

NASA's Shuttle Shuffle Endangers Space Science

EVEN before its first flight, the space shuttle has demonstrated a remarkable capacity for dodging hostile fire. Some 18 months ago, in response to bitter opposition from the Office of Management and Budget over the costs of the shuttle, NASA officials radically altered its design, choosing a model which will be only partially recoverable in place of the fully manned, reusable launch vehicle that was originally on the drawing board. The switch cut the estimated development costs in half, secured support from OMB and easily won approval from Congress in a key vote which allowed NASA to let contracts for the project. Undaunted, however, the shuttle's critics in the Senate have continued to attack NASA's economic analysis of shuttle operations in the hope that they can shoot enough holes in it to persuade Congress to delete funding for the project when NASA's budget comes up for approval. But they have found that one of their key weapons—a critical report prepared by the General Accounting Office—has been badly blunted by yet another abrupt change of tack by NASA (see *Nature*, 243, 372; 1973).

In short, NASA was claiming last year that use of the shuttle will save some \$5,200 million between now and 1990 when compared with the costs of a comparable space programme using conventional, expendable launchers. But the GAO was about to publish a report criticizing NASA's figures and suggesting that cost overruns and other uncertainties may reduce the claimed economic advantages of the shuttle, when NASA came up with a completely fresh analysis of shuttle operations which, it is claimed, will save as much as \$16,000 million. The agency has yet to make a formal announcement of its new mission model, and it has yet to provide details of how those remarkable savings are to be made, but according to one NASA official, the chief change from previous plans is the idea of using the shuttle for sortie missions with the spacelab which may be developed by ESRO. The spacelab will cut the cost of payload development and thereby allow NASA to make more shuttle flights. In that case, it is not difficult to see why NASA is anxious that ESRO should develop the spacelab.

But, as important as costs are to members of Congress, this complex debate over constantly shifting economic analyses to some extent misses the most important question about the shuttle: is it the best vehicle for carrying out a productive and useful space programme? So far, NASA's promotion of the space shuttle has been a clear case of putting the cart before the horse. Instead of first choosing what objectives should be accomplished in space in the 1980s, and then planning a launcher system to fit in with those objectives, NASA has sold Congress the concept of the shuttle and is now discussing what it will be used for. It has, for example, asked the Space Science Board of the National Academy of Sciences to offer advice on how the shuttle can best be used for scientific missions. It goes without saying that such a study should have been made two years ago, and it is not sufficient to argue that political realities forced NASA first to sell the concept, and then come up with the justification.

There have been signs, however, that critics of the shuttle in the Senate have changed their line of attack, and are asking some embarrassing questions about the effect of the shuttle on other space activities in the next few years. Their questions deserve a better answer than NASA has so far given. In short, they are concerned that the projected costs of developing the shuttle will squeeze out more valuable and productive programmes.

That concern has gained considerable momentum from a table supplied by NASA to Senator James Abourezk which outlines the runout costs of all the programmes contained in NASA's budget request for 1974 (in other words, the table does not include any estimates for new projects). The table shows costs of the shuttle increasing from \$200 million last year, to \$1,100 million in 1976 and \$1,190 million in 1977, while the run-out costs of space science and applications programmes decline steadily from \$868 million last year to \$422 million in 1977.

The worrying thing about the table is that although it takes no account of any possible new programmes, it shows no decline in NASA's total spending until after 1977. The clear implication is that unless NASA is able to persuade the Office of Management and Budget and Congress of the need for a larger total budget, there will be no money for new projects until after spending on the shuttle peaks in 1977. The consequences of such a hiatus are surely sufficiently alarming to require an explanation from NASA.

But the standard response from NASA officials is that they are sure that the agency's total budget will soon get back to the level of two years ago—about \$3,400 million. But the cold fact is that this year the Office of Management and Budget trimmed NASA's budget request to \$3,100 million. Spending projections for next year suggest a total budget of \$3,160 million and there is absolutely no guarantee that it will pick up again.

What then would be the consequences if NASA's optimism turns out to be unjustified, and there is no money for new programmes for the next few years? The High Energy Astronomy Observatory has already been suspended, and its missions considerably reduced in scope. The Grand Tour of the Outer Planets has gone by the board, as have several of the Apollo missions that were expected to be most productive and two Orbiting Solar Observatories have been scrapped. Those projects were dropped partly because of budgetary pressures in the past few years, but also because NASA would not be able to support them and the shuttle without a large budget increase. In a sense, therefore, the shuttle has already cut deeply into the space science programme, and it will cut even more deeply if there is no money available for the Venus Pioneer mission, which will be up for funding next year, or even for the revamped HEAO missions. NASA's nimble footwork in dodging criticisms of the shuttle has thus secured approval for the project, but it has also seriously endangered the health of space science for the next few years.