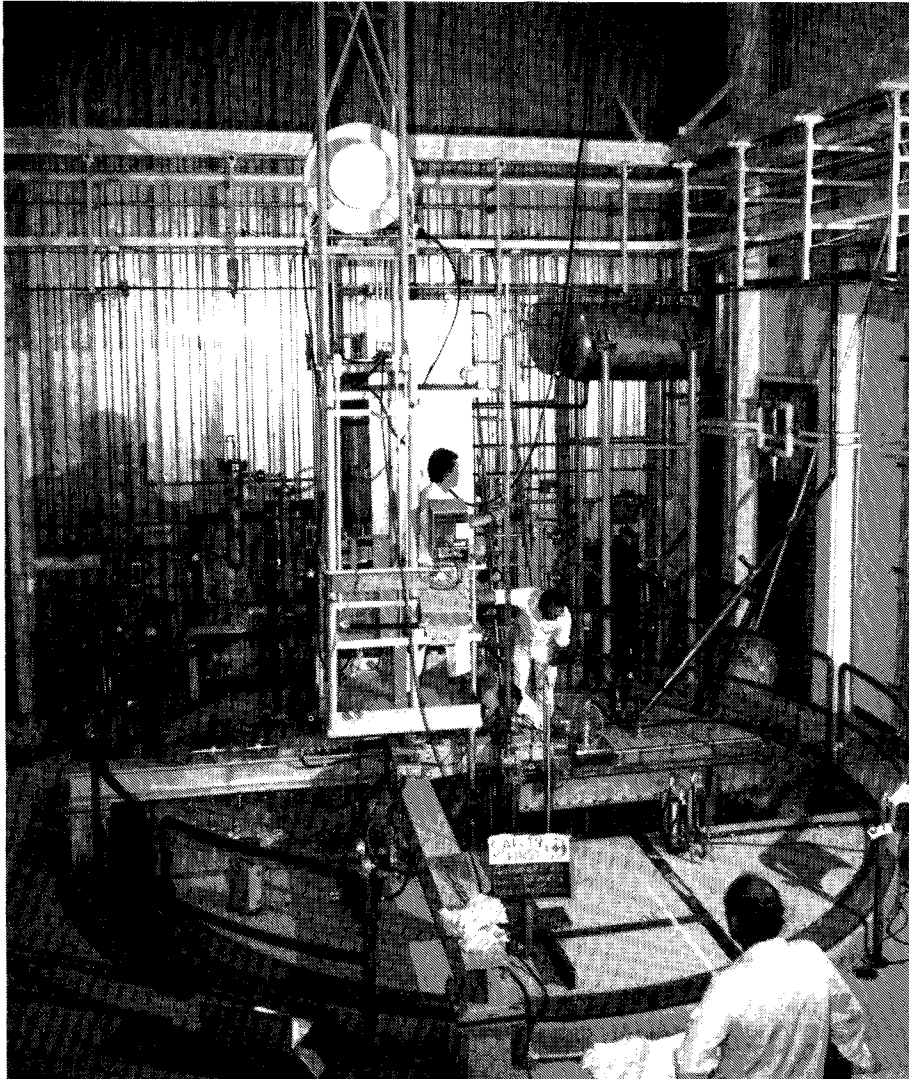


The Slowpoke Reactor

By Jim Eidt

Downsized nuclear technology for large scale heating systems. Is it safe? Will it sell?



There's a certain inevitability perhaps, in these days of calorie-free this, and low-sodium that, that someone would develop and try to market the first "lite" nuclear reactor. That's what Atomic Energy of Canada is attempting to do with its Slowpoke Energy System. And the federal crown corporation is hoping the experiment pays off worldwide.

The Slowpoke is a small nuclear reactor, designed to heat large buildings or clusters of buildings, such as a university campus. AECL prefers to call it a uranium-fired, hot water boiler, and it would probably prefer the public to think of it in those terms as well. The marketing of a small nuclear reactor, whatever it's called in

the vernacular of the research community, is likely to be a difficult task.

AECL's operations branch manager, at its Whiteshell Nuclear Research Establishment in Manitoba, admits as much. Although the company is actively negotiating with a Canadian customer for the sale of the first Slowpoke, Larry Meyer says the company realizes it is also pitching the concept to all Canadians, in hopes they will accept it too.

"We have recognized that the greatest hurdle to the success of this product will be gaining public acceptance of it," says Meyer. "We have a demonstrator unit right now that we can show people. However, it's operating in a research atmosphere, and it's

absolutely mandatory to the success of the product that we get a unit out into the real world and have it accepted by the public."

The Slowpoke Energy System evolved from the Slowpoke II research reactors that are found across Canada, generally in universities and other research institutions. The concept is markedly different than the nuclear power stations that generate electricity in Ontario, Quebec and New Brunswick. The sole function of the Slowpoke is to produce 80 degree Celsius water for circulation through a heating system.

"The device is ideal for areas requiring approximately ten megawatts of heating power, and that's suitable for something like an average-sized office tower, a shopping mall, a university complex or a large hospital," Meyer says. "I think we are getting a good reception from an interest point of view in Canada."

Competing Energy Source

The Slowpoke can compete on an economic basis with other standard sources of energy, according to AECL. It can heat buildings for an average of two cents per kilowatt hour, although it has a rather hefty start-up cost of \$5-\$7 million. On the other hand, the Slowpoke will give a minimum of 25 years of service with relatively little maintenance, and even the cost of the replacement fuel is included in the capital cost.

"Slowpoke would produce your heat at something in the order of 1-1/2 to 2-1/2 cents per kilowatt hour. Oil heating in Canada generally costs in the area of three cents a kilowatt hour," says the man in charge of marketing the Slowpoke, Metro Dmytriw. He adds, "Electricity is in the range of three to four cents a kilowatt hour, and natural gas ranges between one and two cents. We cannot compete with gas in all situations."

How It Works

The Slowpoke process is really quite simple. The uranium sits in a tank of water 13.5 metres deep, which is built into the ground. Even with standards governing the use of radioactive materials, the building to house the Slowpoke need not be specially designed or built, although AECL admits the reactor is more suited to a new

facility than a retrofit. The uranium fuel sits near the bottom of the tank, and through controlled fission, heats the water. The hot water rises naturally through a central column to a heat exchanger, which transfers the heat from the tank's water to water in pipes. Then, that is circulated through the building. And that's all it does, says Meyer, who cringes at comparisons with the much larger, electricity-producing nuclear power plant, called the CANDU.

Atomic Energy of Canada intends to emphasize the differences between the two energy systems to the Canadian public, and to the anti-nuclear lobby.

Selling the Idea

"We certainly have run across the anti-nuclear groups already. However, we are finding their arguments really do not apply to our product," says Meyer. "They are really based on a misconception of what our product is all about. And the product, just by due process, will not be put into any community where the public does not accept it."

Although the anti-nuclear lobby is powerful and persuasive, AECL is not without allies. There are more than half a dozen Slowpoke II reactors being used for research in Canada, including one at the University of Alberta. Researchers like reactor technologist Pete Ford say they have been models of efficiency and safety.

"We've never had a problem at all," says Ford. "You have the usual problems with trying to do things that haven't been done before, but that's what research is. We've never had any problem with the reactor itself."

The Slowpoke II is used by graduate students and academic staff for research involving isotope production and neutron activation analysis. It too, is a small reactor, barely the size of a garbage can, although the water and concrete shielding used make the total package considerably larger. Commissioned in 1977, the Slowpoke II at the University of Alberta has been operating problem-free.

"It's been a very successful venture," according to Ford. However, it won't be Pete Ford and people in his field that AECL is going to have to convince about the Slowpoke heating system. The marketers at AECL, led by Metro Dmytriw, are careful not to call the

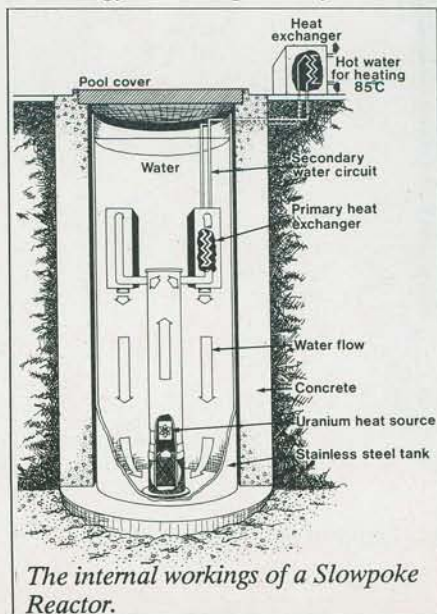
Slowpoke anything that suggests its power source. Generally, it is called "the product" or "the device" and the uranium is referred to as the "heat source". After decades in the business, AECL is aware of the public's antipathy towards things nuclear.

Even the scientific community is mixed, although Dmytriw dismisses the opposition.

"There are still people who resist fluoridation, and there's still a Flat Earth Society. On any scientific question, there's going to be disagreement, and that's the nature of science."

Quite simply though, AECL needs the Slowpoke to succeed. Canada hasn't sold an electricity-generating CANDU reactor since the late 1970's, and thanks to nuclear debacles like Three Mile Island and Chernobyl, much of the planet has soured on nuclear energy. As a result, AECL's prospects for selling any more of its billion dollar CANDU reactors are dim at best. "It's not a good market out there for any kind of large energy system," argues Dmytriw. "If you look at the fate of coal-fired generating systems, hydro dams, things like that, those have all suffered a comparable setback in construction starts."

"The size of the market that Slowpoke can meet and the size of the income is, of course, not as large as the CANDU electricity generating systems. Those are huge, billion dollar systems. The initiative to start development of the Slowpoke comes from a general AECL philosophy that users of technology developed by AECL



should pay for that technology. So we're following incentive now to go to our labs, and find things that are commercially viable. Slowpoke is part of that whole process." Given the moves by the federal government, though, to sell off unprofitable (and even some profitable) crown corporations, AECL may be gambling with its own future.

It is betting on a product that, if accepted by the public, could have dozens of applications across the country. The world market is also ripe according to AECL, which had representatives from South Korea and Czechoslovakia on hand for the official commissioning of the Slowpoke demonstration unit in mid-October.

Although other nations are developing their own versions of small, heating reactors, Canada has a significant lead according to AECL, which also believes its product to be superior.

Meyer says the world market is very attractive, but he believes that potential can't be tapped until a Slowpoke is sold in Canada.

"We suspect that overseas customers will definitely want to see the product in action in our own country before they would consider it." Dmytriw isn't so sure.

"Business is business," he says. "And if a country can see that if it can guarantee its energy supply for a long time, and can make some major gains in its energy programs, it doesn't mind demonstrating the technology first."

AECL believes it might have an operating Slowpoke in place by 1990, if negotiations now underway bear fruit. The deal could be wrapped up early this year. Among the bumps in the road ahead, is the anti-nuclear lobby. It is distrustful of anything that uses uranium, especially while the problem of nuclear waste disposal remains unsolved. But even anti-nuclear activist Dr. Colin Park of Edmonton can see applications for the Slowpoke, particularly in northern Canada, where heating fuel must be trucked in at enormous expense.

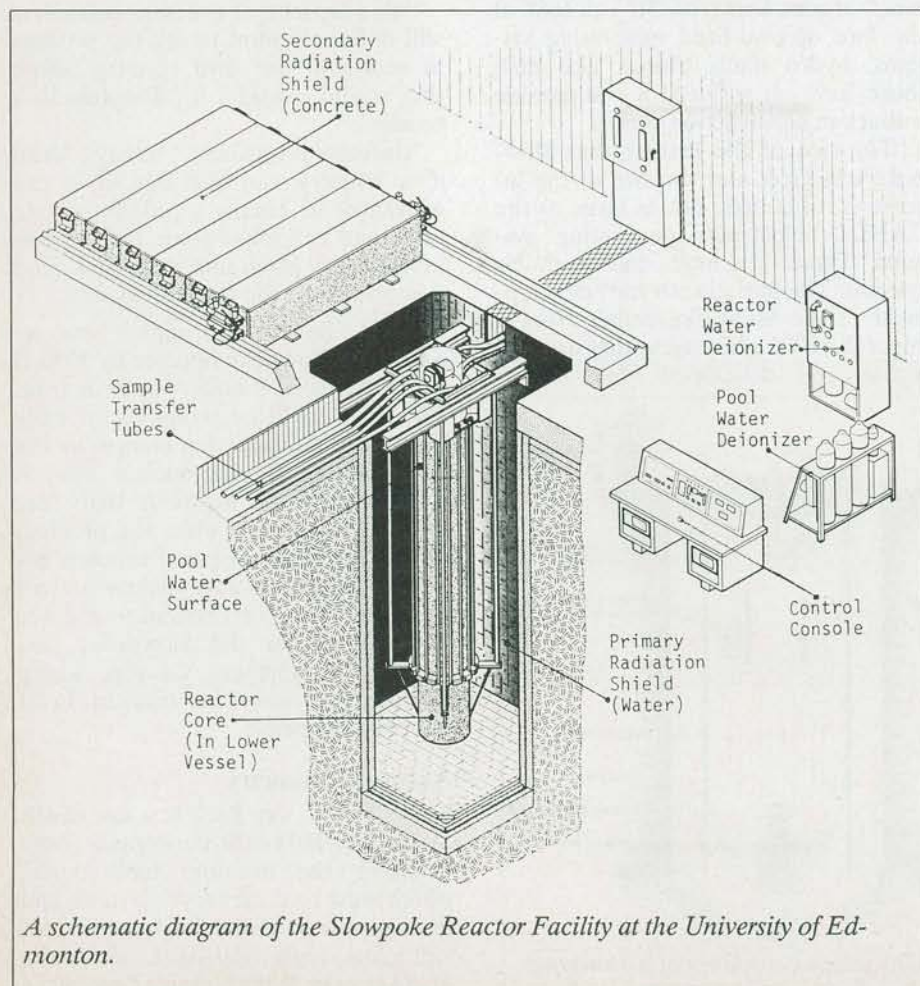
Safety Concerns

That's not to say Park is a fan of the Slowpoke. He's still concerned about changing the uranium fuel source, which must be done very few years, and he says the potential for human error still exists, regardless of the simplicity of the system. What's more, Park, while

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Commissioning of the Slowpoke demonstration reactor at Pinawa, Manitoba.



A schematic diagram of the Slowpoke Reactor Facility at the University of Edmonton.

admitting Canada's nuclear industry is better than most, still worries about exporting problems around the world. Unreliable local construction, he says, coupled with a lack of control over how the system is run once it is sold, make foreign sales risky. Park also alleges the nuclear industry is full of examples of deceit.

The public too, is leery about claims of safety from the nuclear industry. Studies are still being conducted, and statistics compiled, from the Three Mile Island accident nearly a decade ago, and there are indications that the resulting health problems have been worse than anticipated. The work on Chernobyl's worldwide impact is only getting underway.

Add to those major nuclear accidents, the 3000 or so small incidents reported at nuclear facilities in North America each year, and the public has a right to its concerns. Certainly, such information saps public confidence, despite the industry's best efforts to bolster it. Dmytriw thinks a sale would help considerably in that regard.

"We're talking with quite a number of people. We've already done a number of studies, where the answer was no. For example, Hay River in the Northwest Territories asked us to come up and look at whether we could heat the town using Slowpoke. It turned out we couldn't for a variety of engineering reasons. The major difficulty that we found there, was that the town was fairly well dispersed, and so the cost of putting in the distribution hot water lines was fairly high. It wasn't the source of heat itself, it was getting the heat to the buildings."

AECL plans to continue pointing out the differences in technology between its Slowpoke and the giant reactors that are the main sources of public fear. AECL takes the pounding of a hostile anti-nuclear lobby, a suspicious public and a divided scientific community, and tries to make a successful business out of a product that ranks somewhere between government and the tobacco industry in popularity. The little Slowpoke may help in that regard, although most early sales may end up in either remote Canadian communities, or other countries.

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