

Waste shipment stirs debate over lack of nuclear store

Tokyo. Japan's shipment of high-level radioactive nuclear waste from France, which left in the face of environmentalists' protests last week, has drawn attention to the lack of a permanent site to store such waste material.

The British ship *Pacific Pintail* is returning to Japan the first 28 of 3,000 cylindrical containers of high-level waste derived from reprocessed Japanese nuclear fuel that must be returned to Japan from reprocessing plants in France and Britain over the course of the next decade.

At the same time, the 47 nuclear power plants operating in Japan are generating the equivalent of about 1,000 further containers of such waste every year. But the government and nuclear power industry has no permanent disposal site for the waste.

That being carried by the *Pacific Pintail* takes the form of glass contained in cylindrical stainless steel containers, each 1.3 metres in length and 43 centimetres diameter. The containers will be "temporarily" stored for between 30 and 50 years in a high-level waste storage facility at Rokkasho village on the northern tip of Japan's main island, Honshu.

Rokkasho is the site of a multi-billion dollar complex for uranium enrichment, for the storage of both low-level and high-level waste, and for nuclear fuel reprocessing. All the facilities are complete except the fuel-reprocessing plant, which is expected to begin operation early next decade, after several years delay (see *Nature*, 369, 596; 1994).

The nuclear industry and the government have jointly won local support for the Rokkasho complex partly by providing massive government subsidies to the village amounting to ¥18,000 million (\$180 million), or about ¥150,000 for each of its 12,000 inhabitants (see *Nature*, 345, 285; 1990). But the villagers remain opposed to the permanent storage of high-level waste at Rokkasho.

Long-term government plans call for the waste to be buried at a depth of more than 500 metres. But government and industry have yet to find a suitable site.

The waste will remain highly radioactive and toxic for thousands of years and the disposal site must be stable for this length of time. But on this timescale, nearly all regions of Japan are threatened by earthquakes and/or volcanic eruptions.

A more immediate problem is that no local community in Japan will accept a permanent waste disposal site. Even attempts to carry out research on disposal are bitterly opposed by local residents.

In 1985, for example, when officials of the government-owned Power Reactor and Nuclear Fuel Development Corporation

(PNC) tried to carry out a survey at Horonobe, a small town in the northern island of Hokkaido, they were blocked by hundreds of protesting residents and union members, who feared that Horonobe would become a permanent disposal site.

PNC officials had to sneak onto the site at the weekend, when the local residents had relaxed their guard, in order to choose sites for boreholes and collect rock samples.

PNC maintains that Horonobe is not a candidate for permanent disposal of waste and that, at present, their only purpose at Horonobe is to carry out research on disposal. "There are no candidate sites at present," insists a PNC official.

A decision on a site is still a long way off. The long-term plans of the Atomic Energy Commission released last year only call for establishment of an organization to handle high-level waste disposal by 2000; actual disposal would begin between 2030 and the middle of the 2040s.

Meanwhile, the government is pursuing another route to try to reduce the amount of high-level waste that must be disposed of. In the budget for fiscal year 1995 (starting on 1 April), the Science and Technology Agency has ¥1,364 million (\$13.6 million) for PNC to embark on a long-term programme to develop a new form of nuclear fuel reprocessing (see *Nature* 359, 766; 1992).

This procedure would incorporate into reprocessed plutonium fuel highly radioactive minor actinide elements such as americium, neptunium and curium that are normally discarded as high-level waste.

PNC estimates that if this technique was applied and the fuel repeatedly burned and recycled in all fast breeder reactors that are expected to begin commercial operations from 2030, the amount of minor actinides produced by Japan's nuclear power industry by 2100 would be reduced from the 310 tons expected from present reprocessing techniques to 60 tons. Furthermore, nearly all of the 60 tons would be locked into repeated fuel cycles of the fast breeder reactors rather than being in the form of waste.

The government sees another advantage in this approach. The plutonium fuel containing minor actinides will be unsuitable for diversion to the manufacture of nuclear weapons. It might therefore help to reduce international concern that Japan might use its growing stockpile of plutonium to make nuclear weapons.

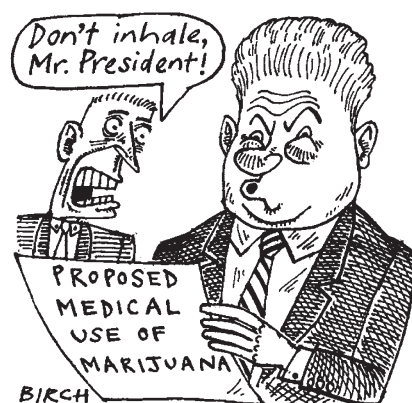
The catch is that such fuel is much more radioactive than pure plutonium, and will need to be made and handled by specially developed robots. PNC officials do not expect their project to be ready for practical application for at least 10 to 15 years.

David Swinbanks

US stalls over tests of marijuana to treat AIDS patients

San Francisco. US drug enforcement policy has collided with scientific freedom over a study of the potential medical use of marijuana, delaying research into what some claim could be a life-saving therapy for AIDS-related wasting.

Donald Abrams of the University of California, San Francisco (UCSF), has been trying for more than two years to obtain approval for research into whether marijuana can restore the appetite and body weight of individuals with AIDS-related wasting. His study is to be sponsored by the Community Consortium on AIDS Research, of which he is research director, and would be the first officially



approved trial in the United States evaluating the potential medical benefit of marijuana.

Yet even though the protocol for the trial has been accepted by the California Research Advisory Panel and the UCSF Review Board, as well as by the Food and Drug Administration (FDA), Abrams has been unable to obtain a supply of the drug because of a ban by the Drug Enforcement Administration (DEA) on importing marijuana, and the refusal of the National Institute of Drug Abuse to provide it. A meeting called by the US Public Health Service to discuss the problem has been postponed twice and never rescheduled.

Supporters of marijuana use think Abrams has run up against deliberate government opposition. His critics feel that he has become a pawn of those wanting to legalize the drug. But other researchers into the physiological effects of marijuana wonder why he is being treated differently from them.

One government official confirms what many observers suspect: that agencies determined to convince the public that marijuana is dangerous are not keen on a study that could show some beneficial effect. Indeed, the Clinton administration is said to be reluctant to champion a study