

US nuclear safety

Hanford plutonium plants in a narrow squeak

Washington

PUBLIC apprehension about nuclear safety was stirred again last week when the Department of Energy (DoE) shut down two military plutonium plants at the Hanford nuclear reservation in the state of Washington. Operations will be halted until the outcome of an investigation into widespread safety violations which was set up after an incident on 29 September in which rules designed to avoid the formation of a critical mass of fissile material were broken.

DoE's order to stop operations followed only by a few days the publication in the *Seattle Times* of highly critical internal safety audits of the Hanford plants conducted by the operating contractor, Rockwell-Hanford operations, a division of Rockwell International. DoE denies any link between the leaking of the audits and the decision to shut down the two plants, which could remain out of action for a month or more. Other nuclear facilities at Hanford run by other contractors are not affected.

The two plants concerned are the PUREX plant, which chemically separates uranium and plutonium from irradiated nuclear fuel, and the plutonium metal finishing or "Z" plant, which converts plutonium nitrate solution from the PUREX plant into metallic plutonium for nuclear weapons. The irradiated fuel com-

es from the "N" reactor, also at Hanford, which was itself the subject of a recent DoE safety inquiry because of its similarities to the Soviet reactor at Chernobyl that exploded last April.

During the 1970s, the Rockwell-



Hanford's PUREX processing plant.

Hanford plants were producing only small amounts of plutonium for research, but production for weapons began again in earnest in the early 1980s. In the 29 September incident, workers in the "Z" plant started to transfer a plutonium-bearing solution through a temporary pipeline isolated by five manually operated valves from a tank which was not "critically safe" in the sense that it could not be filled with the solution without the risk of its becoming critical.

Regulations require fissile solutions to be isolated from unsafe tanks by fixed

plugs. Criticality would produce intense radiation and large amounts of heat, and could cause an explosion; at least five people have been killed in the United States in criticality accidents since the 1940s.

None of the solution actually reached the unsafe tank, but even so, Rockwell rated the incident at 4 on a 1 to 5 scale of seriousness. The incident was reported to DoE on 2 October, and the shutdown order came six days later, after DoE inquiries found other instances of by-passed safety controls and a general "lack of appropriate controls, reviews and procedures".

The audits leaked to the *Seattle Times* indicate a pattern of routine violations of safety measures and of the rules devised to guard against theft of nuclear material.

Violations of the redundant safety regulations to ensure against solutions going critical are not themselves rare; 23 were reported during the year that ended on 1 October, which led Representative Ron Wyden (Democrat, Oregon) to claim last week that it was publication of the critical safety audits and the prospect of congressional interest, rather than the 29 September incident, that led DoE to decide to put its house in order.

The auditor whose critical conclusions were leaked, Carl Ruud, spent last Thursday in closed discussions with the oversight and investigations subcommittee of the House of Representatives' Energy and Commerce Committee, which has been investigating safety at Hanford for some months. Ruud is likely to be invited back to give formal testimony. Wyden said the shutdown showed the seriousness of the safety problems at Hanford and that DoE's safety reviews had "lost all credibility". Ruud, who still works for Rockwell, has declined to speak to the press.

The Hanford reservation, which covers more than 500 square miles, has been in the plutonium business since the beginning; it produced the material for the Nagasaki bomb. And that may be its biggest problem: many of the plants are still using Second World War technology.

The site is also dirty, in both the conventional and nuclear senses. Documents released during the past year indicate that Hanford released up to 1 million curies of radioiodine and kilogram quantities of plutonium into the environment during the early years, causing "Chernobyl-sized" doses to milk-drinkers in the vicinity, according to Robert Alvarez of EPI. Hanford now has huge problems with ground contaminated with chemical solvents and accumulating high-level waste sitting as sludge in decaying storage tanks; one estimate puts the cost of cleaning up the site at not less than \$11,000 million.

With increasingly stringent oversight from Congress, DoE may have to face the indefinite closure of some of the plants.

Tim Beardsley

Pharmacia takes over LKB Producter

PHARMACIA AB, one of Sweden's leading pharmaceutical companies but best known to the laboratory scientist as the manufacturer of materials for molecular separation methods, is to buy up LKB Producter AB, a rival Swedish company, best known for its high quality instruments for separation techniques. The deal represents a considerable about-face for Pharmacia, which was itself the subject of a takeover bid last February, which was stopped only after Refaat El-Sayed, president of Fermenta AB, the company planning to buy Pharmacia, admitted falsifying his claims to a master's and a PhD degree.

Already the two leading European companies in laboratory separation, Pharmacia and LKB are together estimated to account for at least 40 per cent of a world market of US\$560 million a year. Electrophoresis and chromatographic techniques and equipment are the mainstays of their business. But both companies have recently developed interests in diagnostic

kits, with LKB taking a lead in the development of immunoassay kits that use non-radioactively labelled reagents.

Last week, Pharmacia agreed to acquire 82 per cent of LKB's voting stock from the holding company Incentive AB for 776 million Swedish kroner (\$113 million). It now plans to obtain the remaining shares for another \$73 million. In the past three months, Pharmacia has also acquired Intermedics Intraocular Inc., a Californian eye-care company, and AB Leo, a Swedish drug company that cost it \$480 million.

Meanwhile El-Sayed, who remains majority shareholder and group chief executive of Fermenta, last month signed agreements to sell a third of the voting shares in the company to three Swedish groups. The meaning of the sales in the run-up to the decision in November by Montedison, the Italian chemicals group, to whether to pursue its earlier plans to acquire a majority stake in Fermenta, is hard to fathom.

Peter Newmark