

## French research

# Rigidity of science contracts

FRENCH researchers and technicians working for research councils such as the Centre National de la Recherche Scientifique (CNRS) may have to wait until September before they win the coveted security of "*Fonctionnaire*" (civil servant).

A new contract of employment granting this status, at present enjoyed only by university employees, was expected this month but has run into serious difficulties with the trades unions (which represent predominantly technicians).

Although the contract has been approved by the Prime Minister, Pierre Mauroy, and three other ministers concerned (industry and research, civil service and finance), the government may now give the unions time to produce a reasoned response. This will push the date of the final decree into the autumn unless the French administration follows in the steps of its predecessor, which took to publishing controversial legislation during the summer.

The unions are not alone in objecting to the new contract. Researchers who helped to draw up an earlier version in consultation with the previous research and industry minister, Jean-Pierre Chevènement, argue strongly that the present draft fails to do justice to the special nature of research careers. And directors of CNRS itself are also concerned. So if the present version is pushed through this summer, or even succeeds unchanged in the autumn, there is likely to be an unholy row.

The objections centre on the "exceptions" that have to be made to the usual civil service contract to accommodate promotion on merit and appointments to high-level research or technician posts from outside. When a working party at the National Colloquium on Research and Technology in January 1982 decided to seek *fonctionnaire* status for technicians and researchers, it assumed that such possibilities could be accommodated.

The draft contract thus provides that an entrant will be guaranteed a small increase of salary throughout his or her career, but that promotion to fundamentally new levels will be determined purely on the basis of performance. The underlying progression would avoid the problem that a technician, for example, can be "blocked" for ten years at one salary. One consequence is that people are then promoted more from compassion than on scientific judgement.

In 1982, the minister of the civil service was encouraging: he would welcome such a radical example to improve career development in other parts of the civil service, where appointments and promotion are determined by paper qualifications and rigid quotas.

However, the minister has since been advised that some 1-2 million other civil servants might demand exactly the same

rights and salary rises as the scientists and technicians, so that the revolution might go too far and cost too much.

Chevènement, apparently, managed to hold his ground for a time, but was already slipping when he resigned. The new minister of industry and research, Laurent Fabius, seems to have given up the fight. The result is that French researchers and technicians are being offered a more rigid draft contract than that already in existence.

Pierre Papon, director-general of CNRS, who saw the draft contract last

week, said on Monday that there was still "a degree of freedom" in the wording of the contract, and that "a kind of compromise" between the rigid civil service view and the earlier colloquium view was possible by September. The main problem is to be able to hire experienced people at the right pay and level, he said.

The chances of a slow underlying slope in salary, plus promotion on merit, was, however, "not completely clear". It is certainly not in the present text, he says. This problem is not so much for the scientists as for the technicians and engineers, says Papon — which is exactly where the unions come in and why French research could find itself in difficulties with technicians' strikes by the autumn. **Robert Walgate**

## UK geothermal energy

# Third hole lucky for Camborne?

THE British "hot dry rocks" geothermal project run by the Camborne School of Mines in Cornwall has been promised another £11 million by the Department of Energy. This will cover the last three years of a seven-year research programme. In spite of the difficulties encountered earlier this year in establishing strong fluid flow between its two existing 2,000-metre-deep holes, the Camborne team has thus succeeded with its argument that its first holes were essentially "wildcats" — against some scepticism within the Department of Energy.

The two existing holes, and attempts to connect them by "hydrofracking" and other methods, have taught the Camborne team "a lot of about the stress regime" deep in the Cornwall granite, according to the deputy project director, Dr John Beswick, last week. While the behaviour of the rocks is consistent with what is known of tectonic forces, the fracturing is more difficult to understand. Television observation reveals cracks at the holes themselves, but how the cracks spread between the holes is uncertain. Microseismic observations have suggested that hydrofracking had opened fractures beneath the holes, but — said Dr Beswick — the microseisms indicated movement below the holes, but not necessarily the existence of flow paths.

Some £3 million of the new £11 million will be spent on drilling a third 2,000-metre hole, always envisaged, and it now seems sensible that it should go a little below the bottom of the present holes into the zone of the microseismic events. A key problem now will be to determine exactly what that fracture regime is. That there are opened fractures is clear: "we can pump 180 litres per second of thick gels down a hole" said Beswick. The trouble is that, at present, relatively little of that volume comes back up the second hole. Camborne must arrange that it comes up the third hole to be drilled (or *vice versa*).

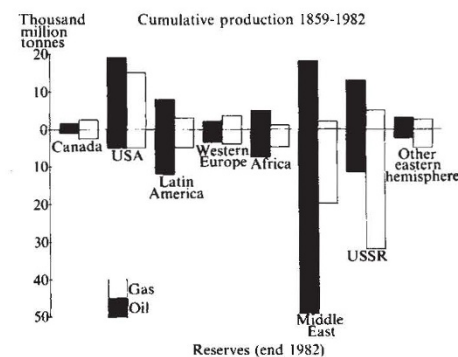
The cash will also be used to automate

certain tedious parts of the experiments and to prepare for a 6,000-metre well beyond the present seven-year programme. Some support for that may come from the European Commission, but Brussels is interested in supporting one of two new French projects in the interests of diversity.

The Camborne project is now seen as complementary to that at Los Alamos, New Mexico, which works at much higher temperatures (and lower depths) on the side of a volcanic caldera and which has encountered problems of shielding electronic equipment and short tool lifetime. The Camborne team argues that low-temperature sources (which are geographically common) may be more economical sources of geothermal energy.

**Robert Walgate**

# World oil resources



In spite of the much increased production of crude oil from the Middle East, the United States remains the territory from which most oil has been produced in the past century. The chart (taken from *BP Statistical Review of World Energy*) shows cumulative production and proved reserves of petroleum and natural gas (at 1982) in different regions of the world. Criteria for the determination of reserves as "proved" vary from place to place.