unlikely to be used at separation plants (where inspectors are virtually permanently in residence) or in light-water reactors (where redundant monitoring equipment is probably cheaper).

In Japan, the system is also being advocated as a means of safeguarding the sea transport of fissile material, providing a means of making sure that cargoes are not illicitly diverted on the high seas. In such an application, communication would be by means of Earth satellites of the kinds being developed for marine navigation. The effective use of the system for the inspection of nuclear installations on land is thought to require the development of a network of IAEA field stations (of which there are at present only two, in Toronto and Tokyo) and the existence of an efficient trunk telephone system (found wanting in Bulgaria during the 1980 trial of the system).

The application of the system to the monitoring of agreements on chemical and biological weapons presupposes the design and installation of effective automatic monitoring equipment at plants covered by an agreement.

Soviet nuclear power

Signs of caution

The Soviet nuclear energy programme is running into difficulties. In spite of the high priority given to power station construction, last year's targets were not met. And although no specific reference has been made to the need for greater standards of safety, Pavel Falaleev, first deputy Minister of Energy and Electrification, has said that the safety requirements of power stations were being tightened despite the radiation around them being "considerably below the permissible limit and practically no different from natural levels". In a Soviet context such a remark is sufficient to indicate considerable high-level rethinking.

The discussion of the nuclear programme began about six weeks ago, with a meeting of the Central Committee of the Communist Party to review shortcomings, where the emphasis was on the logistics of construction although inadequacies in the design sector were noted.

Three weeks later, the theme was taken up in a leading article in *Pravda*. This at first followed the line of the central committee meeting, noting that production-line nuclear power units had already been developed, and that supply problems could be dealt with by economic sanctions to penalize those who held up the plan. *Pravda* then went on, however, to suggest serious deficiencies in the design sector.

Here, it was claimed, the Ministry of Energy and Electrification had failed to exercise its supervisory duties. Changes in materials and specifications had been made without either proper justification or the

Sticky problem over Iraq fuel supplies

Two French nuclear physicists, backed by three prestigious members of the Académie des Sciences, have warned President Mitterrand in a report that there would be no easy way to stop Iraq making bomb-grade plutonium — if France rebuilt the Osirak reactor destroyed in a bombing raid by Israel nearly a year ago.

This is the second report condemning the reactor sale to be prepared by the two physicists and to be sent — unsolicited — to the president who is said to be sympathetic to the arguments but to be short of apolitical technical advice.

What stung the physicists to produce a second report were widely-reported claims that "caramel" — a low (7 per cent) enriched uranium oxide fuel — was the answer to the problem. If caramel were sold to Iraq to fuel the reactor, in place of the 95 per cent enriched uranium for which it was originally designed, the claims went, Iraq would have no quick route to the atomic bomb.

However, this misses the point, the new report stresses. The caramel fuel would still produce the same neutron intensity in the large pool around the reactor, where test materials are placed to investigate their reaction to neutron bombardment. If these test materials were replaced by depleted — or natural — uranium (of which Iraq is believed to have supplies) plutonium would be produced in the uranium, and could be extracted chemically.

The only advantage of caramel is that it cannot be used directly to make bombs, whereas 95 per cent enriched uranium is more easily converted. But, the reports point out, four years ago Giscard d'Estaing set limits on deliveries of enriched fuel to Iraq. Fuel would be sent in single reactor-loads of 13 kg, each of which would be loaded into the reactor under supervision and promptly irradiated making diversion technically very awkward. From that time, the diversion of the fuel itself ceased to be a problem — so the use of caramel solved nothing.

The production of plutonium by neutron bombardment, however, could amount to 3.3–8 kilogramme per year (to quote the assessments of both the Commissariat à l'Energie Atomique and the International Atomic Energy Agency). The amount of plutonium required for a bomb is generally taken to be 6 kg, although under certain circumstances 1–2 kg could be enough. Thus, say the two reports, Iraq could have the capability (in plutonium, at least) of producing a bomb within six months of beginning irradiation, whatever fuel the reactor was loaded with. IAEA inspection, however, might interfere considerably with this rate of production.

France has said it will help rebuild Osirak, provided Iraq guarantees that the reactor will be used entirely for peaceful purposes. The new report may make this politically more difficult for the president.

Robert Walgate

apparatus for selecting the "most progressive" solution to engineering problems. In particular, a proposal put forward by the *Atomenergostroyproekt* design trust, for a change in the structure of the "protective shells" of power stations, was turned down without being studied by the necessary multi-disciplinary panel of experts. The scientific council of the ministry, *Pravda* said, must bear greater responsibility for such decisions.

This reference to protective shells is significant. If, as seems likely, this refers to the concrete containment vessel common in Western power stations, it reflects a change in Soviet policy. Until recently, such vessels were dismissed by Soviet designers as unnecessary, and a capitalist ploy to raise construction costs. Demands from the Finns and Hungarians led them to introduce containment vessels into reactors designed for export. The remark in *Pravda* suggests that they may now have been introduced into reactors for home use whereas previously it was thought sufficient to surround reactors on the outskirts of major cities with a kilometre or two of parkland or playing fields.

Vera Rich

Intelligence testing

Soviet inequality

The Russians have finally "come out" on the subject of intelligence and other objective tests of performance and personality. The January/February issue of *Voprosy Psikhologii* (Problems of Psychology) contains three papers endorsing such tests in principle.

The papers are printed prominently at the front of the journal, preceded only by a major statement on future psychology services policy, based on the decisions of the November plenum of the Soviet Union's ruling communist party. The journal quotes President Brezhnev himself in support of a call to concentrate on "scientifically-based solutions to the problems of the nation's education in the service of the scientific and technological revolution".

This is a startling but unequivocal *volte-face* by the Soviet authorities, who have until now (in public at least) regarded "testology" as an instrument of class warfare in the hands of the ruling capitalist élite. Testing was even made illegal in

Russia in 1936 by an edict that may now have to be hastily repealed.

One of the most extraordinary admissions in the first paper, by K.M. Gurevich, is that there are still significant class divisions inside Soviet society, as well as national cultural differences within the empire, which test content must take into account.

Western workers in the field of intelligence testing may also prick up their ears at the news that foreign tests are already in use (presumably in the enforced absence of nationally-devised and standardized ones). In fact, it was the use of such tests which originally brought testing into disrepute in the Soviet Union. Gurevich advises: "Above all, when embarking on a study with one of these (foreign) tests, it is vital to decide what contingencies it makes sense to employ in order to make it an appropriate instrument for carrying out an investigation under conditions very different from those under which it was created". A citation at the end of his paper shows that Gurevich recently published a book on the subject (*Psychological Diagnostics. Problems and Research*, Moscow, 1981).

In the second paper, V.I. Slobodchikov makes an interesting distinction between "suitable" uses of test procedures — that is, they may be used for discrimination and selection but not for "controlling development or in remedial education".

At the opening of the third paper, by Yu. Z. Gil'buch, the British intelligence tester Professor H.J. Eysenck is accused of epitomizing the "mechanistic" attitude to testing. This does not deter Gil'buch, head of a Kiev laboratory, with more than twelve

"WHAT I CAN'T UNDERSTAND
ARE ALL THE HIGH
I.Q.S IN SIBERIA."

years of published work on the subject, from concluding his piece thus:

"The fundamental question at the root of any discussion about content validity in intelligence tests is this: what underlies individual differences in the degree of mastery of mental operations as exemplified in any particular culture (as represented in tests)? Is it mostly factors of biological inheritance, innate gifts, or is it (alongside and in interaction with these) the conditions of education and upbringing, which in various families and various schools are unavoidably present in greater or lesser variety?"

Soviet test experts are frantically trying to

devise tests which allow for different norms within classes and national cultures, but which will also serve the practical purpose for which the tests have been revived — namely, the more efficient selection of personnel to man their scientific and technical revolution.

The present aim of Soviet psychologists seems to be to devise tests which tap the purest, least culture-bound workings of the brain, such as solving abstract puzzles, chess problems and devising imaginary games.

Just how important this is to the Soviet Union is summed up by Gurevich thus: "In our country at present the growth of psychological diagnosis has become one of the most vital supports of theoretical and applied studies in the field of education, farming and management. In pre-school education, high school and professional training, methods of psychological diagnosis must be used to assess levels of psychological development: this allows for the inevitability of change within the very process of education, and provides a broad base from which it can advance to rationalization and improvement."

Elizabeth Roberts

Biological warfare

Soviet use

Washington

The Reagan Administration claims that it now has clear and scientifically verified data that the Soviet Union is providing toxic agents for military use by its allies in Laos and Kampuchea, and has circumstantial evidence that the Soviet Union is itself using such weapons in Afghanistan.

The evidence is contained in a report presented to Congress by Secretary of State Alexander Haig last Monday, providing a detailed analysis of eyewitness reports, chemical analysis of samples and information from other sources gathered over the past seven years.

According to Under-Secretary of State Walter Stoessel, the evidence shows that the Soviet Union has been engaged with its allies in the use of weapons that are forbidden by the Biological and Toxin Weapons Convention of 1972. "The USSR is flagrantly and repeatedly violating international agreements, and this is now a threat to the whole international community, since toxin weapons are a cheap, convenient way of subduing and exterminating opposition which could be used against other people", Mr Stoessel said.

The State Department's report is intended to stem sustained criticism that it has failed to substantiate its allegations of the use of chemical and toxin weapons — and in particular of tricothecenes — with adequate medical and scientific data.

Various other hypotheses have been put forward to explain the presence of tricothecenes in samples which have been brought back from South-East Asia and

Incriminating data

Washington

The State Department report details how the evidence for the occurrence of mycotoxins has been obtained. It says that the US Army's Chemical Systems Laboratory was unable to detect them in the few samples returned from South-East Asia, so that Dr Chester J. Mirocha from the University of Minnesota was asked to apply his gel-separation and mass spectrometric techniques to the problem.

Three closely related mycotoxins are said to have been identified: T-2, nivalenol and deoxynivalenol. A sample of material thought to be contaminated and obtained from Kampuchea contained 109 p.p.m. of nivalenol, 59.1 p.p.m. of deoxynivalenol and 3.15 p.p.m. of T-2. Control samples of vegetation, submitted for analysis gave negative results.

Samples of water from Laos and Kampuchea contained 150 p.p.m. of T-2 and 25 p.p.m. of diacetoxyscirpenol, another closely related toxin. A sample of yellow powder collected after a supposed attack by chemical weapons showed no evidence of toxins but did yield a yellow pigment, similar to one found by Dr Mirocha in a culture of *Fusarium roseum*. The report says that this may mean that the agents used in South-East Asia are crude extracts of *Fusarium* cultures.

A crucial element in the State Department's case is that the concentrations found in the samples from South-East Asia are greater than those associated with natural contamination. Typically, the latter yield only a few parts per million of mycotoxin, although one measurement of 41 p.p.m. of mycotoxin in contaminated grain in the United States is on record.

The report includes names of Soviet scientists and of four laboratories thought to be involved in research with mycotoxins. The laboratories are the Institute of Experimental Veterinary Science (Moscow), the Institute of Microbiology and Virology (Kiev), the Institute of Nutrition (Moscow) and the Institute of Epidemiology and Microbiology (Moscow). There is no suggestion that the research there is military in character.

analysed in US laboratories. Some have claimed, for example, that they could have come from various forms of rat poison, others that they might be the residue of naturally occurring fungus.

State Department officials, however, said at a press conference on Monday that they had looked closely at the various alternative explanations and had not been able to substantiate any.

Mr Richard Burt, the department's