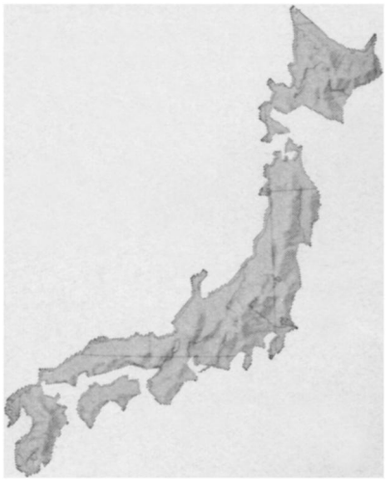
letter from Tokyo



Nuclear planning

Japanese pursue developments ranging from a power network to nuclear-powered steel furnaces

by Stuart Griffin

Japan's exploitation of atomic energy is now being programmed on a widespread domestic basis following the adoption of a long-term plan for exploitation and application of nuclear power. Details have been disclosed by Director General Naotsugu Nabeshima of the Government's Science and Technology Agency.

Nuclear power generation will reach a total of 1.3 million kilowatts by 1970, a pace much faster than the Japanese Atomic Energy Commission's original estimates compiled in 1967, which foresaw 6 million kilowatts by 1975 and between 30 million and 40 million kilowatts by 1985.

For effective use of nuclear fuel, the AEC has inaugurated a Power Reactor and Nuclear Fuel Development Corp. This body has been commissioned to develop a new converter and a fast breeder at a cost of approximately $555 million.

The project aims at putting a sodium-cooled, high-speed reactor with an output of between 200,000 and 300,000 kilowatts into operation by 1975. The converter, expected to be a heavy-water-moderated boiling water type, will probably attain criticality with an output of roughly 200,000 kilowatts by 1970.

(In the United States the Atomic Energy Commission just issued comprehensive plans for the development of liquid metal (sodium) fast breeder reactor plants for generating electricity. The time schedule laid out in the U.S. plan calls for a demonstration plant to be built in the 1970's and a commercial plant in the 1980's. The LMFBR program has been given the highest priority in the commission's program to develop nuclear power.)

To ensure a stable supply and effective utilization of nuclear fuel, the Government plans:

- To leave overseas exploitation of uranium to private enterprises.
- To coordinate uranium-enriching research around 1972.
- To initiate a program to develop a special reactor to utilize plutonium.

The Government has also announced its decision to locate the berth port of the nation's first nuclear-powered vessel, now under construction and ready provisionally by late 1971 or early 1972, at Mutsu City, in Aomori Prefecture, 850 miles north of Tokyo, at the tip of Honshu, main Japanese home island.

The commission started a five-year plan late in 1967 for early utilization of food irradiation so as to prevent decomposition, insect losses and germination, and to take steps to realize as soon as possible practical use of nuclear fusion.

The Radioactive Radiation Council, adviser to the commission, is scheduling a series of meetings to discuss the effects of disposing of nuclear wastes at sea. The council served notice, in addition, that further studies relative to safety issues will be on future agendas.

The nuclear agreement with Great Britain was revised last March, in order that the principle of reciprocity would be adhered to. And the new agreement with the United States concluded in July provides for securing enriched uranium and plutonium from America for the next 30 years.

Japan is building three pressurized water reactors (PWR) for power generation as well as the reactor operated at Tokai Village, 70 miles north of Tokyo. The nation has obtained concessions to develop uranium mines abroad and has managed, it says, to produce plutonium 239 domestically (SN: 6/1, p. 519).

Japan's steel industry may build an experimental nuclear-powered blast furnace in 1972, part of the industry's plan to boost its competitive ability internationally and to secure a new type of energy to replace coking coal.

This would start the home application of nuclear energy to the booming iron-steel industry, already third in the world, trailing only the U.S. and the U.S.S.R. One project envisions the supply of electric power generated by a nuclear-driven reactor to steel mills. This would cost less than the current method, based on coking coal.

In the U.S. steel industry, electric melting furnaces are in wide use for making high-grade tool steel. In 1967, in the U.S., approximately 15 million tons of steel were made with electric furnaces, as opposed to 41 million tons by basic oxygen furnaces and 70 million tons by open hearth furnaces (SN: 10/7/67, p. 346).

The electric furnace is still more expensive than basic oxygen and open hearth furnaces, but as low-cost nuclear power is developed, the electric furnace will gain wider usage.

The primary advantage of an electric furnace is that the temperature of the melt in the furnace can be controlled with much greater precision, and thus used for high-quality tool steel.