that would burn plutonium and breed further plutonium fuel.

The plutonium cycle has dominated French nuclear thinking since the 1970s, when it was predicted that uranium would become scarce and that plutonium would become the fuel of choice.

Twenty years later, uranium prices are lower than ever, and plutonium from reprocessed spent fuel and dismantled weapons is generating a large and unwanted stockpile. But reprocessing plants continue to be built and operated, with the La Hague plant producing 15 tonnes of plutonium a year.

The conversion of Superphénix in 1994 from a power plant to a research reactor aimed at incinerating plutonium may have ended the French dream of developing power-generating breeders. But it still gave the plutonium cycle a second lease of life, by keeping open the unlikely option of developing a park of incinerators, and the associated reprocessing plants that would be needed. Although such research may continue at a reduced level, any plans for industrial-scale fast breeders in the near future have now disappeared.

Controversy over the La Hague plant has also been fuelled recently by a study linking it to increased rates of leukaemia in the region, and claims that levels of radioactivity in discharges from the plant were greater than officially stated (see right).

Incineration remains a "valid research angle", however, claims Gerhard Heusener, who heads nuclear safety at the Karlsruhe Nuclear Research Centre in Germany, and leads the small German participation — about DM 5 million (US$2.9 million) annually — in the French incineration research programme CAPRA.

But he admits that it is "hard to imagine" using fast neutron reactors to burn plutonium on an industrial scale in the near future, given that this would require building one plutonium furnace for every five pressurized-water reactors.

Debate is likely to grow over the coming weeks with the expected completion of a report commissioned by the government on the recycling of plutonium. "The end of the breeder programme puts into question the rest of the [plutonium] system", argues Mycle Schneider, director of WISE, a Paris-based energy consultancy.

Les Verts has called for a halt to new reprocessing contracts, pointing out that reprocessing is by far the most polluting part of the nuclear fuel cycle. Observers in Paris predict a long, hard battle over the future of the La Hague plant, adding that the outcome is difficult to predict. The plant has been a key component in the management of France's spent fuel and its shutdown would provoke a complete rethink of the French nuclear fuel cycle. □

Cogema's 'arrogance' adds to La Hague's problems

[PARIS] Continuing controversy about the level of radioactivity in discharges from the reprocessing plant at La Hague took a political turn last week when France's environment and health ministers rallied to the support of the environmentalist group Greenpeace.

This followed an incident in which divers from Cogema, the company that operates the plant, were alleged to have removed underwater monitoring equipment that had been installed by Greenpeace.

Greenpeace immediately filed charges against 'X', a standard legal procedure in France, for "theft by an organized gang". Cogema admitted having "confiscated a foreign body". Dominique Voynet, the environment minister, criticized the removal of the equipment, saying "it is not unusual for an independent organization such as Greenpeace to exercise its role of vigilance by carrying out measurements of the discharges".

In a blistering leading article, the newspaper *Le Monde* described Cogema's action as "pitiful". Drawing a comparison with the bombing by the French secret services of the Greenpeace ship *Rainbow Warrior* in Auckland harbour in 1985, the newspaper argued that the latest incident betrayed the persistence of an obsolete "arrogant" belief within the nuclear industry that nuclear activities are none of the public's business.

The pipe that discharges waste from the La Hague plant into the English Channel has become the flashpoint of a lengthy battle between Greenpeace and Cogema. The latest measurements by Greenpeace show that levels of radioactivity in sediments in the vicinity of the pipe exceed European norms.

Officials at the health ministry expressed disbelief that official monitoring could have missed what Greenpeace detected. The government body responsible for carrying out spot checks on Cogema's monitoring, the Office de Protection contre les Rayonnements Ionisants (OPRI), limply explained that it had restricted measurements to the beaches, and had ignored the area around the end of the pipe.

The revelations follow a controversy earlier this year, when exceptionally low tides exposed the mouth of the pipe on a beach open to the public. Measurements made then by CRIIRAD, a respected private nuclear monitoring group, at the request of Greenpeace showed levels of 300 microsieverts per hour at the mouth of the pipe. "A person remaining in the vicinity of the pipe for four hours would have received a dose of radioactivity exceeding the annual maximum dose", says Bruno Chareyron, a CRIIRAD official.

CRIIRAD has protested about the scale of the authorized outputs, claiming that these amount to a figure greater than the discharges of all the world's nuclear reactors taken together. The plant is authorized to release annually 37,000TBq of tritium alone.

IMAGE UNAVAILABLE FOR COPYRIGHT REASONS

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Channel vision: La Hague's waste discharges have become a focus of attention.

CRIIRAD complains that the methods used to determine acceptable levels are available only to Cogema and the government, but not to the public. Chareyron points out that Cogema gathers data on only 4r radionuclides, whereas the UK authorities responsible for monitoring discharges from the Sellafield reprocessing plant look at 14.

CRIIRAD has also found the highly toxic radionuclide iodine-129 in moss within a 7-km radius of the plant, suggesting that the plant was also producing air pollution. Cogema and OPRI had not detected this, Chareyron claims.

Public concern about such claims has been heightened by preliminary research results suggesting that rates of childhood leukaemia in the region are higher than expected.

Following the success of Les Verts in last month's general election, the political tide in France now seems to be turning in favour of environmental organizations. Voynet said last week that she intends to demand an independent study of the levels of radioactivity being dumped from the plant into the channel, as well as a public inquiry into the levels of authorized outputs. And Bernard Kouchner, the junior minister for health, instructed OPRI to carry out a detailed radiological survey of the area around the pipe.

A critical test of the new government's position will come this autumn, when 15 European countries are scheduled to sign the Convention for the Prevention of Marine Pollution, which includes the ultimate goal of reducing radioactive emissions from reprocessing plants to close to zero. **D.B.**