should be another review, intended to see how far industrial participation has gone.

OCEANOGRAPHY

New Antarctic Ship

A NEW polar vessel is to be provided for the British Antarctic Survey by the Natural Environment Research Council. It will cost about £1·75 million to build and it is hoped that it will be ready for operations in the Antarctic in October 1970. The new vessel will not be an addition to the polar fleet, because it will replace one of the survey's existing vessels, RRS Shackleton, and it will also replace a ship chartered each year by the survey to supply bases which the Shackleton cannot reach in some ice conditions.

The new research ship will be built by Robb and Caledon at Leith, Scotland. It will be 326 feet long, with a beam of 60 feet, and it will be specially designed for ice breaking. There will be accommodation for 62 survey personnel and the crew, approximately 130,000 cubic feet of space for general cargo, and a laboratory equipped for biological and oceanographic work. There will also be a helicopter deck. Propulsion will be by a diesel-electric system and there will be a service speed of 14 knots. If necessary, the ship will be able to operate for 50 days at full speed—a safety factor when it is operating over long distances in ice-filled waters.

RAILWAYS

Turbines on Rails

BRITISH RAIL now seems to have reached agreement in principle with the Ministry of Transport about the financing of its advanced passenger train. Discussions have been in progress for some time, because British Rail, though enthusiastic about the new train, is in no state to finance its development—likely to cost up to £5 million. But the ministry confirmed this week that agreement over the sharing of costs had been reached, although detailed discussions continue.

The new train, designed by a team at the British Rail research centre at Derby, is designed to be powered by Rolls-Royce Dart engines, de-rated to 1,500 HP. Construction will owe more to aircraft technology than it will to conventional railway engineering; the structure will be stress skin light alloy, producing a weight per passenger very much less than normal trains, lower even than some motor coaches. The maximum speed of the advanced train will be around 150 mph, cutting the time taken to get to Bristol from London to less than an hour, and the time from London to Newcastle to 145 minutes. The train is designed to operate on the existing track, though some improvements will be necessary.

As well as the advanced passenger train, the design for which has been common knowledge for eighteen months or more, British Rail is now talking of a less ambitious plan making use of the new Leyland gas turbine engine introduced at the Commercial Motor Show. This engine, designed for a large truck, produces 400 HP, and could be fitted into conventional rolling stock. In this case, the top speed would be 100 mph, no greater than the existing British Rail Inter-City services, but the gas turbine might offer greater comfort and quietness. Because it has been designed for use with a heat exchanger, it might also be a more economic proposition. A typical train, according to British Rail, would use ten Leyland engines, eight for power and two for auxiliary services.

Despite British Rail's enthusiasm, it is certain that its advanced passenger train will be beaten into service by gas turbine trains in other parts of the world. Before the end of this year, both the United States Department of Transportation and the Canadian National Railways expect to be operating turbine trains built by the United Aircraft Company. These trains are based on the ST 6 gas turbine engine developed by United Aircraft of Canada Ltd, and each engine will develop 550 HP. The trains, designed for Canadian National, should be brought into service between Montreal and Toronto, and each will consist of fourteen cars capable of carrying a total of 600 passengers. Designed like an aircraft, the train will be about one third of the weight of a conventional diesel train, and will travel at speeds of up to 100 mph in Canada.

SAFEGUARDS

Slow Progress

THE achievements and aspirations of the International Atomic Energy Agency in developing safeguards against the secret production of nuclear weapons were outlined by Mr B. W. Sharpe, a member of the Division of Safeguards and Inspections of the IAEA, in a lecture at Imperial College, London, last week. Inevitably most of the talk was devoted to the problems, both political and physical, that must be overcome in order to maintain a viable inspection system. Some observers were left with the feeling that the difficulties involved in trying to carry out inspections on the sort of budget available to the IAEA may well be overwhelming.

Mr Sharpe made no attempt to disguise the difficulties facing his department. About eighty nations have already signed the non-proliferation treaty, and although many of the countries most likely to wish to produce nuclear weapons have not yet ratified the treaty (as distinct from just signing it) an IAEA staff of one or two hundred would spread very thin through this number of suspects. A staff of about 200 is expected to be available by 1974, but Mr Sharpe conceded that the IAEA would have to make use of the domestic safeguards systems which many countries have already instituted for their own purposes. He expressed confidence, however, that a small bunch of observers placed at key spots in the conveyor belt of fuel production—whether on reactor sites or at an earlier or later stage—should be capable (logistically) of uncovering any frauds perpetrated by the home team. But even if this were conceptually sound, the political and legal barriers to its implementation are considerable.

Why should a non-nuclear country accept the inevitable encroachment into its commercial activities when the nuclear powers are exempt? Can the staff of the IAEA themselves not only be trusted but also be seen to be trusted? These are questions which are receiving realistic appraisal from both the IAEA and its member states, and the governments of those nuclear powers that have ratified the treaty have

offered to allow inspection of non-military nuclear installations to offset any hypothetical commercial advantage they might otherwise obtain.

The ideal safeguard system would involve automatic controls. Item identification and material measurement would be automatically monitored, and materials could only be moved through specific access points. Effective tamper-resistant seals are apparently feasible, and because the object of the scheme is to detect weapon production and not to prevent it—a practical impossibility without going through the Security Council—it is possible that within a few years at least the technical problems may be overcome. That would at least leave the field clear for the financial, legal and political battles, and remove the alibi of technical infeasibility.

INFORMATION

Keeping Physicists Aware

PHYSICISTS in the United Kingdom and the United States appear to be satisfied with the current awareness journal *Current Papers in Physics* published jointly by the Institution of Electrical Engineers and the American Institute of Physics, but they feel that some changes could be made in the layout of *Current Papers*. These are some of the results from a joint study, made by the IEE and the AIP in 1966, the first year of publication of the journal. Panels of physicists in both countries took part in three tests. The first investigated the methods used to keep up to date before *CPP* appeared and was reported earlier this year (see *Nature*, **217**, 704; 1968). The second and third tests—on users' comments on the coverage, format and arrangement of *CPP*, and the actual use made of it—have now been published.

The second study was made after three months of publication of *CPP*. Two panels of 239 physicists in the UK and 586 physicists in the US answered questionnaires. On the coverage of *CPP* most of the physicists preferred "the same as *Physics Abstracts*". Acceptance of the principle of arrangement under broad subject headings was almost unanimous in both countries, and three-quarters of the panels in both countries also felt that the order in which these broad subject headings were arranged was convenient. But there was much less satisfaction with subheadings. Several respondents also requested a smaller page which would be easier to handle, and layout was criticized by 12 per cent of the US panel and 29 per cent of the UK panel. On the whole, members of the panels opposed the addition of features such as indexes and expanded titles. In their summary of results the authors of the reports, Margaret Slater and Stella Keenan, say of the second test that most of the physicists on the panels find *CPP* a "useful and workable tool"—59 per cent of the US panel and 63 per cent of the UK panel said that they did not want any other form of current awareness journal. This must augur well for the future success of the journal.

The purpose of the third test was to get some idea of the relative interest shown in the various subject sections of the journal, and of the extent to which the sections provide useful material to interested physicists. The test analysed the use of one particular issue (October 10, 1966). A total of 608 physicists indicated the sections they read in that issue and in what order, and at the same time made requests for either an abstract or the full text of references that were of interest. Two patterns of use were discovered; 52 per cent of the US panel and 47 per cent of the UK panel used sequential scan, that is reading *CPP* from front to back cover omitting sections of no interest. The remainder of the panels looked at the sections in the order of interest to them, the order of use being determined by subject field, not layout. As might be expected, the users of sequential scan looked at more of the 58 sections of *CPP*—an average of 9·5 sections for this group as opposed to an average of 7·5 for the other users. An attempt was then made to try to relate the use made of *CPP* with the specified subject field of the user. This allowed the panel to be divided into "narrow" and "broad" users. For some unexplained reason, the US users were found to be narrower in their use of *CPP* than the UK panel.

DETERGENTS

Active Sites in the Wash

BIOCHEMISTS are drilled from youth to treat enzymes with respect—never to let their temperature stray far from 0° C, never to let the *p*H differ much from 7, never to agitate them and, above all, never to let detergents get near them. Given that commercial enzyme preparations are also extremely expensive, biochemists were sceptical when earlier this year both Procter and Gamble and Unilever announced in Britain that enzyme detergents are going to wean British housewives away from the familiar products such as "Scruf" and "Fuzz".

The use of enzymes in washing up has a surprisingly long history. A Dr Otto Röhm took out a patent on the idea in 1913, and periodically since then attempts have been made to establish cleaning products based on enzymes in the mass market. Only in the past few years, however, have enzymes become cheap enough and reliable enough to be a serious competitor for the traditional detergent. Enzyme brands now account for a fifth of detergent sales in the Netherlands, and "Ariel" and "Radiant", the new British enzyme brands, are outselling other brands in some parts of the country.

There is some rationale behind the venture. Modern surface-active detergents such as the alkyl-aryl-sulphonates are ideal for removing fatty stains from fabric but are less efficient with protein and carbohydrate stains. The enzyme products contain proteinases and amylases and are claimed to be effective against a repertoire of stains—blood, gravy, sperm, milk, chocolate, egg and sweat—all of which are otherwise obstinate because of their protein or carbohydrate components. The manufacturers will not divulge the identity of the enzymes they are using, but the bacterium *Bacillus subtilis* appears to be the standard source for both proteinase and amylase. Early enzyme cleaners to reach the market were designed for pre-soaking the wash, before the final hot laundering, but the latest products are all-purpose mixtures of enzyme and orthodox detergents.

These combined products use a heat-stable and alkali-stable variant of the proteinase usually produced by a mutant strain of *B. subtilis*. The discovery of this variant was necessary before enzyme cleaners could