ANUMUKTI

A Journal Devoted to Non-Nuclear India

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Special Note to Drivers of Trucks Carrying
Explosive Nuclear Waste through Metropolitan New York.

check oil levels every five milts.

change fan belt every thousand.

check tire pressure every morning..

change tires.

Buy *radials.*

check shocks every hundred.

check rear-view mirror and side-view mirror incessantly.

Keep eyes on rod.

Grant all other vehicle and each pedestrian

the right of way.

Do *not pass.*

Do not drive in the rain.

Do *not drive in the snow.*

Do not drive *in the dark.*

Signal.

use headlights on high beam.

Go slow.

Do *not break suddenly or otherwise.*

Think about your mother

and look out for crazies.

June Jordan
Atomic Ghost: Poets Respond to the Nuclear Age.

Directions for carrying
Explosive Nuclear Wastes Through
Metropolitan New York.

Enter Long island Expressway at Brookhaven. Proceed west. Exit at Hoyt Street in Astoria. Turn left onto Astoria Boulevard. Trundle under the elevated tracks there. Turn right to ramp for the 59th street Bridge. Cross the Bridge. Follow local street travelling west until Amsterdam Avenue. At Amsterdam turn right. Proceed North.

LETTERBOX

I have been subscribing to *Anumukti* for the past few months and find it very useful. Since I live in the USA, I would like to see more information on the Indian nuclear industry. Perhaps, other readers of Anumukti in India can cootribute by sending in newspaper clippings related to our nuclear establishment. With some critical editing and commenting, even a press release from them can provide a handle to understand what is happening within the facilities.

Apropos your editorial (*Anumukti, Vol. 10, 41)* on the Koodankulam Reactors -. The reality is that it is the Russian nuclear industry that is really in trouble. But, like nuclear establishments all over the world, they still carry a lot of clout and hence there is still quite a bit of official support for their views. The following excerpts from an article by Kalyan Shankar in The *Hindustan Times* on the sorry state of the Russian nuclear industry should be of interest in this regard.

The future of the Russian nuclear industry does not appear to be very bright While on the one hand it does not attract the younger generation any more, many scientists of the Soviet era have left the country for greener pastures. The Russian youth today is looking for a glamorous job in a multinational company or setup his own business rather than opt for the specialised nuclear field.

The Russians are also worried about the brain drain and lesser investment in the nuclear industry. For instance at the prestigious Kurchatov institute in Moscow, which was the birthplace of the Soviet Union's atomic weapons program me, 7000 workers have viol been paid their wages for months. The institute is reported to have received barely a third of its budgeted amount for the year I9V6.

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From The Editor's

Like the roof of the CAN DU type reactor at Kaiga which crashed of its own weight in 1994, the whole Canadian nuclear programme seems to be crashing down, or getting delaminated to use the correct nucleo-lingo. Since Canadians were the guys who taught Indian nucleocrats their tricks, this has major implications for the Indian atomic energy programme as well.

In the early 1960s when major decisions were being taken regarding the nuclear programme, Dr Homi J Bhabha, the father of the Indian nuclear effort decided to make CANDU the main reactor type in India. The reasons behind this choice were:

- It used natural uranium as fuel instead of enriched uranium. India had no enrichment facility (it still doesn't) and did not want to become dependent on foreign suppliers for fuel.
- Uranium resources of the country were small and CANDUs had the smallest requirement of uranium both in the core and as yearly replacement. At the same time it produced comparatively larger quantities of plutonium which could be used to fuel a breeder programme with the ultimate view of utilising the vast thorium deposits of the country.
- CANDUs had on line refuelling capacity which meant that theoretically they could run longer without refuelling outage, required less maintenance, gave less of a radioactivity dose to workers and were overall cleaner systems than other reactor types then in consideration.
- They were pressure tube systems and did not require manufacture of large pressure vessels which were beyond our technological capabilities.

For all these reasons Bhabha preferred the CANDUs as the mainstay of the Indian nuclear programme, despite the fact that their efficiency as electricity producers was low and they required the use of heavy water which was expensive. But for the two Boiling Water Reactors at Tarapur, all of India's nuclear power reactors are of the CANDU type.

During the early years of operation in Canada, the CANDUs' performance was the best in the world with capacity factors of many reactors in the high nineties. Unfortunately, while Canadian CANDUs were setting records as the best performers in the world, Indian CANDUs were setting records as the worst. The capacity factors of the Indian plants were usually in the low forties and sometimes in the low twenties. That is when they did run which was not most of the time. These problems were airily dismissed as "teething troubles" by Indian nucleocrats.

However, as years went by the performance of the Canadian CANDUs declined precipitously and they started rivalling their Indian counterparts. What the decision to close seven of these reactors in one shot means is that the problems of ageing that they are encountering are not capable of solution by simple means and are inherent in the design which despite its early promise has failed to live up to expectations. An organisation responsible to shareholders has decided to cut it's losses in order to survive. The article on page 3 details the problems faced by Canadian CANDUs.

In our next issue, we will have a detailed comparison between the operating records of Indian and Canadian CANDUs and show that the record of the Canadians in running these reactors has been far superior to that of the Indians by any objective criteria. Thus, we should take heed from their decision to lay off seven of them in one go and shut down these fatally flawed machines while there is still time before a catastrophe strikes.

The CANDU Collapse

Seven Canadian Reactors to Shut Down

Toronto Ontario Hydro announced on August 13, 1997 that it would shut down its oldest seven reactors within the next year. This includes four 515 MWe reactors at the Pickering "A" nuclear station, just east of Toronto, and three 848 MWe reactors at the Bruce "A" nuclear station on the shore of lake Huron near the town of Kincardine. Ontario Hydro had previously shut down *one* reactor at the Bruce "A" station in 1995. Ontario Hydro is also shutting down Canada's last remaining heavy water plant at the Bruce site. CANDU reactors need heavy water for both coolant and moderator. Dave Martin, Research Director of Nuclear Awareness Project, stated, "This is the largest single nuclear shutdown anywhere in the world. It's the beginning *of* the end for nuclear power in Canada."

The Bruce "A" reactors lasted less than half *of* their expected 40-year lifetime. The Pickering "A" reactors lasted only 25 years, despite having been re-tubed at cost of $I billion (Cdn).

The shutdowns will leave Ontario Hydro with 12 reactors four at the Pickering "B" station; four at the Bruce "B" station; and four at the Darlington station. Ontario Hydro refers to the current shutdowns as 'lay ups". implying that the reactors may be re-started at a later date. However, Nuclear Awareness Project believes that the reactors will never be re-started, for economic, as well as environmental and safety reasons.

"The Ontario Hydro shutdown will also seriously hurt the chances of foreign CANDU sales by Atomic Energy of Canada Limited (AECL).'' said Dave Martin. AECL is a Canadian crown corporation that designs and markets CANDU reactors. AECE is currently seeking to build reactors in Turkey, Romania, and the Republic of Korea. CANDU performance has declined dramatically in recent years. In 1996, Ontario Hydro's 19 operating reactors ran at an average capacity factor of 66%. The Pickering "A" station had a capacity factor of 36%. and Pickering *"B"* 49% in 1996. Martin added, "The message is clear: do not buy CANDU reac- : tors".

Closure of the problem-plagued Pickering "A" reactors vindicates ten years of public education work by activists with Nuclear Awareness Project and its local affiliated group, Durham Nuclear Awareness (DNA). The four ageing reactors, now over 25 years old, were the oldest operating CANDU reactors in Canada, and have been the subject of several recent controversies.

In May, it was revealed that i Ontario Hydro had dumped more than 1,000 tonnes of copper, zinc and other metals in Lake Ontario. The metals were being eroded from the Pickering stations' brass steam condensers over the last 20 years. Durham Nuclear Awareness has requested an investigation under Ontario's Environmental Bill of Rights, alleging that Ontario Hydro officials knowingly reported incomplete environmental data to the Province of Ontario.

In July, Ontario Hydro revealed that it had failed to report tritium contamination of ground water on the Pickering site for the last twenty years. In 1979 it found 2,150,000 becquerels per litre (Bq/L) of tritium in ground water, and in 1994 found 700,000 Bq/1. Tritium can cause cancer if ingested. Ontario's current "objective" for tritium in drinking water is 7,000 Bq/L, but in 1994 a provincial advisory committee recommended that this level should be reduced to 100 Bq/L, and brought down to 20 Bq/L within five years.

While Canada decides to shutdown its CANDUs, India decides to go in for expensive retuning which as experience at Pickering shows, doesn't always work because no one in the establishment has the guts to take a decision of shutting down even worthless junk

Ontario Hydro will increase the use of coal and oil-fired stations to compensate for the closed nuclear reactors. In the last four years, the giant utility has decimated its conservation programs, and recently cancelled its first tentative efforts at a renewable energy program for independent power producers. Added coal and oil generation will result in major environmental impacts. The Ontario environmental community is rallying to demand a truly sustainable energy future based on demand management and renewable energy, with the use of gas-fired cogeneration as a transition technology.

A History of Some Selected 'Significant Events'at Pickering Nuclear Generating Stations

August 1, 1983 — Pickering reactor 2 had a 'loss of coolant accident' (LOCA), after a pressure tube had a metre-long rupture. The entire station was shut down, and the four reactors at Pickering "A" were eventually retubed at a cost of about $1 billion - more than the original $716 million cost of the station.

November 22, 1988 — Pickering reactor I had a power excursion caused by operator error that caused damage to 36 fuel bundles. The cooling system was contaminated by radioactive iodine, which was vented over several weeks following the accident. Ontario Hydro did not believe that such an accident was possible, and had to revise its operating procedures and retrain staff.

September 25, 1990 — Pickering reactor 2 had a "severe flux tilt", with large power shifts in the reactor core, caused in part by the CANDU design. Staff spent two days trying to stabilise the reactor core before shutting it down, and were later criticised by the AECB for not shutting it down immediately.

August 2, **1992** — Pickering reactor I had a heavy water leak from a heat exchanger that resulted in a release of 2,300 trillion becquerels of radioactive tritium into Lake Ontario. This was the worst-ever tritium release from a CANDU reactor, and resulted in increased levels of tritium in drinking water from Whitby to Burlington.

December 10, 1994 — Pickering reactor 2 had a major Moss of coolant accident' (LOCA). A pipe break resulted in a spill of 185 tonnes of heavy water, For the first time ever, at a CANDU, the Emergency Core Cooling System (ECCS) was used to prevent a meltdown, and about 200 workers were involved in the clean-up. The reactor was restarted on February 14, 1996.

July 21, 1995 — Two technicians carried out work on the wrong reactor (Pickering reactor 5 instead of reactor 6), disabling the second fast shutdown system on reactor 5, which was operating at full power at the time.

While The Canadians Shutdown Their Own Reactors, They Continue To Promote Similar Reactors For Sale in Turkey, Romania And In Other Parts Of The World

February 19, 1996— About 500 tonnes of water spilled into the #6 reactor building when employees working on an Emergency Water Supply valve failed to isolate it from the system. An investigation revealed that safety equipment could have failed due to water damage, and both the primary and backup heat sinks were actually lost for a section of the reactor core. The accident blew a 60 lb. valve component 6 feet into the air, almost hitting a worker and shot water up to the reactor building dome.

April 15, 1996 — Pickering reactor 4 had a heavy water leak from a heat exchanger that resulted in the release of 50 trillion becquerels of tritium into Lake Ontario. The level of tritium in local drinking water peaked at about 100 times the usual level.

April 21, 1996 — All eight reactors at the Pickering nuclear stations were shut down to repair a backup valve on the Emergency Core Cooling System. The flaw was detected on April 15th, and the system had been tested one month earlier. Hydro did not advise the public of this situation until April 20th.

October 11, 1996 — "Drug paraphernalia" were found in the Operating Island' at the Pickering nuclear stations. A station manager commented: "The continuing discovery of such items in the plant is both embarrassing and a threat to our recovery and survival as a business." This was one of five significant event reports relating to illicit alcohol and/or drug use in the Pickering nuclear stations in 1996.

May 17, 1997 — A media report revealed that Ontario Hydro had failed to report the dumping of more than 1,000 tonnes of copper, zinc and other metals into Lake Ontario from the Pickering stations, due to the erosion and corrosion of brass steam condensers. DNA has requested an investigation under the Environmental Bill of Rights, alleging that Ontario Hydro officials knowingly reported incomplete environmental data to the Province of Ontario.

July 30,1997 — Ontario Hydro revealed that it had failed to report tritium contamination of ground water at the Pickering nuclear generating station for the last twenty years. In 1979 it found 2,150,000 becquerels per litre (Bq/L) of tritium in ground water, and in 1994 found 700,000 bequerels/litre

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If Wishes were Horses Department

So far out that they might as well be in space

Optimist at IAEA symposium see 1,000 new reactors by 2050

Nucleocrats fancy themselves us futurologists. I used to think that this was a disease confined to India. But I find that it has spread worldwide and in fact some nucleocrats abroad are worse affected. As predictors of the future they have a record which is far inferior to that of even the astrologers.

Just twenty years ago nucleocrats were confidently predicting that there would be 1,000 reactors by the year 2,000. With barely two years left they have over half the target still unreached. Undeterred by these minor inconsistencies, they are now saying that there would be thousand more in another fifty years. Only one thing can be said with any certainty about these latest predictions. The predictors won't be around half a century hence in case anybody wants to question them!

Featured speakers at an IAEA hosted symposium this month optimistically forecast a major expansion of nuclear power during the coming five decades. "The world will have to add up to 1,000 reactors to meet energy demand," said Dan Meneley, chief engineer at Atomic Energy of Canada Ltd. (AECL). "Our low scenario is 300 new reactors. It might be zero, but we don't expect that to happen."

Meneley summarised the third of six "key issue papers" working groups prepared by consensus for the International Symposium on Nuclear Fuel Cycle and Reactor Strategies. The symposium, co-sponsored by the OECD Nuclear Energy Agency (NEA), the Uranium Institute and the European Commission, was held in Vienna from June 3-6, 1997. It was a follow-up of the 1980 International Nuclear Fuel Cycle Evaluation (INFCE).

The conference began by describing energy supply and demand scenarios through 2050, and continued with detailed discussion of the future of the nuclear fuel cycle.

Still A Diehard Optimist

In his opening speech, IAEA Director Blix said "new realities" had emerged since the late 1970s, when the U.S. government initiated the International Nuclear Fuel Cycle Evaluation (INFCE), "and it seems appropriate again to consider various aspects of different nuclear fuel cycle options." In 1980 he said, world nuclear power capacity in 2000 was predicted to be between 850 and 1,200 gigawatts (GW). Capacity stands today at only 351 GW and almost certainly "will not be greater than 380 GW" by 2000, Blix said. In addition, "the predicted commercialisation of fast breeder reactors has not occurred," and "the closed fuel cycle has not taken hold."

Based on three scenarios (ecology driven, middle course, and high growth), the conference's first issue paper projected world nuclear generating capacity by 2050 at somewhere between 333 GW and 1805 GW. The scenarios were based on analyses by the International Institute for Applied Systems Analysis, in Laxenberg, Austria and on data from the World Energy Council.

In a separate study prepared for the discussion, five experts from the Los Alamos National Laboratory (LANL) predicted that nuclear power would remain concentrated in the OECD countries until about 2050, then shift by 2100 toward developing countries including China. If a carbon tax is levied during the next century, LANL said, "the economic niche of nuclear power will be widened, while moderately decreasing overall primary energy demand and GNP." But, the LANL experts forecast, its impact on green house gas abatement will be limited "unless nuclear energy moves into non-electric applications."

Breeder reactors will enter the market in the 21st century, they said, "only if significant costs for fossil fuels arise" beyond those used in their model, if strong carbon taxes are globally applied, if low capital costs are possible, and under assumptions of limited uranium resources.

By contrast, the consensus issue paper assumed that fast reactors would be introduced after 2030 and by 2050 would represent about 10 per cent of the worlds nuclear capacity. For LANL, a 10 per cent breeder share could only be reached around 2100, under the most optimistic assumptions.

Naoto Sagawa of Japan's Institute of BNiergy Economics, forecast that nuclear reactors will supply 20 per cent of the power in the entire Asian region by 2050, assuming significant energy saving (reduction in energy intensity of 1.5 per cent annually) and an expected decline in the region's average growth rate from the current 6.2 per cent to 2.4 percent in 2030-2050. But nuclear's share in Asia could be higher, he said, suggesting

that fast breeders would be needed in Asia once nuclear supplied about 50% to 60% of total power. At that level of nuclear power output, uranium demand in Asia would reach 250,000 metric tons/year, and reactors in Asia alone would rapidly consume the world's natural uranium resources if we rely only on natural uranium," Sagawa said.

Menely told a June 4 press briefing that, if China is to attain the level of environmental protection enjoyed by Western countries during the next 50 years, China "would build seven hundred 1,000 MW reactors, assuming they don't have any other resources." If that were to occur, he said, "it puts us up to the number of up to 1,200 new reactors in the world" predicted by his working group.

From Here To There

But even in this gathering of Hallelujah, Praise the Lord! tub thumping believers, there were some participants who had been bitten by the reality bug. They expressed surprise that so little effort was made to discuss how the optimistic scenarios calling for major nuclear expansion would actually be realised. Former Shell executive Peler Beck said: "Too many people here were saying, we can wait, and the world will turn to nuclear power' ...In the oil business, as soon as you say your technology is mature, you're in the first stage of dying.

None of the symposium's scenarios count on renewable energy sources making a serious contribution during the next 50 years. Beck said Shell officially expects rcnewables to account for half the world's energy supply by 2050. "It's possible that nuclear will have only a minor role, but that prospect didn't even figure at this meeting," Beck observed.

Other experts said the lack of balance was caused by the inclusive, consensual process adopted in drafting the issue papers, one technology against another. Quipped one European issue paper author, "if there is a working group of five people with someone from AECL and one Indian on it, you are going to get a forecast that a third of world's reactors by 2050 will be PHWRs and a third of the fuel burned will be thorium."

In response to a query after his paper projecting 1,000 new power reactors, Meneley explained that the authors did not concern themselves with the details of realisation. "The world will need the energy," he exclaimed. Mow the reactors get built "doesn't really matter."

According to acting Nuclear Energy Agency's director General Sam Thompson, however, it is going to matter. "There can be no doubt that for some years to come, it will be difficult to make an economic case for new investment in nuclear generation if the bases for comparison of fuel costs are not radically altered," Thompson said.

Another observer noted that the forecasts presented at the symposium bore the heavy stamp of vendor companies, research and development organisations, and other technology holders "whose basic mindset is, 'when in doubt, go for a nuclear option.'"

"If any utility people had come to this meeting and had been involved in the paperwork," one U.S. DOE official said, "the results would have been more sober."

The role of market forces was barely discussed in preparation of the baseline energy scenarios for the fuel cycle studies. But Thompson warned at the outset of the symposium that "one characteristic of markets is that they tend to emphasise short-term rather than long-term interests. Even where the governments have few options, they will not automatically look towards a long-term commitment such as a nuclear plant as a solution."

Nucleocrats keep insisting that their's is a "mature technology"
in today's competitive world
"As soon as you say your technobgy is mature, you're in the first stage of dying"

The consensus working group paper on reactor strategies forecast that by 2040, between 10 and 15 GW of fast breeder capacity will have become operational. A separate French-Japanese-Russian paper on the global fast reactor outlook concluded that "fast reactors have demonstrated satisfactory performance over 45 years from the standpoint of reliability and safety, thus confirming their maturity." However, one U.S. national laboratory official commented that for units large enough to contribute significantly to future electricity production, "That statement just isn't true. He noted that operation of Superphenix in France has been beset with bureaucratic delays and technical problems, while the timetable for the restart of Monju in Japan is in doubt.

Mark Hibbs
Nucleonics Week June 19, 1997

Fly Now! Pay Throughout Your Life

On May 2 the passenger flight KL 129 of Royal Dutch Airlines (KLM) transported a package of radioactive medical equipment that was not checked sufficiently for radiation. Since February the producer of the Technetium-99 diagnostic source, Malinckrodt Medical in The Netherlands, had worked with defective radiation monitors. Royal Dutch Airlines was reproached that it transported the source unchecked, did not inform authorities and failed to inform the 115 passengers. During judicial investigations into the incident, KLM announced it would no longer transport radioactive material in passenger flights.

The Observer of June 22 uncovered the story. According to international transportation rules, the outside radiation limits of a package may not exceed 200 millirems an hour. The high levels on the Technetium-99 source were discovered after some weeks by a Heathrow airport (UK) employee. Radiation levels were more than 1000 millirems an hour. Malinckrodt Medical said there was contamination of radioactivity outside the lead container on a needle on top of it. This should have been checked at the Malinckrodt factory but remained uncovered due to a defective radiation monitor. Since February, employees found strange results from the equipment but no remedial measures were taken. According to officials, a passenger right above the package could have received about 150 millirems of radiation during the flight. 'Acceptable' radiation dose for the general public is 100 millirem a year.

After the publication by the Observer several authorities started investigations. According to the Dutch Traffic Inspection (RVI) both KLM and Malinckrodt violated the law regarding transportation of dangerous goods. KLM was especially reproached for not informing government authorities after the discovery at Heathrow. They were only informed by British authorities on May 23. RVI passed the case to the office of public prosecutor for prosecution. KLM fears a suspended withdrawal of permission to transport radioactive goods as penalty. Some passengers started a case to get financial compensation for future health consequences.

On June 27 another package from Malinckrodt was found at the Schiphol airport with radiation levels higher than permitted. The package was not put on a plane as it arrived too late. It was sent back to Malinckrodt. After this new incident, KLM announced it would also stop transporting radioactive materials in cargo planes during further investigations. Authorities withdrew the transport license of Malinckrodt for a few days. On June 30 the license was renewed, adding more safety requirements. However, KLM still refuses to send packages from Malinckrodt while the investigations are still going on.

Sources: WISE Communique 475

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The Bomb Under Your Seat

The flight in question was a short hop from Amsterdam to London. What about the long intercontinental flights lasting eight hours or more. A package emitting radioactivity allowed under the rules could still make you into an involuntary nuclear worker! Whom do the rules protect'[7] The manufacturers and the airline would both claim that they were "well within internationally accepted standards" and anyway you were subject to much greater risk just crossing the street. There is also the question of the safety of the airline crews and airport package handling staff. These things can be sitting unclaimed for months dousing unsuspecting staff with their deadly rays.

Letterbox

Continued from page 2

However, Minatom, the Russian Ministry of nuclear power is planning the construction of ten new reactors by 2005. Russia is even trying to attract foreign investment in the reattor projects. The Russians admit that unless they improve the industry, a decade from now, the nuclear industry would be in a poor shape. More orders and more money is what is required. The nuclear scientists are happy that there are still countries like India and China and some other third world countries which need huge power and are willing to place order for nuclear reactors.

And these are the guys who are supposed to be providing finances for the Koodankulam reactors!

1 am also curious about the exact cost of the project - the numbers reported in the Indian media vary from Rs 14000 crores to Rs 17000 crores, a variation of about 20% and when considering projects of this magnitude, this can be significant. Not that one takes these official numbers too seriously, given the track record of delays and over-runs of other reactor constructions. And, one expects that these numbers don't take into account other costs - for example, the cost of training Indian scientists, as mentioned by the Secretary of the AEC. I look forward to future issues of Anumukti.

M. V. Ramana MIT Cambridge, Massachusetts USA

Fast Breeder Reactors: The Dream Gone Sour

Nuclear energy is a dream which over time turned into anightmare. Nothing illustrates this better than the sorry saga of the breeder.

Nucleocrats have always claimed that nuclear energy is an inexhaustible source of power for the future. At the bottom of those large multi-coloured glossy posters are some astronomical numbers sure to dazzle the lay public. One kilogram of uranium gives energy equivalent to two million kilograms of coal! And so on and so forth... That is the dream of the fast breeder.

99.27 % of the naturally occurring uranium consists of the isotope uranium-238 which is non-fissile. Only 0.72 % of naturally found uranium consists of the fissile uranium- 235. Thus most of the uranium recovered after so much trouble of mining and milling is of no direct use in the production of electricity. Its only use is in making bullets and armour piercing shells which vaporise on impact and cause untold misery not only on the enemy but also one's own troops who might inhale the resultant dust. However, the breeder is an arrangement where this non-fissile uranium 238 can be converted into plutonium which is again fissile and thus can be used in producing electricity or making bombs. A proper arrangement can lead to a situation where the reactor produces (breeds) more fuel than it consumes. The fast in fast breeder refers to the speed of the neutrons which cause the fission to occur. In normal (thermal) reactors, neutrons need to be slowed down (moderated) in order for the chain reaction to proceed. The fast has nothing to do with the speed of breeding which is in fact quite slow.

Once the plutonium has been produced in a reactor it needs to be separated from the rest of the spent fuel junk in a reprocessing plant. Thus, the viability of a nuclear electricity programme based on breeders, depends not only upon the amount of breeding in the reactor but also on the efficiency of reprocessing.

From the beginning the very rationale of the Indian nuclear programme has been a successful breeder. This is because despite a lot of exploratory efforts, the country's uranium reserves are small and of very poor quality. Whereas, India has the world's largest deposits of thorium. Thorium just like uranium-238 is by itself not fissile but can be converted to fissile uranium-233 under intense bombardment by neutrons in a fast breeder. Thus for the Indian nuclear programme to be of any relevance to meet the country's electricity needs, success of fast breeders and reprocessing technology is a prerequisite.

In the early days of the nuclear dream, all nuclear establishments all over the world were of one mind regarding the course to follow. All roads led to the breeder.

However, with passage of time and wisdom having dawned through experience, many countries decided to opt out of the breeder. The reasons for this bout of revisionism were the following:

- Unlike in India uranium in other parts of the world turned out on further exploration to be far more plentiful than early fears had indicated. Thus, fears regarding shortages of supply of uranium receded further and further.
- This had adverse effect on the economics of the fast breeders since their economic viability was postulated on high uranium prices. The cost of electricity produced in fast breeders turned out to be three times more expensive than the already costly nuclear electricity. In a competitive world breeders became an idea with an ever more distant bright future.
- While small laboratory scale plants were successful in operation, scaling them up to large industrial scale units proved to be far more difficult than envisaged. The history of the Superphenix, the first of such efforts is a vivid demonstration of the old axiom of there being many a slip between the cup and the lip.

While plutonium is produced in both thermal and fast breeder reactors, its quality is vastly different. Fast breeders produce weapons grade plutonium (in fact this fact was the very source of their attraction to countries where the "peaceful" atom did not mind prancing about in a war dance). But in other countries especially those like the US which had huge quantities of weapons grade plutonium already accumulated, the easy route to such plutonium by others was viewed with suspicion and weapon proliferation concerns became paramount.

As the dream started fading, only two countries with an obsessive concern regarding security of fuel supply still stuck to it, France and Japan. The French decision after Herculean efforts to throw in the towel leaves Japan alone as a country with serious plans for future FBR construction. The Japanese breeder record is also nothing to write home about as well. The 300-MW demonstration breeder Monju was closed after a sodium fire in December 1995 and has been dormant ever since. Once the cornerstone of the Japanese nuclear program, Monju is now symbolic of a Japanese nuclear identity crisis.

That leaves the field wide open with only Russia and India still abiding by the old faith. Although Indian nuclear programme can't do without the breeder nobody in the world considers India to be a serious player since the Indian nuclear establishment has not shown any initiative to do anything truly innovative during the last almost fifty years of its existence. Also it's record in running a small 14 MW Fast Breeder Test Reactor (See adjoining article) has been anything but inspiring. There is also Kazakhstan which has a 150 MW breeder in operation since 1973, but then Kazakhstan's technological prowess are in a class even more exalted than that of India.

The position of Russia is different from all the rest. First, they have large supplies of other fuels and are not really dependent on breeder. They have demonstrated undoubted technological skills. However, their record regarding nuclear technology has been truly world shattering with names like Chernobyl and Kyshtym and Techa river etched on for ever. But luckily they have no money to pursue this or any other dream. May be their dream is that if they show enough interest and some progress, others would pay them not to pursue this dream.

Surendra Gadekar

Sources: Based on material from WISE News Communique 475

Fast Breeders Presently in Operation

COUNTRY	NAME	POWER (MW)	START-UP
India	FBTR	14	1985
Kazakhstan	BN-350	150	1973 I
Russia	Bjelojarsk 3	600	1981
France*	Phenix	250	1974
Japan*	Monju	300	1995

*** Status uncertain: not closed, not functioning**

I Fast Breeders Permanently Shutdown

started	Closed	NAME	COUNTRY	POWER (MW)
1949	1952	Clementine	USA	0,025 th
1956	1957	BR-2	RUSSIA	0,1
1954	1959	BR-5	RUSSIA	
1951	1963	EBR-1	USA	
1961	1965	Lampre	USA	1 th
1966	1972	Fermi-1	USA	66
1969	1972	sefor	USA	20 th
1962	1977	DFR	UK	
1975	1994	PFR	UK	
1967	1982	Rapsodie	FRANCE	40 th
never	1983	Clinch River	USA	280
1988	1988	PEC	ITALY	120
1977	1988	KNK ll	Germany	20/l00th
never	1991	Kalkar	Germany	**346**
1965	1995	EBR 2	USA	20
1985	1997	Superphenix	FRANCE	1240

th stands for thermal output which is usually one fourth of the electrical output

FBTR: Designedly 14 MW finally joins the qrid after 12years at 1 MW (Applause)

India V fist Fast Breeder Test Reactor (FBTR) at Kalpakkam is operating at a slightly higher output than previously, but the unit is not breeding and has juststarted producing electricity, joining the grid at a rated output of I M We.

A single spent Fuel subassembly has been removed from the first core and subjected to post-irradiation tests in hot cells, officials said. The irradiated subassembly, and two more still in the core, will be reprocessed when a pilot chemical separation line for FBTR fuel is operating, anticipated in 1999.

FBTR is designed to run at an output of 42.5 MW (thermal), and now operating at 12.5 MWt, officials said. After years of delays, the unit went critical in 1985 but, as of 1993, never operated at a power level above 1 0 M W t (N W, 13 May 93, 17). Officials said last month that the breeding ratio of FBTR is less than one, and that the reactor is not producing electricity.

According to Indian officials, the Department of Atomic Energy (DAE) and the Indira Gandhi Centre for Atomic Research in Kalpakkam, which operates FBTR, are constructing a pilot facility to reprocess some spent fuel from the reactor. Officials said they anticipated that, provided financing is forthcoming, the breeder fuel reprocessing line may be finished in 1999. The officials said the pilot plant is being built adjacent to a completed commercial spent fuel reprocessing plant for PHWR fuel at Kalpakkam, and that the two plants may share some common facilities. Equipment for the breeder fuel reprocessing line is designed and built in India, these sources said; materials and mechanical testing has revealed no apparent problems.

The design throughput of the pilot breeder fuel reprocessing line will be "very small," one official stressed, since the purpose of the project is to demonstrate the technology by reprocessing a handful of FBTR subassemblies. The DAE plans to build a larger reprocessing facility to accompany a 500-MW fast breeder which is still on the drawing board. By the time the pilot reprocessing line for FBTR is ready to operate, they said, it is anticipated that at least two more irradiated subassemblies, in the reactor's first core after 12 years of operation, will be removed.

Mark Hibbs, Nucleonics Week July 10. 1997,

SUPERPHENIX Dies A Premature But Well Deserved Death

Superphenix, the first commercial and largest Fast Breeder Reactor in the world, will be closed this year and not in 2020 as originally planned. The new Socialist Prime Minister Jospin announced the closure on June]9. Dominique Voynet, the new minister of environment, from the Green Party, confirmed the government's decision to shut it down. The government will take six months to work out the technical details of the closure and to discuss it with its foreign partners.

The sorry history of the Superphenix plant began in 1974 with the founding of NERSA, the European Nuclear Society for Fast Breeders. Partners were: the French EdF with 51%; the Italian ENEL, 33% and the SBK consortium, 16% (made up by the German RWE, the Belgian Electrabel and the Dutch SEP). Its starting capital was French Francs (FFr) 6billion. Construction of the Superphenix started in 1975. It went into operation in 1986, but was plagued by many accidents and unusual incidents and only operated an equivalent of 9 months (278 days) full-power during the whole 11 years. June 19, 1997 the day when its colsure was announced marked the 4000th day of shutdown.

In 1994, after a variety of problems which continued to plague the plant it was decided to refashion the Superphenix from a breeder into a burner of plutonium. Instead of being primarily a producer of electricity it acquired a new role as a research tool. On September 15, 1995, the foreign partners agreed to remain in NERSA and carry their share of the operating costs until December 31, 2000, in exchange for electricity deliveries from the reactor. EdF agreed to pay for the research program.

Superphenix was closed temporarily on December 24, 1996, for repair, maintenance and reconstruction and it was planned for restart in June 1997. It lost its license in February 1997 (see "Upsurge of Revisionism Regarding the French Nuclear Success in *Anumukti* Volume 10 Number 1) and would technically not be ready for restart until this fall. The former government intended to give it a new license without a new public inquiry, but the elections came in between.

Superphenix employs 700 persons besides indirectly supporting another 2500 jobs around a 30 km radius of the plant. NERSA pays FFr 127 million in salaries and contributes FFr 100 million in local taxes. Nearly 2000 people gathered to protest the plans of the new government to close the Superphenix .

There is some uncertainty on how much the shut down will cost. Some estimates put total costs of the Superphenix up till the year 2000 at FFr 60 billion (US$ 10 billion). A study by the Ministry of Economy calculates the direct costs of closure at FFr 20.4 billion: 8.9 billion for paying the debts; 3 billion for closing it; 3 billion for reprocessing the spent fuel, and 5 billion for dismantling. The early closure this year instead of 2020 will add about another FFr 6 billion. The closure will cost EdF, as operator of the plant, several billions. The foreign partners will get compensation for the guaranteed deliveries of electricity through 2000 and could ask for compensation to recover damages for the early closure. A plan for decommissioning, job conversion and a new economic plan for the region has to be worked out.

There is strong opposition to the idea of the shut down among supporters of the plant. These include the energy branch of the CGT trade union, closely linked with the Communist Party, which is a partner in the ruling coalition. They warned that "no decision on closing Superphenix" can be taken without "a true democratic debate on the country's energy policy". The CGT has always strongly supported the breeder program. But now it is more concerned with the broader issues of employment and wages in the region and will not block the closure. Besides, according to Le Monde, dismantling will double the employment at Malville for the coming five to six years.

Europeans Against Superphenix, a confederation of 250 environmental and anti-nuclear groups, asked Minister Voynet on June 6, 1997, to "put an end to the biggest failure of the French nuclear power industry." They celebrated the decision to close Superphenix as a historic victory after more than 20 years of actions. The closure of the Superphenix means that the French breeder, plutonium recycle and actinide burning programs have all to be reviewed. It has still to be seen whether the plans from the new government for a 10 year moratorium for MOX production and use and a review of the reprocessing plant at La Hague, as laid down in the French Green/Socialist agreement of this spring, will be realised. If so, the complete French nuclear back-end policy has to be revised.

Source WISE News Communique 475
Europeans against Superphenix,
9, rue Dumenge, 69004 Lvon,
France

ASKING NUCLEAR QUESTIONS

In a survey of public opinion by Gallup Pakistan, when asked "in your view should Pakistan build or not build nuclear weapons", more than 80% said yes, Pakistan should build nuclear weapons. This overwhelming support for having nuclear weapons goes hand in hand with a widespread fear. Two-thirds of those interviewed expressed fears that war with India may soon break out, and more than half thought that this war would be a nuclear war. All this comes as no real surprise. For most people these questions were asked as if they had no connections and no consequences. They answered them, on the basis on an idea, perhaps no more than a feeling, that nuclear weapons would somehow protect them.

It would be worth going to each of the 1,000 households whose opinions were sought and asking them if they knew what a nuclear weapon was. Did they know what it would do if it exploded? Did they understand the way in which it was supposed to be a defence? Had they any idea about why in the Cold War between the US and USSR both sides had tens of thousands of nuclear weapons and yet still felt unsafe?

Did this 80 per cent, and more, who want the bomb ever think about the possibility that having nuclear weapons might actually make war more likely[0]

Nuclear weapons raise the stakes in conflicts between states. This is supposed to be their job. It is the mechanism through which they create deterrence. It is the threat of escalating a conflict to a nuclear level, a level of such destructiveness that war becomes unthinkable, that is meant to stop war starting in the first place. But this solution to the question of whether to go to war or not only makes sense in a world of rational calculation, of states knowing what their interests are, and being able to judge them precisely. Real states are not rational, they have other interests than war and peace, and nuclear weapons increase the space that states have for pursuing these interests.

What nuclear weapons do in this situation can be seen from the Cuban example. To the Russians, Cuba was theirs, ideologically. The Cuban people had fought a revolutionary war against a tyrannical government, a government backed by the United States of America. The revolution had been the choice the Cubans had made.

For the Americans, Cuba was theirs by virtue of history and geography. It had been an American backyard.. World War III, a real war to end all wars, perhaps even the end of the human race, could have started because the Soviets wanted to deploy nuclear weapons in Cuba, to counter the American nuclear weapons in countries bordering the Soviet Union. If the Soviets hadn't made a fuss about the American weapons, why should the US make a fuss about Soviet weapons?

The Soviets had miscalculated. The US did make a fuss. They demanded the Soviets withdraw. Then it became a matter of Soviet and American pride. The deadly combination of nuclear weapons, ballistic missiles and a tiny island in the middle of the nowhere that both sides felt belonged to them, but was not actually vital to either of them. And it was the nuclear weapons that mattered. Without nuclear weapons, the Russians in Cuba posed no threat to the US. With nuclear weapons, the threat was taken to be mortal.

India and Pakistan both have nuclear weapons of sorts and they also have their Cuba. It is called Kashmir. The similarities may not be exact but they are significant nonetheless. The interests clash and the battle is fought out behind the shelter of the belief that there will not be a real war. The Indian state seems prepared to go to any lengths to keep Kashmir. The number of troops deployed there and the brutality that they are prepared to use are clear indicators of that. Pakistan, sheltering behind its nuclear weapons, has become determined to use Kashmir to even old scores.

It is not surprising then that most of the 80% or so of Pakistanis who want the Bomb also fear India. And so they should. The two are connected. Neither side may want to go to war but as recent events have shown things quickly get out of hand. A rocket attack led to more casualties than expected. It exploded into several days of shelling across the border but then the situation calmed. Suppose it hadn't. Suppose that the casualties had mounted, and Indian helicopters patrolling the Line of Control had been shot down. Suppose.. .It is easy to write such scenarios. How far out of hand they get can be judged from an Indian opinion poll carried out last year, thirty-three percent of the people questioned said India would be justified in using nuclear weapons if Pakistan were about to take Kashmir. These were people who had thought at least that far.

Like their Indian counterparts, the Pakistanis who expressed their opinion that the war would become nuclear, were drawn from the group that thinks their country should have nuclear weapons. These are people by and large, in the famous words of General Sherman, "who have neither fired a shot nor heard the shrieks and groans of the wounded, who cry aloud for blood, more vengeance, more desolation." For those who know about war.

Sherman said, "war is hell." Nuclear war goes so far beyond Sherman's experience of fighting in the American Civil War, that to call it hell is to understate the horror.

Perhaps the question should be asked again of the 65% of Pakistani people who fear war between India and Pakistan, and the 56% who expect it to be nuclear war, whether they still want nuclear weapons but this time after they have been shown videos of Hiroshima and Nagasaki. It would be interesting to know how many of them living in Islamabad, for example, still think Pakistan should build nuclear weapons when they are told what would happen if there were to be a single nuclear explosion over their city.

The choice of example is not without significance. Hiroshima, like Islamabad, sits at the bottom of an arc of hills and had about 300,000 people. A simple nuclear weapon, the kind that India and Pakistan have, killed 200,000 of them. To help the people of Islamabad, most of whom are involved in the business of running this country, think about this issue in strategic as well as in personal human terms, perhaps they should be asked: given that a nuclear war is more likely to be started by Pakistan (since it has a much smaller army and is likely to lose a conventional war), and given that India is likely to retaliate to a nuclear attack of its own, and given that a nuclear weapon could kill two of the every three people in Islamabad, do you think Pakistan should pursue its nuclear weapons programme?

Dr. Zia Mian

A FISSILE MATERIAL CUT-OFF TREATY

The spectre of nuclear weapons continues to haunt our world. A Fissile Material Production Cut-off Convention is on the anvil. The aim of this treaty is to prohibit production of fissile material for weapons production.

All nuclear weapons require fissionable raw material - highly enriched uranium (HEU) or plutonium. Since neither of these are found in nature, extensive processing facilities are needed in order to produce these. Thus a natural route to cap the world's nuclear arsenal is to control or stop the production of these materials for use in weapons. Control strategies, however, are complicated by the fact that enriched uranium and plutonium can also be used for non-weapons purposes, especially as fuel for nuclear reactors.

The present approach has been to allow the production and use of fissile material but to monitor (or "safeguard") its use by verifying that it is not diverted to making nuclear weapons. This strategy is applied presently only to those countries that posses and use fissile material and that have signed the Nuclear Non-proliferation Treaty (NPT) as non-weapon states.

HISTORY

A production cut-off was first proposed by USA in 1956. The USSR rejected this proposal. In 1989, President Gorbachev of the Soviet Union agreed to a cut-off in production, but the Bush administration in the USA was opposed to it. The recent interest in the cut-off arises from the situation that all the nuclear weapons powers feel that they have already accumulated enough for future needs and want to prevent threshold states like India and Pakistan from doing the same.

The UN General Assembly passed resolution 48/75 which "Calls upon all States to demonstrate their commitment to the objectives of a non-discriminatory, multilateral and internationally effectively verifiable treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices".

SCOPE

A cut-off treaty would allow states which already have stocks of unsafeguarded fissile material to maintain them outside of international safeguards, but would allow the future production of fissile material only if the material is safeguarded. While the convention will be open to all countries for signature, the states that have already signed the Nuclear Non-proliferation Treaty (NPT) as non-nuclear weapon states are already subject to all the provisions of a fissile cut-off. Thus the primary goal of the convention will be to attain the signatures of the five declared nuclear weapon states (China, France, Russia, the United Kingdom and the United States) and the three undeclared states (India, Israel and Pakistan).

A fissile cut-off would reduce the discriminatory nature of the existing non-proliferation regime by being equally applicable to both the nuclear weapon states as well as the undeclared states. The weapons states however do not want a fissile cut-off convention to include existing stocks. Thus even though the cut-off would be non-discriminatory in how it applies to different countries, its effects on the different signatories would be highly discriminatory.

IMPLICATIONS

A production cut-off would have few immediate implications for the USA and Russia. Both countries have huge stocks of fissile material and have already stopped producing further amounts. In fact, their problem has been what to do with the huge surplus.

Britain is not believed to have produced weapons grade uranium since 1963, in part because it was able to acquire HEU from the United States. It is also not believed to be producing any plutonium currently. However since its military stocks of fissile material are relatively small, a production cut-off would place reasonably strict limits on the size of its future arsenal.

France is not currently believed to be producing fissile material for weapons. However France does not make a clear distinction between civil and military materials and has reportedly used plutonium produced in power reactors to make nuclear weapons. Given the size of its stockpile, a cut-off would have little immediate impact on its nuclear-weapon program.

China is reported to have stopped producing HEU and plutonium for weapons. Because there is much uncertainty about the size of its nuclear arsenal and its past production, the size of its military stockpiles is unknown and thus the implications of a cut-off are not clear.

It is the undeclared states (India, Israel and Pakistan) for which there is much uncertainty in the implications of a cut-off. Since these are believed to have relatively small stocks, a cut-off would affect them most dramatically.

VERIFICATION

Verification is complicated by the fact that for many of the signatories of a cut-off numerous previously unsafeguarded facilities will continue to operate under a cut-off.

The core set of facilities targeted for verification would include those which produce or have, in the past, produced, HEU or plutonium for weapons. This could be widened to include operating or shut-down plutonium production reactors as well as civil nuclear facilities. The scale of a verification scheme that includes all these can be realised by noting that the United States alone has about 300 facilities which might be subjected to safeguards. An even broader system could include measures to detect clandestine fissile production.

Difficulties of verification would be compounded in countries which actually wanted to hide information from inspectors. Some of the methods suggested to overcome reluctance to disclose information are remote sensing from satellites and aircrafts, environmental sampling of air, water or soil in the vicinity of the site and independent verifications of material accounting data.

There is general agreement that the principal verifying agent of a multilateral cut-off treaty should be the International Atomic Energy Agency (IAEA) which already conducts such verification for all non-weapons signatories of the NPT. Moreover, the IAEA has significant experience applying safeguards in a variety of situations. This would mean an increase in the workload, and thus, the budget of the IAEA. It may also take time to train additional IAEA inspectors and otherwise prepare to fully implement safeguards. As a result, the convention could specify that the verification provisions be phased over a period of a few years, beginning with the core facilities.

CONCLUSION

A fissile cut-off is central to the future of nuclear arms control and provides the only way to cap nuclear arsenals. This is, of course, only the first step, since a cut-off treaty would still leave states with unsafeguarded material that can be used for weapons. However this is a necessary first step, and, in view of the dangers of stockpiling and proliferation, it is urgent.

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(This is an edited version of an article which first appeared in Peace Magazine, Toronto)

The Hawks Soar High

Indian Position on the Nuclear Issue

Prime Minister I.K.Gujral on May 31st said that India will not sign the fissile material cut-off treaty (FMCT). In a speech at the Bhabha Atomic Research Centre, he said, "Earlier we did not sign the nuclear non-proliferation Treaty (NPT) and the CTBT in spite of pressure by power blocks. Their stand on fissile material cut-off treaty will also be dealt in a similar manner

A more nuanced version of the "official position" on the fissban and on other issues is often found at forums like the Conference on Disarmament (CD) and international conferences. For example, speaking at a recent conference in Washington, Ambassador Prakash Shah said, "When we became the lead sponsors of the UN General Assembly Resolution on FMCT in 1995, we had envisioned it within the overall context of nuclear disarmament. We remain convinced that if FMCT has any value, it has to be part and parcel of a negotiated, phased programme for the elimination of nuclear weapons.

So, is that the final position?

Despite this seemingly defiant posture, there are some signs of flexibility. For example, in response to charges of inflexibility, Indian officials usually point out that the "time" in the time-bound process is negotiable. A more substantial case of flexibility is to be found in the Indian position on the inclusion of existing stocks into fissban negotiations. The nature of the Indian nuclear strategy, to the extent there is one, is based on ambiguity about the extent of their fissile material stocks. Thus, traditionally, together with the five nuclear weapon states (P-5) and Israel, India had argued against the inclusion of stocks in the proposed basic FMCT.

On the other hand, in the domestic debate, the last few years have seen what seems to be a hardening of postures and an increased legitimisation of the idea that India should "exercise" its nuclear option, or be prepared to do so at short notice.

Drifting into Deterrence

missile programmes, especially the intermediate-range Agni, is among the suggested preparations. A more recent public action along these lines has been the movement of India's short-range Prithvi missiles to Jullundhur.

Ever since the early sixties, sections of the Indian policy-making community have advocated building a nuclear arsenal. However, their influence has been relatively marginal, as evidenced by India's refusal to go overtly nuclear and not conducting any nuclear tests after 1974. The first indications of a shift in the balance were seen during the period before and after the indefinite extension of the NPT in 1995.

The arguments used by the bomb lobby have been broadly the following:

- Nuclear disarmament is just a pipe dream; India's moral position made sense in the past when India's nuclear capabilities were more limited. Nuclear weapons are here to stay and hence India should go about building its own nuclear arsenal.
- The fissban, like the CTBT, is a continuation of the hegemony of the P-5, and, as with the CTBT, India should oppose this treaty.
- The fissban does not reduce security threats to India in any way, but constrains India's responses and its nuclear option significantly.
- The verification of the fissban, unlike the CTBT, would involve intrusive safeguards at indigenously-construe ted nuclear reactors and other facilities.

It appears that with each round of negotiations in international nuclear arms control the Indian bomb lobby has become more powerful. For the hawks, the rationale for the linkage between a time-bound nuclear disarmament process and the fissban or the CTBT is two-fold. First, it buys time so that the internal debates can be fought out and some consensus for further nuclear weapons development reached. The second rationale is that this linkage is needed to gain credibility among the majority of India's urban elite who support India's official position that India should keep its options open only as long as the other states are not willing to give up their arsenals. Indeed, there is still overwhelm ing support for India being part of global nuclear disarmament. A recent poll conducted by the Kroc Institute and the Fourth Freedom Forum, found that 83% of those polled supported an international agreement for the elimination of all nuclear weapons.

In addition to the public postures of the government officials, there is another point of view that is expressed behind closed doors. While the crescendo about fissban has been building up in the Indian media, several Indian policy-makers have been quietly talking, informally, about trying to make a deal with the United States about the nuclear question. According to these people, India would be quite willing to sign the fissban - but for a price. What exactly the price is has never been stated explicitly, but most of the proposals focus around nuclear and space technology.

This reflects the view that through its actions at the CTBT negotiations, India has proved capable of playing hard ball with the great powers, and the time has now come for the West, especially the United States, to recognise that India is a trustworthy nuclear state whose regional interests need to be accommodated. It is suggested that in return for this acceptance, India is prepared to abide by some limitations on its nuclear programs - not due to arm-twisting by the P-5, but because it is a responsible player. As in the case of the P-5 who, after having developed the requisite capabilities, embraced arms control as an extension of their security policies, India, in the view of the hawks, may be beginning to see itself as "arriving," if not as having "arrived," and so may be considering arms control negotiations in this new light. However, the price the hawks would like to extract for any Indian participation in the international arms control process is a greater legitimisation of the Indian nuclear and missile prowess and bargains that would enhance the technical capabilities and domestic position of the nuclear and space departments.

In all these debates, the voices of the doves are seldom heard. One of the important reasons for their getting marginalised is the continued resistance of the P-5 to even consider a time-bound disarmament process.

Like any other state where no single group has a monopoly on national policy-making, what India will do at the fissban negotiations or elsewhere is determined by domestic politics and the influence of different groups within the country. With the hawks on the rise, in part due to the policies of the P-5, in order that there be some positive developments, there is a special responsibility for the P-5. They have to dramatically reduce the sizes of their nuclear arsenals, along with adopting other measures that de-emphasise the role of nuclear weapons, such as de-mating warheads from missiles.

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(This is an edited version of an article which first appeared in INESAP Journal)

Costs Blast Off On Underground Tests

The price of a pair of controversial underground nuclear blasts has more than doubled over original estimates, according to information supplied on June 30 by the US Department of Energy (DOE). Both tests - the first was held July 2 -are to be conducted at the Nevada Test Site near Las Vegas by the nation's nuclear weapons labs. Top-ranking DOE and lab officials have repeatedly estimated the cost of the so-called subcritical experiments at $15 million to $20 million each. The tests are designed to shock radioactive plutonium with a high-explosive detonation without producing a nuclear chain reaction. But the DOE, which funds the labs, revealed test preparations have already cost between $77-$100 million without any tests taking place.

The first blast, code-named Rebound, occurred more than a year after its original planned date. The DOE has said it delayed the tests to finish an analysis of future uses for the test site. But critics claim the DOE held off to avoid complicating negotiations underway last summer concerning a global ban on full-scale nuclear tests, the CTBT.

"The first tests are significantly more expensive than we expected, largely due to the increased time line," said DOE spokeswoman Carmen MacDougall. The DOE is asking for another $70 million for fiscal 1998, which begins October 1, 1997, but a bill approved by the House last week forbids it from spending more on the experiments until DOE Secretary Pena submits a written report detailing 1996 and 1997 expenditures. MacDougall also blamed the high start-up costs to doing something new. The cost per test is expected to come down if the labs are allowed to conduct a series of blasts, as originally planned.

Paying so much for the tests is "grotesque-, said Christopher Paine of the Natural Resources Defense Council (NRDC) in Washington. NRDC is the leading environmental group in a lawsuit filed in May 1997 that challenges the subcritical tests, among other DOE nuclear weapons programs collectively known as stockpile stewardship and management. "As a taxpayer, I'm outraged," said Livermore activist Marylia Kelley, president of Iri-Valley Citizens Against a Radioactive Environment, another plaintiff in the suit. The two subcritical tests are part of the DOE's 10-year $40-billion nuclear weapons program. Preparations are moving ahead for Lawrence Livermore Laboratory to conduct the second test this fall, before the new fiscal year begins, but no date has been set.

Actions

On the day of the first test, July 2, many actions were held. We will mention two of them. Three members of the Alliance of Atomic Veterans penetrated the DOE's security system. They went 40 miles (65 km) into the test site by mountaun bike to the Low-Yield Nuclear Experiment Research (LYNER) Facility, hid under a trailer and waited for the count-down. Shortly after they were sighted and arrested. The action proved that -deep penetration- of a vital military installation is possible. A busload of 50 members of the international press heading into the Nevada test site was blocked by activists at the entrance of the test site. Three women dove under the bus and locked themselves with chains. The chains were cut and the women were removed by force and arrested. Four people blocking the bus were also arrested. All were fined. The actions got international and local media attention.

Contact: Tri-Valley CAREs, 5720 East Ave. # I16, Livermore, CA 94550 USA.

Can Alang Be Far Behind?

There is a ship-breaking yard at Gadani in Baluchistan. Its counterpart in India is Alang near Bhavnagar on the coast of Gujarat. The folio wing report regarding the shocking goings-on at Gadani is a reminder to activists to investigate Alang as well

The Baluchistan High Court set up a seven member expert com mittee June 4 to investigate charges that radioactive waste and other hazardous materials were being dumped near the coast of Gadani where a ship salvage industry is flourishing. Press reports say old ships brought to Gadani for scrap carry hazardous material, which is dumped in Pakistan's territorial waters before the ship is taken ashore for salvage. A citizen petitioned the court to probe press reports that an ageing Japan registered ship bought by a Pakistani salvage firm had dumped 150 drums of radwaste last month. Pakistan has a 750 kilometre coastline and multinational companies have explored using some marshy wastelands for storage of hazardous waste. There have been frequent reports of the salvage industry dumping hazardous materials near Gadani, known as a ship "graveyard."

Nucleonics Week June 19, 1997

Stop Atomic Insanity

Solution Number 23 To The Nuclear Waste Problem

Land Is Sprayed With Radioactive Fertiliser

Auranium-processing plant is disposing of low-level radioactive waste by spraying it on 9,000 acres of company-owned grazing land. Three and a half years after the shutdown of the Sequoyah Fuels Uranium Processing facility, workers are still sprinkling its waste, diluted by rain, from a holding pond at the rate of 10 million gallons a year.

The 'fertiliser' is called Raffinate and is registered with the Oklahoma Department of Agriculture. State and federal officials approved the fertiliser plan in 1986. Raffinate, the main waste from a solvent used to extract uranium for nuclear-plant fuel, is slightly radioactive and contains 18 heavy metals. "We were screaming our heads off when all this was happening," says Kathy Carter-White, an attorney representing residents of the area. "But it was just like the powers-that-be were going forward. We just felt violated by what happened because the land will never recover."

John Ellis, Sequoyah Fuels president, said the company is piping the material to 75 acres of Bermuda grass where as many as 400 cattle graze. Some people blame the fertiliser for such mutations as a nine-legged frog and a two-nosed cow. They also say it could be a factor in some of the 124 cases of cancer and birth defects counted in families living near the plant. There's no proof, though. "It's hard to separate out what damage came from the chimneys at Sequoyah Fuels and what was from the pallets on the ground and the groundwater and the land disposal," said Carter-White. "But the frog was found by a little boy at a country pond that was real close to where this surface application was taking place. The boy shot it and turned it over, and found it had legs sticking out all over its sternum." The big question is of course what happens with the beef of the cattle, or with the hay of the land. Already in 1987 Native Americans for a Clean Environment (NACE) claimed that hay was sold to American Indians. One shipment of hay was accepted (unaware of the possible dangers) by the Navajo Tribal Council.

Sources: Seattle Times, 4 July 1997 / NACE News, May 1987 WISE News Communique 476

Contact: Nuclear Information and Resource Service, 1424 16th Street NW. Suite 404, Washington DC 20036, US.
E-mail: nirsnet@igc.apc.org;
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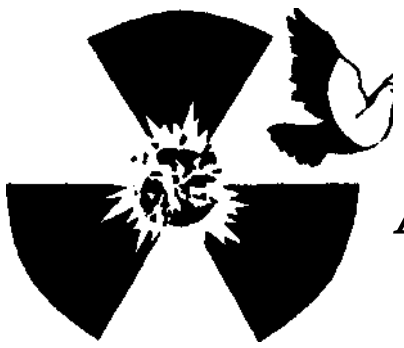

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