ANUMUKTI

A JOURNAL DEVOTED TO NON-NUCLEAR INDIA

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"What happens in the Pacific *is* usually
told from the oppressor's point of view,
because we don't have access; to write our
stories., we don't have access to
resources to travel, we're, not recognised
as a people that should be talking about
what really happens to us."

Titewhai Harawira

Talking about human rights is 'in'; especially for governments. Taking concrete steps to protect the rights of the weak and the dispossessed is not so in especially if there is clash with perceived military interests.

This year we celebrate the two hundredth anniversary of the French Revolution. That revolt of the poor and the downtrodden which established human rights as an. article of state policy. A revolt which forced all governments ever since to derive their legitimacy not from divine- dispensation, but rather from the 'will' of the people. An inspiration to all who desire a more just and equitable world order.

The month of July also marks another, little noticed, anniversary; on July 2nd 1966 France exploded its first nuclear bomb in the Pacific. Despite worldwide condemnation the French government has continued exploding its bombs ever since. The latest of these tests, the third this year, was held on June 11th. Till today 145 nuclear explosions have already taken place on Moruroa and Fangataufa atolls. (41 in the atmosphere and 104 underground). Moruroa atoll is known to be sinking. Strong evidence links an increase in fish poisoning to French testing. Cancer statistics are marked "classified information" and are withheld by France.

Governments have come and governments have gone; the nuclear nightmare of the Pacific rolls on. For the past eight years, France has had a 'socialist' president. A person who was once himself a victim of Nazi persecution. One would expect that at least this administration would be more respectful of human rights ot others. But no, nuclear ambitions - ambitions which are ridiculous in the final analysis - reign supreme.

. In an earlier issue (Anumukti Vol.2 No.1) we have commented on the nuclear imperialism practised by the Americans in the Pacific. Their barbaric actions have brought disease, disability, dislocation and a loss of dignity and culture to a simple, peaceloving people.

The Pacific islands occupy a very special place in the collective conciousness of mankind. Their bountiful yet simple lifestyle has been a source of attraction and inspiration to many. Paintings of Paul Gauguin depict a world close to paradise. It is an obscenity that this paradise has been turned into a living hell by the inheritors of the French and American revolutions.

Celebrations of the revolt of the poor by the rich are a mockery of the revolution. It is only when all the exploited and oppressed peoples of the world, in Pacific and elsewhere, can live a life of dignity and self-respect that the French" Revolution would be truly celebrated.

Nobel Prize Nomination

Anumukti endorses the nomination of Belauan activist groups Ketal Reng and Otie A Beland for the Nobel Peace Prize 1989.

The determination and steadfast resolve of the people of Belau to retain the antinuclear provisions of the constitution of their island reprblic in face of massive US pressure, has been a shining example for all the people of the world. (See Anumukti Vo1.2 No.1 for a detailed report) Indigenous people can take special pride in this struggle of right against might. Indigenous people everywhere as also the Adivasis of India have been special targets of policies which promote location of dangerous industries in the name of development.

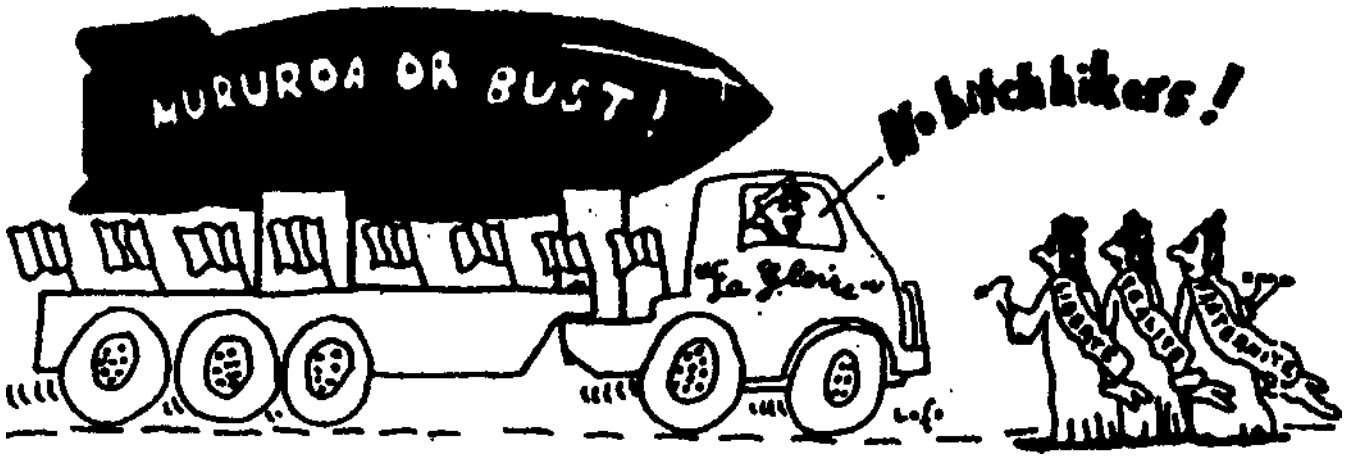
Nuclear Testing Kills in Surprising Ways

"Cignatera" is the name of a disease once rare in the Pacific. It results from the eating of a certain species of fish which inhabits coral reef waters Common symptoms of the disease are vomiting, diarrhoea, disturbances in balance and coordination and in severe cases death due to respiratory failure.

While the exact mechanism and the ecological pathways are still a matter of debate and further research, the culprit seems to be a certain species of plankton which is the fish's food. Nevertheless what is beyond dispute is the fact that wherever the reef ecology has been disturbed by nuclear detonations and military operations, -this form of food poisoning has increased rapidly.

Between 1960 and 1984, the annual incidence of Cignatera poisoning rose tenfold in French Polynesia, peaking in the early 1970's at 12 per 100 inhabitants. On Hao atoll in the Tuamoto Islands, Cignatera was unknown before 1965 The (disease first occured one year after the French used the island as a base for their tests at Moruroa and Fangataufa. By mid-1968, it had affected 43% of the islands 650 inhabitants.

Source: WISE News Communique:309



"For The Good Of Mankind"

Gigantho stone statues with long ears and expressionist faces stare solemnly at visitors to Rapa Nui, known to the world as Easter Island because a European ship "discovered" it on an Easter Sunday. The island is perhaps one of the lone.'liest places on the globe. It has attraoted scholars due to its strange archaeology. Today, Rapa Nui is one of the emergency landing sites of the US space shuttle programme.-

Elusive Peace

The Pacific: covers nearly one third of the eart;h's: surface. Its waves play on the shores of some of the most economicaljy and militarily powerful nations. Heavy battles were fought here during World War II. Ever since, despite its name, the Pacific region has never returned to a peaceful state.

The Polynesian queen of Hawaii was overthrown by the U.S.A. in 1893. It is today the 50th state of the U.S. with 110 military installations, control facilities for conducting nuclear wars and nuclear arms bases. Micronesia, after experiencing frequent change of colonial 'masters' was finally given to the U.S.A. as a strategic trust territory by the United Nations Security Council. The trusteeship agreement required the US government to " promote the development of the inhabitants towards self government and independence against the loss of their land and resources". However, a year before this agreement the U.S. had already detonated nuclear bombs on the Bikini atoll in the Marshall Islands. The people of Bikini were told, " We are testing these bombs for the good: of mankind, and to end all wars". They agreed to being moved away from their island " for a short time" and were consequently relocated on an uninhabited island. When the U.S. navy remembered them a year later, they found them starving on the infertile island. So, they were relocated another time. Today U.S.A. is in the process of releasing Micronesia into something less than complete independence. It want; to keep the right to use the islands for its own purposes but at the same time does not want to grant the- islanders U.S. citizenship. Only Belau, perhaps the most important pawn on the American strategic chessboard, poses an obstacle. Its people have time and again rejected Washington's blandishments and have.reaffirmed their support for the anti-nuclear provisions of the constitution. (See Anumukti Vol.2 No.l August '88)

"Three years later the people of Kongelap were allowed to return to their island despite 'lingering.' radioactivity. Included in these returning to Rongelap were-200 people who had been away from the atoll during the "Bravo" and subsequent tests, an ideal 'control' population for the study of the long term effects of the lingering radiation on the islands". The controls' began showing signs of radiation induced diseases years later, after living on their radioactive islands and eating the radioactive food and water. The people who returned to Utirik, ".50 miles further away, began developing thyroid dislase and cancers equal to the rates of the more heavily exposed Rongelap people twenty years later, giving evidence of the effects of even low-level radiation on human health. The 'guinea pigs' were indeed doing their jobs."

The Nuclear Fix

Islands of Love

The southern part of the Pacific is French Polynesia; an area comprising of about 400 inhabited islands suffering the consequences of the nuclear ambition; of another Western "power". Known in Europe as. "Islands of Love", Polynesia have inspired dreams amongst many among them

Paul Gauguin, Herman Melville and Thor
Reyerdahl.

This dream world was shattered in 1968, by the French decision to start nuclear testing on Moruroa and Fangataufa Atolls. The ruthlessness and the priorities of the French were demonstrated in the very first year itself. A test which was to be conducted in the august presence of President De Gaulle was not cancelled despite winds blowing towards populated areas. After all the French President was a busy man and could not be expected to change his busy schedule just because of an adverse wind!

France despite the Test-Ban-Treaty of 1963 continued atmospheric testing in the Pacific until 1975. These included a long series of unsuccessful attempts to discover the -nechanism by which hydrogen bombs are triggered off. After 1375 Moruroa has been subjeced to an unfinished series of underground blasts. These have damaged the geological structure of the island beyond repair. There are rumours that France is now looking for another site to continue its bomb testing programme. A site often mentioned its Kerguelen Islands in the Indian Ocean.

Powerful Links

France is the country with the most 'successful' nuclear programme. About 70% of its electricity, more than that of any other nation, is produced in nuclear power plants. However, in terms, of profits, the programme has beer, a dismal failure. The state run electri city "board" Electricite' du France- has a debt rivalling that of big Latin American debtor nations. The programme for increased nuclear power generation proceeds i*n* spite of all this. The strong links between the "peaceful" and the military uses of the atom are the 'motivating factor. Hiding this connection far away in the French colonial 'possess-ions on the other side of the globe is so effective that even the peace movement, in France does not show much.concern for the happenings- in Polynesia.

Other countries too, have used the Pacific for their war games. Britain conducted six atmospheric tests on Christmas Island in 1357 and 1958. At that time many people from Kiribati, today an independent republic, were present on the island to work on copra. As the British have refused to trace the people who were exposed to radiation, the government of Kiribati is now doing its own health surveys with very limited resources. Other British tests were conducted on aboriginal land in Australia, mostly in a sloppy manner.

Soviet military presence is limited to the northern Pacific, close to its own coast. However, the Pacific has been used for missile testing by both USSR as well as China.

"And I have had seven miscarriages and stillbirths. Altogether there are eight other women on the island who have given birth to babies that look like blobs of jelly. Some of these things we carry for eight months, nine months. There are no legs, no arms, no head, no nothing. Other children are born who will, never recognise their own parents. They dust lie there with crooked arms and legs and never speak. Already we have had seven such children. Sometimes I feel that I have a baby inside me. I feel very happy that. I will have a baby, but then I an afraid what kind of baby it is going to be. I live in two separate kinds of worlds: one. part of me I want to have a baby, but this other part of me is scared to have a baby.

We have asked ourselves a question. Why, why has this happened? Every year the US Depertment of Energy doctors would come to Rongelap to examine people. They would tell us that everything was OK - that we didn't have anything to worry about. We told them that we didn't feel any betterand that our bodies felt weak all the time. We believe that the sickness is caused by the radiation from the Bravo test."

Lijon Eknilang

Living Laboratories

During the last forty years, the right to life and physical welfare of the people of the Pacific has been frequently abused. They have wilfully been experimented upon. The fate of the victims of the "Bravo" explosion of 1954 on Rongelap, Utirir and nine other **islands** is the best known amongst the **examples** of such "experiments'. (See **Anumukti** Vol.2 No.l or better still see. the film "Half-Life")

Though they lived 300 kms. from the test site, they began to feel the effects of the contamination on the very day of the blast. They were evacuated days later to Kwajelein navy base where soon they lost their hair, their finger-nails ----- ' Three years later they were told to return to their contaminated home. A spokesman of the Brookhaven National Laboratory said, "... the levels of activity are higher than those **found** in other inhabited locations. The habitation of these people on the **island** will offer most valuable ecological radiation data on human **beings."** Hers, the world of SCIENCE had a laboratory the like of which Hitler's concentration camp doctors could only **dream of,** Mueh of what we know about the effects of radiation on human health has been the result of research done on unsuspecting Pacific islanders. Darlene Keja-Johnson from Ebeye Island testifies: "They check their throat for thyroids. They also check their urine and their blood. If a person is found to have a cancerous thyroid that needs to be removed, they are sent to either US or Hawaii or Guam. They don't explain to you what they are going to do to your throat. They just say that you are to go...only the Department of Energy! people. go and meet them, but they don't speak Marshallese. They are told not to make any phone calls to any relatives or friends. They are told to speak only to Department of Energy people."

"Now Japan is deciding to dump their nuclear waste into the Marianas Trench. That has marie our islands so united that we are now much stronger. While some of us are still using kerosene lamps and candles, still fetching water from the well, in the US and Japan they have all the benefits of nuclear power. After all the nuclear bombs, now they are coming back with their nuclear waste.

Our only resources are the land and the ocean. We come to the ocean to relax. Our spirituality is the water, nature, the land, the stones. That's what keeps us alive today. We are a very simple people. Taking care of our families and our lands. Helping the poor. Helping the old people. We have no nursing homes for the aged - they are our books. They are our encyclopaedia. In our culture we have no written books. It is the old people who tell us our story, our tradition, from one generation to the next. They will be the ones teaching us to make rope, how to weave baskets. So, they are very important in our lives.

We are the people of the land and the ocean and we are struggling for survival. The ocean is our spirit. We come back, we sit down, we cry, we pray, we are still praying. Because our water is killing us, slowly."

Chailang Palacios

Growing Opposition

The success of the protest against French atmospheric testing in the seventies, has encouraged the people of the Pacific to continue their struggle against nuclear imperialism. The success was brought about by the cooperation of both non-governmental organisations like Greenpeace and the governments of countries like New Zealand, Peru and Fiji.The struggle promises to be both long and arduous. France meanwhile has, after switching to underground testing, taken to prosecuting the opposition in Polynesia and abroad. The criminal attack on the Greenpeace ship "Rainbow Warrior" in Aukland harbour in 1985 is just an example of this.

The independent nations of the Pacific, are trying to come to a unified position on nuclear testing and military

presence in the Pacific. U.S.A. has been engaged in trying to obstruct these efforts by exerting economic and military pressure. The Pentagon was "kinda delighted" that the coup made it again possible for U.S. nuclear ships to visit Fiji.

Ho **Compensation**

Nuclear blasts have made many an island uninhabitable for lakhs of years. The debris of the tests has either been thrown into lagoons or has been sealed into concrete domes. The first course recycles the waste into the food chain while the latter course just preserves the danger for future generations.

"Since 1971 only four Western nations have used the sea for radioactive disposal. The trend is away from this dangerous practice in light of scientific evidence. When we went to Japan, scientists spoke to us saying that one drum of nuclear waste dropped in the ocean can kill 215,000 to 30,000 people. We are only 13,000 people. We are aware of the fact that Japan has relied on current international law and the London Dumping Convention (LDC), in which we have no say, to defend its plan to dump nuclear waste. To us the LDC is a mistaken idea. Island governments are given no protection and no participation in this convention."

Maria Pangelinan

In 1977, the inhabitants of Rongelap and Utirik were offered a total sum of one million dollars as compensation. Compare this princely sum with the $13 nillion paid to the 24 crew members of a Japanese fishing vessel inadvertently caught in the danger zone of the same test. People of Bhopal would not be surprised by these American double standards!

The French government, as per previous contract, will not be liable to pay **any** compensation or reparations for the damage caused, when it eventually returns Moruroa and Fangataufa to 'the people of Polynesia

Nuclear Waste Bin

As if feeling that this nightmare should never end, several industrialised nations with Japan and U.S.A. in the frontline, plan to use the Pacific as a dump for the waste from their nuclear power plants.

In 1985 the London Dumping Convention, a UN body which sets voluntary guidelines for dumping toxic substances at sea, discussed the dumping of nuclear waste. Spain proposed an indefinite moratorium on nuclear dumping at sea. Activists of the Northern Marianas Committee Against Nuclear Waste Dumping had collected the signatures of nearly 100% of the population against nuclear dumping. Being a colony, they were officially represented by the greatest democracy USA, which opposed the Spanish proposal.

Recently, the issue has cropped up again with a new urgency. Yucca Mountain Nevada has been designated as the site for a high level waste repository. There is local opposition to choice of this site. In case tests prove the site to be unsuitable there is a good chance that Marshall Islands would be . selected instead. Some local politicians have already offered it for a little money in exchange.

Disposing nuclear waste in the Pacific has seemed more and more attractive as protests against disposal of wastes from nuclear power plants grow in the industrialised world. Ecological awareness in the West has thus unknowingly contributed towards a new, aspect of nuclear imperialism in the Pacific.

Source*:

* Thijs de la Court, et.al. The Nuclear. Fix :WISE (1982)
* Frances Connelly, et.al. Pacific **Paradise - Nuclear Nightmare :CND (1987)**
* Women Working for a Nuclear Free and Independent Pacific, Pacific Women Speak Green Line (1987)
* Union Pacifiste Nos.250 & 253 (1989)
* **WISE News Communique No.310 (1989)**
* Indian Express 12.6.1989.

Deadly Companions

Nuclear Race In South Asia

As a result of recent West German Investigations into a series of illegal exports of sensitive nuclear technology, evidence is mounting that Doth India and Pakistan have even mor e extensive nuclear weapons research, development, and production programs than previously thought.

Since the leaders of both the countries appear unwilling or unable to constrain their nuclear weapons programmes, these countries remain in a nuclear standoff. A military crisis might compel them to deploy nuclear arsenals, and risk a nuclear confrontation in South Asia. And if either country tests a nuclear explosive, thy other will undoubtedly follow, unleashing a race for more sophisticated nuclear weapons, including thermonuclear weapons.

Pakistan

Pakistan ranks third, after Israel and Egypt, in the receipt of U.S. foreign aid. In November 1988, as a prerequisite for congressional approval of $231 million of military aid and $350 million of economic aid, President Reagan certified that Pakistan does not possess a nuclear explosive device. The standard, according to the Reagan administration, is, "whether Pakistan possesses a nuclear explosive device, not whether Pakistan is attempting to develop or has developed various relevant capacities." But with his certification, the president attached a letter to the Speaker of the House, indicating that the certification was far from easy. And Pakistan's current status may make it impossible for George Bush to make the same certification in 1989. .

Despite an earlier promise to the Reagan administration not to enrich uranium abovo 5 percent,., Pakistan is **Widely** believed to have been producing weapon'-grade uranium enriched over 90 **percent)** at its enrichment plant in Kahuta since 1986. Pakistan' s current -annual product ion rate of weapon-gracle uranium is. ' estimated to be .20-75 kilograms of weapon-grade uranium a year. At this: rate, Pakistan- will have produced 125-175 kilograms of weapon-grade uranium through 1988 atnd about 175-325 kilograms by the end of 1993. Pakistan's weapon program can build nuclear weapons requiring less - perhaps significantly less - than 20 kilograms of weapon-grade uranium each. Although the actual amount required depends on the skill and knowledge of the designers, at 20 kilograms per weapon Pakistan would have accumulated enough material to build six to eight nuclear bombs by the end of 1383 . Through 1990, Pakistan could have enough for 8-16 weapons.

Unrestricted Plutonium

For several years, reports have circulated that Pakistan is interested in building a reactor that would produce unrestricted plutonium. West German government sources recently revealed that during the mid-1980s Pakistan tried to acquire reactor components and technology from West German firms. According to a March 6, 1983, report in **Nuclear Fuel,** U.S. officials told the West German foreign ministry in 1986 or 1907 that "it is well known that Pakistan is developing an indigenous, unsafeguarded reactor," and advised German export officials to stop a German firm from supplying Pakistan with boron carbide, a neutron-absorbing material used in reactors.

Nuclear Fuel also reported that confessions of key suspects in the German investigation of illegal exports of nuclear 'technology and components to Pakistan by the West German firm NTG Nukleartechnik GmbH indicate that this firm supplied Pakistan with "know-how for desing and construction" of a "small pool-type" reactor.

Any plutonium produced in an unsafeguarded reactor could be extracted from the irradiated fuel in Pakistan' s small, unsafeguarded reprocessing facility, New Labs, near Islamabad; This

facility is reportedly capable of separating 10-20 kilograms of plutonium a year, but it is not known if the plant is operational or whether this annual capacity can be achieved.

Help from Chin

While Pakistan was developing the ability to produce the explosive materials, it was also learning how to design nuclear weapons. In 1984, Reagan administration officials asserted that Pakistan got design assistance from the People's Republic of China, although descriptions of the nature of this assistance *vary* greatly - from information about a crude nuclear device to a copy of the detailed design proven at China's fourth nuclear weapons test. According to Leonard Spector, the test involved the detonation of a warhead carried by a. missile, so if Pakistan received a copy of that design it has a warhead much smaller than a typical Chinese aerial bomb and able to operate under much more exacting conditions.

Whatever the nature of China's help, on its own Pakistan has tested the non-nuclear high-explosive triggering or implosion paclage for a nuclear weapon, according to Spector. Teste using a dummy core of natural or depleted uranium provide critical information about the imp Losion system. Pakistani scientists could evaluate the performance **0f** their design by using flash X-ray machines, which/take split-second photos of the warhead core during a test, or by using "pin-sensors" - electrical conducting pins placed within the core which measure the arrival times of the high-explosive shock wave. Because a spherically symmetrical explosion is required to compress the uranium in the core to supercritical mass, an accurate prediction of how the shock wave acts on the core would improve Pakistan's confidence that its design would perform as expected.

In an apparent attempt to build smaller nuclear weapons or to extend its existing stockpile of nuclear explosive materials, Pakistan has tried several times to import beryllium from West-Germany, and in a few cases succeeded. In 1987 Pakistan also tried unsuccessfully to obtain berylliam illegally from the United States.

* Both India and Pakistan have imported beryllium - a material useful in designing smaller, lighter, and more sophisticated nuclear weapons. India is also producing beryllium in its own facilities.

Beryllium is useful in the design of smaller, lighter, and more sophisticated nuclear weapons. The minimum amount of Plutonium or highly enriched uranium required to sustain a chain reaction, or "critical mass," can be reduced oy surrounding the core with a neutron, reflector, and beryllium is a particularly effective reflector.

Although a test might yield the political benefits of recognition as a nuclear power, Pakistan may be confident enough in its fission bomb design to feel that a full-scale nuclear test is not required. The design could be tested by conducting "aero-yield" tests, in which conventional explosives compress a small core of nuclear material, to produce a nuclear yield large enough to be monitored but still smaller than the blast from conventional explosives. If done carefully, zero-yield tests are virtually impossible to detect.

Tritium-booster

On January 29, 1989, the N**ew York Times** published the puzzling revelation that Pakistan had acquired a tritium purifying plant from West Germany to separate up to a few hundred grams of tritium "a year from other elements. According to **Nuclear Fuel's** reporter Mark Hibbs, the plant was shipped and assembled in stages between 1985 and 1987. About 0.8 gram of tritium was also sent along to test the plant's purification ability. Hibbs reported that the plant is located in a heavily guarded bunker at a military site about 150 kilometers south of Rawalpindi.

A few grams of. tritium, when mixed with roughly equal amounts of deuterium (readily available in such small quantities), placed inside a warhead can

"boost" the yield of the fission explosion several fold, allowing significant reductions in the size and Wight of a r.uclear weapon. (Initial loadings of taitium are not needed in thermonuclear weapons, because deuterium, in the form of lithium deuteride, can be used instead.)

* Pakistan has acquired sophisticated tritium processing equipment from West Germany, and India is building a plant that will be able to produce large amounts of tritium.

Since Pakistan is not known to have a large supply of impure tritium gas, the purification plant might have been intended as part of a complex of facilities dedicated to the production, extraction, and purification of tritium. Hibbs reported in February that Pakistan does not appear to have acquired the processing equipment necessary to separate tritium from the deuterium used as a coolant and moderator in its CANDU power reactor. According to him, it is possible that Pakistan might intend to produce tritium in an unsafeguarded reactor by irradiating lithium-6 targets. U.S. government officials say that Pakistan has tried to acquire lithium-6 and lithium production technology, although the outcome of its efforts is unknown.

Hibbs says that Pakistan intended to test its lithium target technology in the U.S.-supplied five-megawatt-thermal research reactor located in Rawalpindi by placing lithium rods inside neutron-absorbing control rods, which are inserted into the reactor to keep the nuclear reaction from going out of control. Although this reactor is inspected by the International Atomic Energy Agency, these inspections primarily monitor the highly enriched uranium fuel and are not designed to detect secret tritium production.

But even if it succeeds in obtaining tritium, Pakistan may not be able to develop tritium-boosted or thermonuclear weapons at the present time. _ Pakistan's acquisition of a tritium 'separation plant is difficult to understand, since its weapons program .is not thought to be sophisticated enough .o use this material now. Perhaps Pakistan is simply trying to mirror India's perceived capabilities, on-lead the world to worst-case speculation and the-impress ion that its weapon capabilities are more extensive than they are. "Bombs; seem bigger if they are ambiguous," says Theodore Taylor, who played a major role in developing boosted fission weapons. Alternatively, Pakistan might bo lookiig toward the future, and the tritium plant would be smother- indication that Islamabad is trying to improve its nuclear weapons capability in order to be ready to test more sophisticated devices, if it decides to start testing.

In Taylor's view, unless Pakistan has been given or was successful in. stealing a praven design, it is doubtful that Islamabad could develop reliable thermonuclear weapons or boosted fission weapons without conducting full- scale nuclear tests.

Delivering the Bombs

Pakistan has several aircraft capable of delivering nuclear weapons to Largest in India. Its most sophisticated aircraft are its 37 U.S.-supplied F-16 attack aircraft (It has been recently granted 60 more) and about 50 French-supplied Mirage-5 attack aircraft.

* Pakistan is reported to have Perfected the design of nuclear aerial bomb for its U.S.-supplied F-16 attack aircraft, and India has apparently been working on the design of a nuclear aerial bomb since 1984.

In January 1989, there were reports that Pakistan now has an aerial fission bomb that can be carried beneath its U.S. -supplied F'-16 attack aircraft. This report also stated that the detonation mechnism has been perfected and the bomb casing is suitable for high-speed flight. Progress has been made on developing an in-flight fusing mechanism, to prevent detonation until after release from the aircraft. Pakistan has also reportedly shifted from- "rapid-detonation. high explosive to high-meIting-point explosive

technology, which is widely used in U.S. nuclear weapons. This permits a reduction in the size of the warhead.

Pakistani army chief Gen.Mirza Beg announced in early February that Pakistan had successfully test-fired two short-range surface-to-surface missiles with ranges of 48 and 180 miles and with pay loads of about 500 kilograms each - large enough for a nuclear warhead. These missiles could be operational by the early l990s.

India

No one disputes India's ability to build Pissicr: bombs. It detonated a 12-kiloton "peaceful" nuclear explosive in the Rajasthan desert in 1974. Although some reports have stated that India has aetually built nuclear weapons, the Indian government consistently denies these reports and maintains that its official policy is not to build nuclear weapon..

Within a Few Weeks

In 1985 Prime Minister Rajiv Gandhi said repeatedly that India could acquire nuclear weapons at any time. In a **Le Monde** interview in June 1985 He said that India could become a nuclear power

* India probably decided several years ago to acquire the know-how to make a thernonuclear weapon (hydrogen bomb) as a hedge against Pakistan's growing atomic ability, and to be prepared to test such a device within a few months of a Pakistani nuclear test.

within a few weeks or months.

* India probably decided several years ago so acquire the know-how to make a thernonuelear weapon (hydrogen bomb) as a hedge against Pakistan's! growing atomic ability, and to be prepared to test such a device within a few months of a Pakistani nuclear test.

On August 8, 1985, India achieved the ability to produce unrestricted weapon-grade ' plutonium when it commissioned the unsafeguarded 100-megawatt Dhruva reactor at the Bhabha Atomic Research Centre (BARC), a large establishment employing about 14,000 people. India has also operated the 40-raegawatt Canadian-supplied Cirus reactor since the early 1960s, another reactor not subject to international safeguards, The plutonium from the Cirus reactor is. restricted to peaceful uses, which India

claims include "peaceful".nuclear tests;

The Dhruva reactor operated sporadically for three years, finally reaching full power in early 1988. According to India's Department of Atomic Energy's annual report for 1987-88, the Trombay reprocessing facility at BARC has been reprocessing Dhurva's spent fuel. When operating at full power, this reactor produces about 25 kilograms of weapon-grade plutonium a year, or enough for at least five nuclear weapons.

Comparable to China's Arsenal

In late 1985 or early 1986, India's reprocessing facility began separating plutonium from fuel irradiated in the unsafeguarded and unrestricted Mairas Atomic Power Project. The amount of Madras fuel reprocessed and the grade of the plutonium extracted is unknown, although Spector reported that India had recovered enough plutonium from Madras fuel for one to four nuclear fission weapons by the summer of 1986. Since then, the reprocessing facility has apparently continued to reprocess; spent fuel from the Madras reactors.

In all, by the end of 1988, India was estimated to have about 200 -250 kilograms of unsafeguarded plutoniur - enough for at least 40-50 nuclear weapons. During the next few years, this stockpile could increase at the rate of roughly 75 kilograms of weapon-grade plutonium, or enough for more than 15 new weapons, each year. If unchecked, India could create a stockpile of nuclear weapons by 1995 that would be comparable in number to China's nuclear weapons arsenal.

There is little reason to .doubt India's ability to design nuclear warheads small enough to be carried on aircraft and possibly on the missiles it is now developing. These efforts may have been helped by the import of almost .100 kilograms of beryllium from West Germany: in 1984 •• a supply large enough for dozens of nuclear weapons. At about the same time, India commissioned Its Beryllium Pilot Plant at New Bombay, which has produced…at. least kilogram quantities of beryllium.

India produces tritium for a wide

range of civilian applications, including light sources. India's current source of tritium, however, is not explained in the annual reports, although it probably comes from irradiating lithium in the Dhruva or Cirus reactors. India is also setting up a chemical exchange cum cryogenic distillation pilot plant at BARC to remove tritium from contaminated deuterium used in its research and power reactors.

Thermonuolear Weapon

A May 1935 West German intelligence document cited an unconfirmed report that the "leadership of the Bhabha Atomic Research Centre had been given the assignment by the Indian Defense Department, after consultation with the Prim© Minister, to continue working on the development of a thermonuclear weapon." Preparations were to be made so that "within two months of a Pakistani nuclear test, the second Indian test could be carried.out. Such an Indian test should simultaneously be used for the development of a fusion explosion." There is also indirect evidence of India's thermonuclear weapons programme. BARC has an extensive fusion energy research programme which could be of great help in designing thermonuclear weapons. In the mid-1980s, India's Department of Atomic Energy announced that it would develop an inertial confinement fusion process, using high-power lasers to implode tiny amounts of deuterium and tritium. According to the 1987-1988 annual report, one part of the lasers is nearing completion. Once finished, this laboratory-scale facility would provide India with a way to study high-energy density physics associated with a thermonuclear explosion, improve elaborate weapons design computer codes, and develop sophisticated diagnostic techniques and instrumentation.

Indian scientists have also sampled fallout from atmospheric nuclear weapons tests, a technique that may have provided India with useful data about both thermonuclear and sophisticated fission weapon designs. In 1980 Indian scientists sampled radioactive fallout from the twenty-fifth Chinese thermonuclear explosion "to obtain information on the test as well as on the levels of fallout at countrywide monitoring stations."

Missile Delivery

India has several aircraft capable of delivering nuclear weapons against both Pakistan and China. India's most sophisticated aircraft are Anglo-French Jaguars, Soviet MiG-23s and MiG-27s, and French Mirage 2000s. On October 3, 1968, **Defense and Foreign Affairs Weekly** reported that since 1984 India has been perfecting a. nuclear aerial bomb and techniques for its delivery on MiG23 and

-27 aircraft.

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Although there is no public evidence that India has developed a nuclear warhead for missile delivery, India is developing ballistic missiles that are capable of carrying such payloads.

Choice

Pakistan and India can choose to aggravate or to prevent a weapons competition. Unless they constrain their nuclear weapons research and development programs, these programs could create institutional momentum within each country to build and test nuclear weapons. And if either country tests or deploys , the other is sure to follow, with dangerous consequences for the

security of South Asia and the rest of the world.

A test or deployment of nuclear weapons could also cripple current efforts to stop other developing countries such as Argentina and Brazil from going 'nuclear' and perhaps even undermine the viability of the Non-Proliferation Treaty. Several nations may find it politically difficult to be considered inferior to Pakistan in nuclear matters.

* A ban on nuclear tests and a

verifiable nalt in the production of unsafeguarded plutonium and highly enriched uranium would not prohibit either country from possessing nuclear weapons but would significantly limit the size and sophistication of their nuclear arsenals. India's recent decision to join other signatories of the Partial Test Ban Treaty in calling for a conference to expand the treaty is a hopeful first step in the direction of obtaining a universal test ban.

But the main goal in the region should remain verifiable commitments not to build nuclear weapons.

Courtsey: David Albright & Tom Zamora Bulletin of Atomic Scientists, June '09.

Tritium: Bad For Mice And Men

In December 1988, Canadian media reported what appeared to be the first identifiable health effects in citizens due to the release of radioactive material from the CANDU nuclear generating ■station at Pickering, Ontario. The news reports were based on a study performed by the Oshawa based citizens' group Durham Nuclear Awareness (DNA), which utilised published tritium release data an*d* mortality data. Like a number of health studies before it, health effects in citizens ' linked to industrial waste were first identified not by the medical community, industry or government health departments, but by concerned citizens.

At. Pickering it was the radioactive by-product tritium which was linked to increased newborn infant fatalities and certain types of birth defects. What is alarming is that it is routine and unavoidable emissions of "acceptable" levels of tritium which seems to have caused the health effects, and this suggests that, people living near CANDU plants throughout the world are at risk. All CANDU stations create and release enormous quantities of a highly toxic water form of tritium known as "tritiated water". Tritium is created when the large inventory of heavy water within the CANDU reactor captures neutrons. Tritiated water is chemically indistinguishable from water since tritium is an isotope of hydrogen. It is impossible to prevent the release of tritiated water without expensive and exotic isotope separation equipment. Except for the new Darlington nuclear station where such an experimental unit has been set up, all other CANDU stations are releasing tritium on a large scale.

Much of the scientific community is convinced that the release of tritium is not pollution and its build-up near power stations is not a public health threat. The owner of the plant, Ontario Hydro is able to control the timing of its tritium releases and handles tritium releases to air quite differently from tritium releases to water. Tritium released to air disperses widely and does so quickly. Ontario Hydro also has the capability to ensure that some of the tritium it releases to air is done at a time when the winds are blowing offshore.

Tritium in water does not disperse as quickly or as widely as tritium released to air. Tritium releases to water cause water contamination at nearby water supply plants for months afterwards according to Ontario Hydro's own document SSD-IR-80-7.

Tritiated water readily accumulates in people via drinking water, inhalation and other routes. Tritium is doubly

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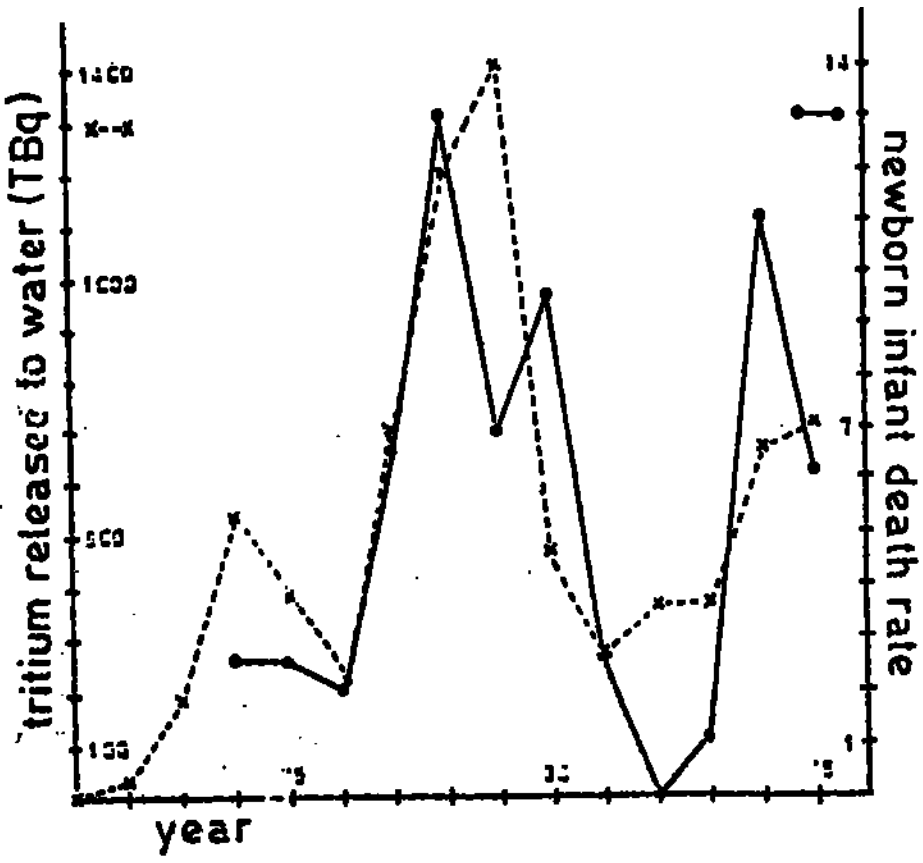
toxic; firsely due to its beta radiation arid secondly due to the fact that tritium decay results in breaking of hydrogen bunds and this plays havoc with biochemical reactions. Humorous studies with mice and other laboratory, animals have shown unequivocal evidence of birth defeats and high infant mortality when tritium is administered in trace amounts to pregnant females or male parents besfore conception. For this reason, children of male nuclear plant workers could be especially at risk due to tritium.

Incorrect Tritium Figures?

The Atomic Energy of Canada Board (AECB) has indicated that the tritium figures it had published in its own report (INFO-0210 in 1986 and in a revised version again in 1987 were incorrect. The AECB now says that the tritium released to water figures for 1978 and 1979 it had published for Pickering power • station must be lowered by a factor of ten. (Even with this reduction tritium releases to water at Pickering in. 1977,1978 and 1979 were still very high.) The errors in. the AECB report were not detected apparently, until after' the DMA report was released.

Examination of the new: data reveals that the possible link between tritium emission end increases in infant deaths and fatal birth defects is now even more .bvious. It is tritium releases to Water and not air which now seem to be strongly linked to newborn infant fatalities. The match of these two curves between 1974 and 1985.' is: particularly striking.



More Study Needed

Citizens must ask whether the Ontario government and Ontario Hydro, who have invested $30 billion to date in nuclear projects in Ontario, are free from a conflict of interest in commenting on the threat to human health from tritium. This question is especially relevant as the experimental evidense associating, tritium with health effects in laboratory animals only surfaced -after Canada made its commitment to CANDU heavy water reactors. (It is not Camadian research which found these problems.) Another question that arises is to what extent has military secrecy concerning nuclear weapons and tritium (tritium is an essential component of thermonuclear weapons) leal to secrecy concerning health effects of tritium?

What. is clearly needed is acknowledgement that there is a potential health problem concerning tritium in our environment. Adequate health and epidemiological studies need to be carried out. We also need a comprehersive tritium health effects research programme.

David MeArthur

Editor's Note: Last year too we had an article "The Perils of Tritium" by Nigel Harle (Anumukti Vol.1 No.6 June '88) on the tritium threat. Tritium is of special relevance to us in India since the mainstay of the Indian atomic energy programme are the very same CANDU reactors, which release large quantities of tritium. Official fondness for them has nowadays become so great that they are refered to as "our own PHWR design".

Medvedev Vindicated

Recently there were newsreports headlined "Soviets Throw Light on a 32-Year-Old Nuclear Mishap". They reported a serious nuclear accident in September 1957 near the town of Kasli in. southern Urals. The cause of the accident was the explosion of a tank filled with radioactive waste. It created a radioactive trail 105 kms long and 9 kms wide and required the urgent evacuation of 10,000 people. Even now, about 20% of the contaminated area is still not fit for habitation. The accident was never reported since it occured at a defense factory intended for building atomic weapons.

These matter of fact reports hide a spellbinding tale. it is the story of one man's perseverance in the face of scepticism and ridicule by the entire-ties tern nuclear establishment. Zhores Medvedev is a Russian geneticist. While on a visit to England in 1973, his passport was; cancelled by the Soviet authorities. He has since lived in England. In 1976, the British popular-science journal, **New Scientist** invited him to write,- an article on the role of scientists in Soviet society. His article entitled "Two Decades of Dissidence" dealt mainly with the harm done,. science by the ideas of Lysenko. In ••""passing, it mentioned that, "one of the most important episodes which: brought a group of influential atomic physicists, together with the" persecuted geneticists was the nuclear disaster in the Urals." Medvedev at the time had no idea that Western experts as well as the media were uninformed about the. disaster. In the article Medvedev also stated the cause of the accident as an explosion in radioactive waste which had been stored underground for many years.

At the time there was a heated controversy in the British press. regarding nuclear waste. Medvedevs revelations sparked an immediate explosion. Nuclear experts immediately denied the story by claiming that it was "technically impossible". Most high handed was Sir John Hill, the the chairman of United Kingdom Atomic Energy-Authority. He called the article "rubbish" and dismissed it as "pure science fiction" and a "figment of the author's imagination". "This sort of waste has a very, very low activity and could not possibly give that sort of explosion, nuclear or thermal."

At this stage, CIA sources stepped in. Although an accident had in fact taken place, they claimed,"it involved a reactor that went out of control and had nothing to do with waste. Moreover, the reactor involved technology only distantly related to present day nuclear power plants and its relevance to the safety of nuclear power plants today is possibly minor."

A month later in December 1976, another Russian emigre scientist, Professor Tumerman, then living in Israel, confirmed Medvedev's account. In I960, while on road trip between Sverdlovsk and Cheliyabinsk he had seen road signs which warned drivers not to stop for the next 30 kms and drive at full speed. He also mentioned that by all accounts the accident had been caused by careless storage of radioactive waste

Despite this eyewitness account, nucleocrats remained sceptical. Sir John Hill reasserted, "even allowing the emote possibility of such an accident he probability that it could possibly ave had the kind of consequences .'escribed is even more improbable."

Medvedev's answer to this challenge - his credibility was a book - a feat of extraordinary research and analysis. Published in 1979, **Nuclear Disaster** *in* **the Urals** critically examines a large body of Russian published work in fields such as radiobiology, radioecology and genetics. Studies of intake of various radionuclides and their propagation 'Through different food chains routinely •mention the size and location of the area where the study is conducted as also the 'siming, the composition and the quantities of radionuclides introduced for the purposes of the study; a full .accounting of **the** radionuclides distri-bution and the amounts left after the experiment's conclusion. Medvedev found

that a very large number of Russian **papers** published during the sixties just om**itted** all such procedural details. Despite the omissions and in some oases, deliberate falsafications, he was able to glean the truth since the departures **from** normal experimental practice were so striking. For example, he showed that the contaminated area was not a small experimental plot as the papers seemed to imply, but an area at least hundreds, of square kms in extent by looking at the numbers of different kinds of birds fishes, mammals, trees, acquatic plants micro-organisms, etc. that had been studied by different researchers.

Nuclear Disaster in the Urals is a book which ought to be read by all - especially students of science not only for the facts it describes are- interesting and important in their own **right.,** but also as an illustration of the scientific method in practice. It **reads** like detective fiction. Clues are marshal led one after the other, till the conclusion seems unescapable. After its publication, no one, not even Sir John Hill could deny the fact of-the accident or that its cause had been the careless storage of radioactive waste.

After the book's publication groups in U.S.' tried to "find out the extent of CIA's knowledge regarding the disaster by U3e of the Freedom of Information Act. The CIA did have a very good knowledge of what had happened. They had not broadcast it however, because they did not want to jeopardise the emerging US civilian nuclear programme.

Why did the Russians decide to inform the world now after having kept quite for so long? They want to build a new nuclear plant in the region. This has raised a furious controversy. Officials claim that the plant would 'utilize' water still" contaminated from the previous disaster.

Lost at Sea

A new study released by Greenpeace, reveals that 50 nuclear weapons and 9 nuclear reactors were lost or dumped at sea during the post war period.

Naval Accidents of 1945 - 1988 by William Arkin and Joshua Handler documents over 2000 major accidents including the sinking of 75 vessels, five of which were nuclear powered, with the total loss of about 2,800 lives. Of the 1,276 officially recorded accidents covered in the report, 377 occured while the vessels were in port. A majority of out-of-port accidents (624) took place **in** the Atlantic, 318 in the Pacific, 110 in the Mediterranean and 34 in the Indian Ocean.

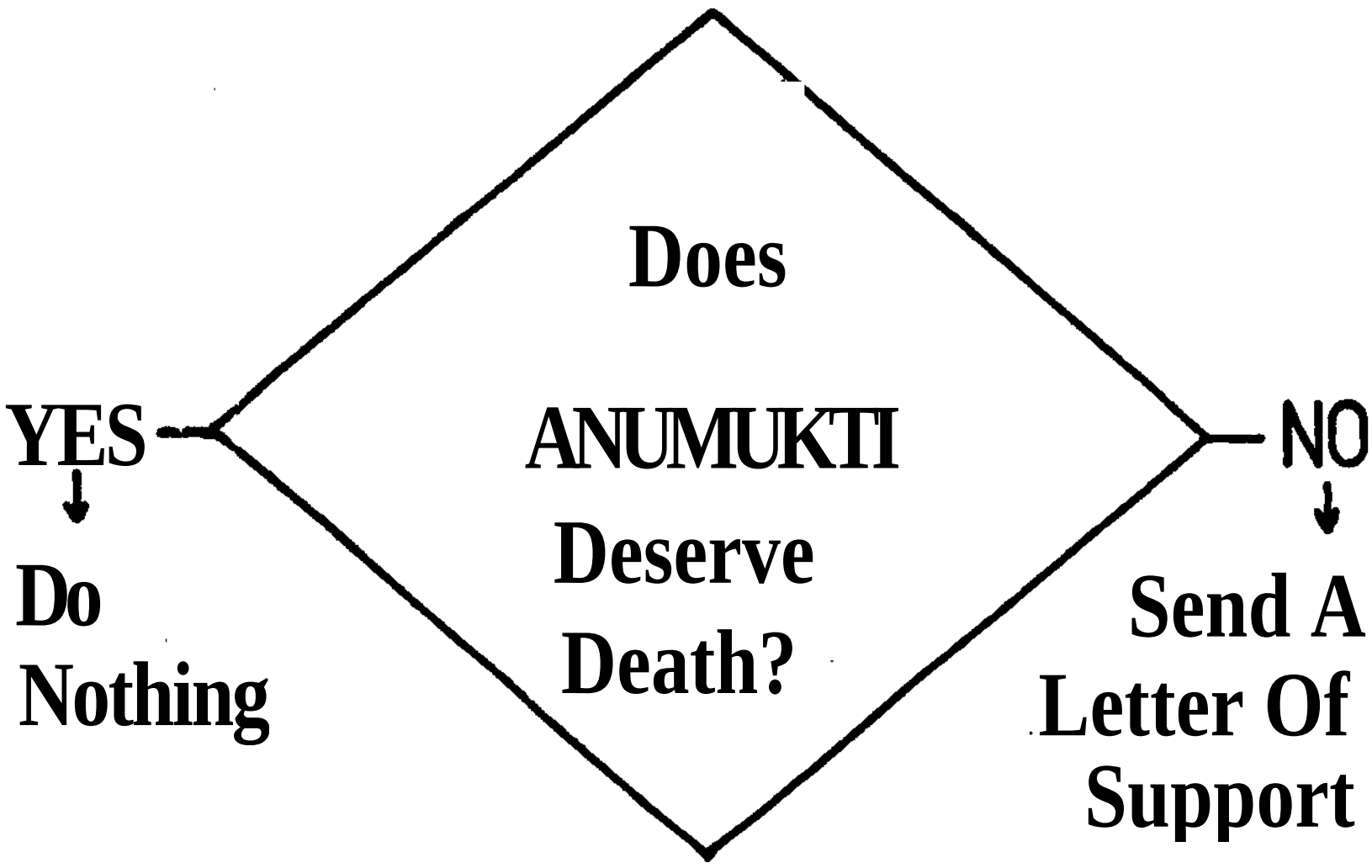
The most frequent causes of naval accidents were collisions, fires, **groundings** and explosions. Twenty seven submarines were lost at sea, of which **four** were USA, five Soviet and three British. Submarines belonging to Israel, Pakistan, Peru, Spain, Turkey and the FRG have also perished.

Launching the Greenpeace report at **a** press-conference, co-author Arkin said that although naval accidents would always be with us, the disasters .are far more dangerous when the vessels involved are nuclear powered. Arkin also mentioned that the authors had been unable to amass all the information on nuclear disasters due to the secrecy surrounding the subject in all countries. However, while preparing the report, Greenpeace for the first time had access to information about three major nuclear accidents on US naval ships, which till then had been suppressed. These were the loss of a hydrogen bomb from the aircraft carrier **Ticonderoga** off the Japanese coast in 1965, the fire aboard the **Belknap** in 1975 which broke out just twelve metres away from its nuclear weapon's **bay** and the leakage of radioactive water from the- reactor of the submarine **Guardfish** in 1973.

At present, there is growing concern about a spate of accidents on Soviet nuclear powered submarines in the last few months off the coast of Norway. Three serious accidents have taken place since April 6th, when a Mike-class submarine sank following a fire. 42 members of the crew died in that accident. Two nuclear reactors containing hundreds of kilogrammes of nuclear fuel and plutonium

from the sub's two nuclear torpedoes are **on** the ocean floor buffeted by the strong currents of the northern seas. **The** Soviets have promised to salvage the wreck. Unless they manage to do it in time, these dangerous toxins would be released to the marine environment sooner or later regardless of the condition of the submarines hull or the nuclear reactors today.

Source: Peace Courier June '89



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Anumukti a year ago had 556 subscibers. This year there are only 375 and just 18 have renewed for the next year starting from August. Obviously something is very wrong. Maybe j it is the fact that we have not been able to stick to the scheduled publication date. Or, maybe Anumukti is no longer interesting enough - become too technical, lacks human interest stories, has a poor get - up —

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