Critics Dispute India–U.S. Nuclear Trade-off

Bid to clear the way for India to acquire reactor spare parts opposed on grounds it would undermine non-proliferation stand

A commitment made by Secretary of State George Shultz during his recent visit to India seems likely to propel the Administration into a collision with Congress on nuclear non-proliferation policy. Shultz told the Indians that they were free to look outside the United States for replacement parts for two aging U.S.–designed reactors at Tarapur near Bombay. Shultz added, however, that if the spares were not obtainable elsewhere, President Reagan intends to take the action necessary to make the parts available from U.S. suppliers. The reactors are an early General Electric model.

Critics in Congress insist that such exports from the United States to India would conflict with the U.S. Nuclear Non-Proliferation Act (NNPA) and undermine U.S. credibility on non-proliferation. The critics say that the President would have to waive provisions of the NNPA to free the components and, in the process, bring out into the open information on the sensitive question of whether the Indians are working on nuclear explosives.

Since India detonated a nuclear device in the Rajasthan desert in 1974, the United States and India have been at odds over India's refusal to accept full-scope non-proliferation safeguards on its nuclear facilities and take the no-nuclear-explosions pledge required by the international Nuclear Non-Proliferation Treaty which India has refused to sign. India–U.S. relations have been especially thorny since passage of the U.S. Nuclear Non-Proliferation Act of 1978, which mandates a cutoff of nuclear fuel to countries that do not accept international inspection of their nuclear facilities.

The Administration motive for the concession on the Tarapur components, according to the official communique on the Shultz visit, was concern about the operating safety of the reactor at Tarapur and the health of employees there. There have been sharply conflicting reports on conditions at the installation (see below).

Success by India in finding the necessary spares abroad would enable the Reagan Administration to avoid a direct encounter with Congress on the issue. The device of enlisting a third party as supplier follows a precedent set last year when France agreed to supply enriched uranium fuel for Tarapur's reactors in lieu of the United States (*Science*, 13 August 1982, p. 614). The virtually unanimous view among U.S. observers here, however, is that India will not be able to find important items on its shopping list elsewhere and will ask the Administration to make good on its pledge to clear the way to buy American.

Although the NNPA criteria for exporting reactor components are less stringent than for export of nuclear fuel, the prevailing view is that the Administration will be obliged to resort to a waiver, the maximum exertion of Executive muscle under the law. This would be forced by reported activities by the Indians at Rajasthan that could indicate preparations for another nuclear test. The Nuclear Regulatory Commission has access to intelligence bearing on non-proliferation matters and, if any doubts existed about Indian intentions on testing, the commission would be required under the NNPA to disapprove the license required for export of the Tarapur components. Indian officials have consistently denied that India is preparing another test.

The NNPA empowers the President to overrule the NRC by waiving the law's prohibitions—even if a country in question were to explode a test device—if he found that to deny the export would be "seriously prejudicial to the achievement of United States non-proliferation objectives or otherwise jeopardize the common defense and security."

The NNPA also gives Congress the power to override the presidential waiver if it passes a concurrent resolution to that effect within 60 days after the President reports his decision to it. The Supreme Court, however, has apparently sunk this NNPA provision and similar ones in other legislation by declaring the so-called legislative veto unconstitutional.

Congress is currently expending much effort to salvage its prerogative; meanwhile, the Executive seems to be taking care not to inflame the legislators on the issue. Deputy Secretary of State Kenneth Dam on 19 July told a House Foreign Affairs panel that in the event of a waiver under NNPA, the Administration would observe a 60-day waiting period to enable "Congress to enact new legislation if it chooses."

The last congressional test of a waiver under the NNPA came in 1980 when the Senate by a bare two-vote margin upheld President Carter's decision to send nuclear fuel for Tarapur to India. Now critics on Capitol Hill have drawn the battle lines on components for Tarapur with a letter to the President signed by 55 legislators charging that "The Indian government is needlessly risking the lives of its citizens to make a point about its right to proliferate," and asking Reagan not to "undercut our non-proliferation goals." The Administration is expected to counter by stressing the humanitarian considerations behind the components export, citing broader foreign policy aims, and arguing that by cooperating in this instance the United States can maintain greater leverage on such important U.S. non-proliferation goals as deterring India from reprocessing nuclear fuel, which produces weapons-usable plutonium. But unless the equivalent of a nuclear French connection materializes, spare parts for Tarapur will trigger the first major confrontation between the Administration and Congress on non-proliferation policy.

. . . from Tarapur, a Grimm Report

India's Tarapur Atomic Power Station has attracted considerable attention as a major point of reference in the debate over nuclear non-proliferation between India and the United States, erstwhile partners in building Tarapur in the 1960's. Tarapur has gained notice of another sort from reports like the recent one in the *Times of India* that said Tarapur "has broken several world records in exposing nuclear plant workers to excessive doses of harmful radiation."

Accounts of operating conditions, in fact, appear contradictory. The Indian and international press in the past have carried reports of problems such as discharge of cooling water with excessive levels of radiation and, more persistently, of exposure of plant staff to high

levels of radiation. Indian officials have strongly denied the existence of dangerous conditions at Tarapur. Recently, the horror stories were put in some question by a rare outsider's report of a visit in June. The visitor was E.A. Grimm, an engineer from the General Electric Company which sold the reactors to India. Grimm, who served as project manager during construction and early operation of Tarapur, noted the need for replacement parts, but said "the plant is running satisfactorily."

A widely noted adverse report of problems at Tarapur appeared in the *Times of India* on 8 May. The story said that outside workers including illiterate villagers had been brought in to do maintenance work in contaminated areas of the plant to spare Tarapur staff further exposure. In what was described as an eyewitness account of work during a shutdown of the plant, the reporter told how a queue of workers lined up outside the contaminated area. Then each, holding a wrench in one hand and a dosimeter in the other, "rushes in, turns a nut through one or two rotations or hammers a knob once and rushes out." The story said that workers in such relays are exposed to 2 weeks worth of permissible radiation in less than a minute and an annual dose in 10 to 20 minutes.

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The story describes in considerable detail how plant staff has been regularly exposed to radiation exceeding the limits set by the Indian Department of Atomic Energy. Indian officials do not dispute the figures, but maintain that Indian citizens have not been exposed to dangerously high levels of radiation.

In the summary of the report made available in this country by GE, Grimm says that the two units at Tarapur are running at about 75 percent of capacity to conserve fuel. He says that operations are "made more difficult" by a lack of spare parts including radiation detectors. He says that "lack of replacement recirculation pump seals seem to be most critical." (In late July, one reactor at Tarapur was reported shut down because of a leak in a circulation pump attributed to worn parts.)

Grimm's summary comment was, "In my judgment, the plant is running well and being run well despite their supply problems. They are dedicated, conscientious professionals who have been working there for 16 years and still only hire graduate engineers for their reactor operators." Grimm asked the reactor operators about radiation doses in the reactor containment area. He said they reported values that are moderate for a plant of that age and are workable.

The Tarapur project was launched by an Indian-U.S. agreement in 1963 and the plant began operation in 1969.

Scuttlebutt in the U.S. nuclear industry is that Tarapur had early troubles with leaks of radioactivity from fuel elements in the reactor core. GE's first production model boiling water reactors (BWR's), the type at Tarapur, were regarded as susceptible to such problems since the design had a unified system employing the same medium as coolant and to drive the turbines, which meant that stray radioactivity circulated throughout the system. Since 1980, the Indians are said to have reduced contamination levels mainly by running the reactors below capacity. A costly, time-consuming full-scale decontamination of the plant has not been done.

Tarapur's GE BWR's each has a rated capacity of 210 megawatts. By current Western standards they are regarded as too small to be economic. GE reactors of the same vintage have been shut down in Germany and Italy as have two in the United States. Tarapur, however, is regarded as important to the Indian power system. It's capital costs were relatively low and the size of the reactors suits Indian needs.

After the Tarapur BWR's were built, India, in the interests of nuclear self-determination, adopted a reactor type moderated by heavy water that could use natural uranium mined in India as fuel. The initiative has proved disappointing since the country has had difficulty in producing adequate heavy water supplies and the new reactors tend to perform below rated capacity. The Indians have learned to live with Tarapur and reportedly would like to extend its operating life beyond the projected 30-year span scheduled to end in the late 1990's. If India gets its way and the spare parts, therefore, Tarapur could continue for years to come as a factor if not the focus in Indo-U.S. nuclear relations.

—JOHN WALSH

Sun Sets at RCA, Rises at Solarex

RCA Corporation has decided to get out of the solar energy business, and is selling its technology and equipment lock, stock, and barrel to Solarex for an undisclosed sum. The deal, which is in the final stages of negotiation, involves RCA's patented technology for making amorphous silicon solar cells.

Although RCA is generally reckoned to be in the forefront of developing this technology, it decided not to risk large amounts of capital—estimated to be up to $100 million—to set up production facilities. Several Japanese companies, however, have not been so cautious; they are already using RCA's process to produce small cells for consumer products.

RCA decided about a year ago that it could not afford to go it alone in large-scale commercial production and began quietly looking for an industrial partner to commercialize the technology through a joint venture. Negotiations with two companies dragged on for several months, and RCA eventually imposed a deadline of 31 March. If agreement could not be reached by then, RCA said it would sell its technology and get out of photovoltaics entirely. The deadline passed, and the business was up for grabs.

Solarex, which is based in Rockville, Maryland, is already a major producer of the current generation of solar cells made from crystalline silicon. Its purchase of the RCA technology will give it a head start in the race to produce the next generation, which will be much cheaper to manufacture. (Amorphous silicon is widely regarded as the leading contender to replace crystalline silicon.) Equally important, Solarex is likely to hire several key photovoltaics experts from RCA, including David Carlson, who has headed the program at RCA for several years. Although Solarex's plans have not been announced in detail, the company intends to set up a manufacturing facility in New Jersey, close to the RCA labs in Princeton.

One unresolved question is what will be done about use of the RCA technology in Japan. At present, Japanese companies are simply using