, BEUC accused the European Commission of procrastination in producing the report on the controversial artificial growth promoters trenbolone and zeranol (which imitate the activity, respectively, of testosterone and oestradiol). The report is being drawn up by a special scientific group on anabolic agents led by Professor Eric Lamming of the University of Nottingham and was originally due last autumn. BEUC regards the delay as an attempt by the Commission to renege on earlier commitments made in the wake of the hormone scare in 1980 in Italy, when babies fed with babyfood made with veal containing synthetic hormone residues began precociously developing sexual features, not necessarily those of their own sex.

Although European farm ministers originally said they were in favour of a ban on the use of all hormones for fattening purposes, pressure from the French and US veterinary industries as well as member states where synthetic hormones are widely used, led to a subsequent Commission ban on only the most dangerous of the synthetic hormones — stilbenes and thyrostatic substances.

As well as expressing concern for consumers' health, BEUC insists that the present 700,000-tonne beef surplus in the Community constitutes an argument against the use of growth promoters in livestock on economic grounds. Only the United Kingdom, Ireland and Luxembourg use synthetic hormones. West Germany permits the use of natural hormones, but the use of all hormones for fattening purposes is banned in the remaining member states.

After looking at the evidence compiled by the Lamming group, the Community's scientific, veterinary, animal nutrition and food committees last April urged the introduction of strict precautions in using natural hormones (17 β -oestradiol, testosterone, progesterone and their less stable additives) and more effective monitoring. BEUC wants a strict system of controls as well as labelling stating clearly that the meat contains no added hormones.

The problem of the two synthetic hormones still allowed as additives, trenbolone and zeranol, is that the data are considered insufficient. Partly in answer to requests by the industry the Commission agreed to further research and reconvened the Lamming group. Its failure to report last autumn is seen by BEUC as an indication that the European Commission is bowing yet again to pressure from member states and interested parties.

European Commission officials deny this but admit that political pressure is so strong, on both sides, that scientific views may not really be taken into consideration.

The report may not now appear before the end of 1985, but, according to Professor Lamming, the reasons behind the delay are technical. Consumer concern, he says, has generated much new research into the two compounds. Analysing all the data takes time.

The evaluation of the latest data has also raised questions about the reliability and relevance of test methods. The immediate objective is to tell whether there is a threshold dose of hormones below which no effects appear, but this is more than usually complicated by doubts about the relevance of tests with laboratory species to the potential hazards of such compounds in humans.

Anna Lubinska

Danube dam stopped

WORK on the controversial Gabčíkovo-Nagymaros hydroelectric project (see *Nature* 311, 293; 1984 and 313 171; 1985) has now been halted, Mr Matyas Szuros, secretary of the Central Committee of the Hungarian Socialist Workers' Party revealed last week. This means, in effect, that the Czechoslovak government has agreed to a moratorium on the almost completed diversion and dam at Gabčíkovo. Work on the Hungarian dam at Nagymaros was stopped in 1981 for lack of funds and under pressure from Hungarian ecologists fearing irrevocable damage to the water-table of north-west Hungary, destruction of river-life and the drowning of the scenic "Danube Bend", Budapest's chief resort area.

Interviewed on Budapest radio, Szuros explained that when the agreement for the scheme was first signed in 1977, the effect on the environment could not be calculated. The two governments, Szuros said, had modified the original agreement "on the basis of mutual agreement" in 1983. This would imply that the moratorium had been agreed before the environmentalists' petition against the dam and the clamp-down on public discussion of the project at the beginning of 1984.

According to Szuros, there is now until the middle of 1985 to "analyse in a comprehensive way, carry out scientific research and assess the potential further effects on the environment" of completion of the project.

Vera Rich

Radioactive waste

Disunited states urged to act

Washington

STATES could soon face serious problems disposing of low-level radioactive waste, unless efforts now under way in the US Congress succeed in breaking the political stalemate which, for the past four years, has prevented the development of new disposal sites.

The radioactive waste materials concerned consist mostly of discarded laboratory equipment and clothing. Arrangements for the disposal of highly active wastes, such as arise in fuel reprocessing, are covered by separate legislation.

A law passed in 1980 gave states until 1 January 1986 to form themselves into regional compacts responsible for their own waste disposal, after which date the three existing disposal sites would be able to exclude waste from other regions. States lacking their own disposal sites have, however, blocked the required congressional approval allowing them to do so; in retaliation, the three states with sites have threatened to close them down completely if they are required to take out-of-region waste after next year. It is still unclear how a short-term crisis will be avoided.

Some 2.7 million cubic feet of low-level waste are produced each year in the United States, half of it by electrical utilities and half by hospitals and research institutes. The need to develop new sites will become urgent as the rate of waste production increases; roughly 40 per cent more waste will be produced each year by 2007. Most states have now reached provisional compact agreements under the low-level radioactive waste policy act, but as choosing and developing a suitable site can take five years, some urgent interim arrangements are necessary. Congress is thought unlikely to grant the necessary approval for formation of regional compacts until a solution to the immediate problem is found.

The latest attempt at a political solution is a bill introduced in the House of Representatives by Congressman Morris Udall (Democrat, Arizona). Udall's bill, which arose out of extensive consultations with state governments, would require states without disposal sites to submit within one year plans for developing sites; the states with operating sites would be obliged to continue taking limited quantities of out-of-region waste until 1993. Udall's bill, which is in the form of an amendment to the 1980 act, would also provide a standard form of agreement for compacts. But even in the bill does prove politically acceptable, in its present form it would provide only a partial solution to the growing waste problem.

There is general agreement among states that the two major sites now in operation (at Barnwell, South Carolina, and Hanford, Washington) should take less

waste in future than they do now. Under Udall's proposal they would have to take each year only 60 per cent of the amount of waste they received from outside their compacts in 1983; a third, much smaller, site in Nevada would have to take only 150,000 cubic feet of out-of-region waste. Udall makes no provision for the remaining 40 per cent, and some states are making plans for drastic action.

One widely discussed option is that power companies might be required to store their low-level wastes at power stations for five years, after which time it is hoped new sites will be nearing completion. The proposal is, not surprisingly, being resisted strongly by the utilities; the American Nuclear Energy Council, a lobbying group, is pushing for "good faith agreements" between states to ensure continued access to the existing sites. But supporters of the five-year storage idea point out that it would reduce waste production to under 60 per cent of the 1983 level and so perhaps solve the crisis.

Although not included in Udall's bill, the five-year storage plan is likely to be discussed at forthcoming meetings of state representatives where the waste issue will be tackled. There is, however, general recognition that any solution is likely to be fraught with legal complications, because agreements between states come close to the dangerous ground of balance of power between states and the federal government.

Two provisional regional compacts have already been submitted for approval in the 99th Congress and three more are expected to follow shortly. The outlines, at least, of compact agreements can be discerned for most of the country, though with negotiations at different stages. Negotiations centre on procedures for deciding where in each compact a new disposal site would be built; some compact agreements specify, for example, that all member states producing more than a certain percentage of total waste must have a site in their own territory.

The major political log-jam is in the north-east of the country, where Massachusetts and New York, both major producers, have refused to form compacts with New England states. Massachusetts, under a state law known as chapter 503, cannot join a compact or approve a site decision until a public referendum is held — which cannot be until mid-1986, after the legal deadline for formation of compacts. Both New York and Massachusetts may be forced to consider temporary storage facilities and to impose draconian waste-reduction measures that would go beyond the voluntary efforts made so far. As for what will happen in the longer term, the answer is, in the words of one analyst following the issue, "anybody's guess".

Tim Beardsley