board last week that he shared the enthusiasm for such a project, although arguing that it should be planned in conjunction with what is likely to be NASA's next major project, a permanent orbiting space station which could be used as a base for manned planetary missions.

Members of the advisory board wondered whether there might be a danger that if NASA did embark on such a project it might further squeeze the space science budget, as the Apollo Moon landings and the space shuttle appeared to have done, but Dr Beggs tried to calm such fears. Admitting that the near-term looked relatively bleak, with no new planetary starts likely to be approved for 1983 or 1984, he replied that in the past the space science budget had done best precisely at those times when NASA had been able to generate political support for its major undertakings. **David Dickson**

More bickering about solar satellites

Washington

The National Aeronautics and Space Administration (NASA) seems unlikely to grant the request from the European Space Agency (ESA) to bring forward the launch of the International Solar Polar Mission, now due in 1986.

ESA had made this request following NASA's decision to stop work on the vehicle which it was to have provided for a dual-spacecraft mission, with the original intention that the two would pass simultaneously in opposing orbits over the poles of the Sun. European scientists had hoped that NASA, which will still launch the ESA space vehicle from the space shuttle, would be able to arrange an earlier flight to help compensate for the disruption and the loss of experiments which the cancellation has caused.

Last week, however, NASA officials said that the growing concern over whether the shuttle will be able to maintain an already overcrowded launch schedule means that a 1984 launch is virtually out of the question.

There is a slight possibility of a launch in 1985. However, since there is only a relatively short launch window in that year, and since the same window is required by the Galileo probe and orbiter scheduled to start its journey to Jupiter at the same time, the chances of arranging both launches within the same period seem slim.

ESA officials are still angry at the way in which NASA cancelled its proposed spacecraft; a resolution adopted by ESA's space programme committee last month suggested that ways should be explored of seeking some type of compensation from the US agency and ESA's secretary general Dr Quistgaard suggested the early launch date as one form of recompense.

US officials admit that it is the first time NASA has had to go back on a previous agreement, but claim that the "memorandum of understanding" signed between the two organizations makes it clear that the solar mission agreement was subject to the availability of funding, and that NASA could not legally commit itself to more than one year's advance funding.

In addition, Dr Hans Mark, deputy administrator of NASA, told a recent meeting at the National Academy of Sciences that although the decision to cancel NASA's involvement in the solar mission was regrettable, there had been several occasions in the past when European governments had broken commitments, for example some of those made through the North Atlantic Treaty Organization.

On the first point, ESA claims that the memorandum of understanding had been agreed on the basis that normal funding procedures would be pursued by both sides — and that NASA is at fault not for having failed to provide the funding promised, but for having decided unilaterally to omit the project from its request to the Office of Management and Budget for the 1983 budget. On the point that some European organizations have broken commitments in the past, ESA argues that it is not fair to penalize ESA for failures of individual European states.

Meanwhile NASA scientists are discussing the possibility of launching an Explorer satellite into an ecliptic orbit around the Sun to coincide with the European spacecraft's encounter. This satellite, which would be launched in 1985, would provide baseline measurements of the solar wind — and that might go some way to making up for the deficiencies resulting from the decision not to send a full US spacecraft. **David Dickson**

Diablo Canyon reactor

Licence revoked

Washington

The US nuclear industry has come in for an unexpected roasting from the new chairman of the Nuclear Regulatory Commission (NRC), Dr Nunzio Palladino. His criticism of its quality control was made before a congressional committee on the same day that the NRC voted to revoke a licence issued only two months ago to permit start-up tests at the Diablo Canyon nuclear reactor in California, on the basis of a series of engineering mistakes made when the plant was strengthened to resist earthquakes in the mid-1970s.

Six weeks of frequently-violent demonstrations by anti-nuclear protesters in September and October failed to stop the plant's owners, Pacific Gas and Electric Company, from proceeding with plans to start to load the reactor with uranium. The protesters claim that the plant is inherently unsafe because it has been built less than three miles from the Hosgri Fault, a branch of the San Andreas Fault system.

As the demonstrations were coming to an end, however, an engineer with the company discovered that a blueprint had been misread when the plant's support structure was being strengthened to compensate for the possibility of earthquake damage, causing the loads on various components to be miscalculated. Further errors found later included the misapplication of stress level numbers along the Hosgri Fault and the use of incorrect data in calculating the ability of pipes to withstand an earthquake.

Besides causing considerable embarrassment to the Pacific Gas and Electric Company, this discovery led to immediate pressure on NRC from Congress. The Reagan Administration has promised to speed up the licensing of new plants; but this strategy requires that public confidence should be maintained that safety is not being sacrificed in the process.

Appearing before the House Interior subcommittee, Dr Palladino, former dean of engineering at Pennsylvania State University, said that "after reviewing both industry and NRC past performance in quality assurance, I readily acknowledge that neither have been as effective as they should have been in view of the relatively large number of construction-related deficiencies that have come to light".

An order approved by the five-man commission, which voted 4-1 to suspend the low-power operating licence and unanimously for an independent audit of the quality control safeguards used by Pacific Gas and Electric Company, said that the suspension was necessitated by the seriousness of the errors in the initial review of safety modifications.

Following NRC's decision, the Pacific Gas and Electric Company issued a statement saying that it was "disappointed", since "nothing has been discovered to date that would indicate that the plant is not safe". The company claims that the plant had many redundant safety systems compensate for any threat from the Hosgri Fault. **David Dickson**

Uranium enrichment

US–India stand-off

New Delhi

India is trying to become self-sufficient in the production of fuel for its nuclear power plants following its bitter experience with the United States over the supply of low enriched uranium for the Tarapur plant in Maharashtra state.

The latest round of discussions between Indian and US officials has failed to break the impasse over the clearance of at least pending applications with the United

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States for the supply of enriched uranium. The United States maintains that India should sign the Nuclear Non-Proliferation Treaty and open all its nuclear installations — indigenous as well as foreign-aided — for international inspection as required by the US Nuclear Non-Proliferation Act of 1978. The supposed fear is that a uranium reprocessing facility in India might be used to extract plutonium for atomic weapons.

India rejects this contention, however, arguing that the 1978 US legislation should not be applied retrospectively and unilaterally to a bilateral agreement entered into in 1963. India has said time and time again that its nuclear technology would be used for peaceful purposes only. India holds the Nuclear Non-Proliferation Treaty to be discriminatory, saying it includes only civilian establishments and specifically excludes military establishments of the nuclear weapon states which prescribe non-proliferation for others and not for themselves.

The issue is now a matter of principle — especially as India is now almost self-reliant for nuclear fuel production.

Indian nuclear scientists have developed mixed oxide fuel of uranium and plutonium which can work as alternative fuel in place of the enriched uranium supplied by the United States for the Tarapur plant. The only other operational nuclear power plant at Kota in Rajasthan utilizes indigenous natural uranium. The nuclear plants being built at Narora and Kalpakkam will also be pressurized heavy water reactors using indigenous uranium.

Sunil Saraf

British academics at the barricades

Genteel academic militancy reached boiling point last week, with a mass lobby of the British Parliament by some 10,000 university teachers protesting not merely at the British government's decision that the university budget should be cut but at the uncertainty that remains about the arrangements that may (or may not) be made to deal with redundancies among academics. Some of the participants (see picture) wore fancy dress.

The lobby (on Wednesday, 18 November) coincided with a debate in the House of Commons on the planned reduction of the public subvention for universities, called by the Labour

opposition. One government speaker complained that it would have been more convenient if the debate had been arranged for the following day, so that those inclined to do so would have had a chance to listen to what the lobbyists were saying.

Both occasions followed by a lunch-time break the first appearance of Sir Keith Joseph, the new (since last month) Secretary of State for Education and Science, before the Select Committee on Education, at which he and his retinue of civil servants were unable to put into words a definition of the "Robbins principle", the doctrine that qualified candidates for university entry should be catered for. At the beginning of last week, the UK Committee of Vice-Chancellors also (unusually) made public its own account of an unsatisfactory meeting with the minister and a waspish letter it had written to him afterwards.

The debate in the House of Commons has confused and not clarified the immediate financial prospects of British universities. Sir Keith Joseph and his minister with special responsibility for higher education, Mr William Waldegrave, declined to answer the apparently simple question whether the government would pay the cost to universities of breaking contracts with tenured academics. Each of them said, however, that the British government would be prepared to "listen to" arguments that it would save money by extending the period over which the universities were now required to contract.

The Committee of Vice-Chancellors is now drafting such a document.

US nuclear technology

Exports raise fears

Washington

Fears are mounting in Washington that the Administration's efforts to increase nuclear technology exports could be encouraging the proliferation of nuclear weapons. Last Thursday, members of Congress questioned the Administration closely about its agreement with Australia which, for the first time, would mean the United States sharing its knowledge of centrifuge technology for enriching uranium.

The criticism came only a few days after a new storm had broken over the ability of the International Atomic Energy Agency (IAEA) in Vienna to provide satisfactory safeguards against the diversion of nuclear materials from civilian to military use.

The decision to share enrichment technology with Australia is part of an effort to encourage US companies to participate in a joint venture with the Australian government to construct enrichment facilities for its nuclear industry. It was contained in a memorandum signed on 12 November by President Reagan which also instructed the Department of Energy to look at ways of transferring the federal uranium enrichment programme into private hands.

During a hearing of the Senate Foreign Relations Committee's subcommittee on energy and nuclear non-proliferation, several members questioned Administration officials closely on this decision. Centrifuge technology has previously been subject to strong government restrictions, on the grounds that it could provide a relatively inexpensive way of producing weapons-grade nuclear fuel.

However, the Administration continues to insist that, although a hard line will be taken with any country that diverts civilian technology to military use, in general IAEA provides the best way of minimizing the risks of proliferation through its safeguards and regular inspections.

This argument suffered a setback earlier this year when an ex-IAEA inspector, Mr Roger Richter, told the same Senate committee that IAEA had failed to detect efforts by the Iraqi government to work clandestinely on nuclear weapons, and that present IAEA safeguards were "totally incapable of detecting the production of plutonium in large-size material test reactors".

At the time, IAEA officials fiercely contested Mr Richter's conclusions, claiming that he had not been aware of all the relevant facts. However, it now looks as if they will have to go through the same process in defending themselves against criticisms made by another ex-inspector, Mr Emanuel R. Morgan, in a report commissioned for the Nuclear Regulatory Commission by commissioner Mr Victor Gilinsky.

The report — not officially released but leaked to the *New York Times* — echoes Mr Richter's conclusion that IAEA is incapable of detecting the diversion of a significant quantity of nuclear fuel "in any state with a moderate to large nuclear energy establishment".

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