Australia Dossier by Kelvin Heslop

Government okays research reactor

Notwithstanding the good news, the policy of "One step forward, one step back" in the nuclear field, continues.

On Sept. 3, the Australian government announced that it would build a new nuclear reactor in Lucas Heights, outside Sydney. The $215 million reactor will replace the nation's only existing atomic plant, the 39-year-old High Flux Australian Reactor (HIFAR). The new reactor, too, will be a small, research reactor of the light-water-pool type, designed to produce fast neutrons. It will produce 14-20 megawatts of heat and three times the amount of neutrons as HIFAR.

The announcement ended months of fierce debate over whether to replace HIFAR, and was greeted with the predictable howls from Prince Philip's environmentalist stooges downunder. However, Minister for Science Peter McGauran, a driving force behind the decision, said that the new reactor was a "life and death issue." McGauran said that about 260,000 Australians undergo some kind of nuclear medicine procedure every year, and that demand was growing by about 15% annually, which would soon outstrip HIFAR's capacity. For instance, he said, "We've found that when the reactor is shut down for maintenance, that on average, one in three shipments is delayed, often for 24 hours or more. That not only throws the timetables and schedules of the 180 nuclear medicine centers throughout Australia into chaos, it could very well—and indeed, I can say with certainty, having spoken to nuclear medicine practitioners—cost lives." A spokesman for Prince Philip's Friends of the Earth, John Hallam, accused McGauran of a "nuclear fixation."

Debate had also raged on *where* to build, with environmentalists and opposition leader Kim Beazley charging that it was dangerous to build a reactor so close to a major city. Proponents pointed to HIFAR's unblemished safety record, and McGauran emphasized that the short half-life of the radiopharmaceuticals required the reactor be near a major airport, so that the isotopes would not deteriorate before reaching their destination.

Research reactors are the only proven facilities for the bulk production of technetium-99m (Tc-99m), which comes from molybdenum-99, which is produced in a reactor. Worldwide, 90% of the 20-25 million annual diagnostic procedures in nuclear medicine are conducted with Tc-99m-labelled radio pharmaceuticals. There are a number of other uses for radioisotopes: for process controls and non-destructive testing in the metals, paper, and chemicals industries; assisting mineral prospecting, and to improve ore analyses and extraction; quarantine sterilization in agriculture, and irradiation of fruit fly pupae, which incapacitates breeding; and, in materials testing, where neutrons are used to investigate the microstructure and properties of solid and liquid materials, especially emerging advanced materials such as polymers, plastics, and Kevlar for the aerospace, automotive, biotechnological, petrochemical, and telecommunications fields.

On the same day that the government decided to go ahead with the new reactor, it vetoed a proposal from the Australian Nuclear Science and Technology Organization (ANSTO) to build a state-of-the-art reprocessing plant, to process spent fuel from both the existing plant and the new one. Instead, Australia will repatriate 689 spent fuel shipments of U.S. origin back to the United States, and will ship another 1,300 spent fuel elements to Dounreay, Scotland for reprocessing.

However, the government granted ANSTO the okay to seek overseas partners to build a demonstration plant, in Australia or abroad, to stabilize and store nuclear waste from the new reactor's spent fuel rods. The new technology, called Synroc, was developed by Australian National University already 20 years ago. Dry granules, called "Synroc precursor material," are mixed with the liquid waste, which is then passed through a furnace to drive off water and the nitric acid in which the waste is dissolved. The dry powder is then put into a stainless-steel container, and subjected to over 200 atmospheres of pressure at 1,200°C for about two hours. Known as hot isostatic pressing, this fuses the Synroc and waste into a stable cylindrical block 30% of its original volume.

ANSTO has been in discussions with the U.S. Department of Energy's Argonne National Laboratory in Idaho over building a Synroc plant, to process tons of high-level waste from the Argonne fast-breeder reactor, which is being decommissioned.

The government's decisions to replace HIFAR and to allow the possible development of the Synroc technology, are welcome. However, its veto of a reprocessing plant continues decades-long sabotage of promising nuclear research. In the 1950s, Australia was a world leader in such research, and helped to develop the High-Temperature Gas-Cooled Reactor. Such projects, like the plans to build a centrifuge uranium enrichment plant, and other cutting-edge projects, have been repeatedly shut down.