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47/1, (First Floor) St. Marks Road
BANGALORE - 560 001

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IPPNW IN BRIEF

Early History:

A long-standing professional association between two leading cardiologists, Dr. Bernard Lown of the U.S. and Dr. Evgency Chazov of the U.S.S.R., was the impetus for the formation of International Physicians for the Prevention of Nuclear War. Following an exchange of letters between Drs. Lown & Chazov, in which they expressed their deep concern about nuclear war, Dr. Lown met with two other Harvard University physicians, Dr. James Muller and Dr. Herbert Abrams to discuss plans for launching an international physicians movement to prevent nuclear war. In December 1980, a meeting in Geneva brought together Dr. Lown, Dr. Muller, and Dr. Eric Chivian of Massachusetts Institute of Technology with Dr. Chazov and two of his colleagues, Drs. Leonid Ilyin and Mihail Kuzin. The historic meeting of American and Soviet physicians provided the concensus that has been the basis of IPPNW activity since then.

Objectives:

IPPNW is founded on the principle that, by virtue of their Hippocratic Oath, physicians have a strong ethical commitment to preserve human life and health and that this concern must necessarily extend to the global community. Not only can physicians fully understand the medical implications of nuclear war; their professional identify transcends national and political boundaries and makes it possible for them to speak with one voice on this critical issue. IPPNW seeks to bring together physicians of diverse national identities to apply their medical expertise to the problem of preventing nuclear war and controlling the nuclear arms race. In general, IPPNW seeks to coordinate the activites of national physicians groups, to foster communication among these groups, and to assist in the establishment of new physicians groups.

Organization:

IPPNW is a federation of regional and national physicians groups, each of which differs in its composition, structure, and program. IPPNW respects the identity of each national physicians group, and encourages individual physicians to join and work with these groups. (Worldwide, there are 27 established regional and national physicians groups and 17 groups in the process of organization, involving tens of thousands of physicians.) IPPNW acts on behalf of all affiliated national groups through the IPPNW Internatiinal Council and Board of Directors. The current president of IPPNW is Dr. Bernard Lown. The Physicians for Social Responsibility (PSR) is the Indian organisation coordinating the activities of the IPPNW.

Activities:

The World Congresses of IPPNW. IPPNW has held ~~two~~ three international congresses, the first outside of Washington, D.C. in 1981, ~~and the second in Cambridge, England in April, 1982~~. The fourth congress is to be held in Helsinki in June 1984. The First Congress was attended by more than 100 physicians from such diverse countries as the U.S., U.S.SR., Japan, Canada, France, Norway, Holland, West Germany, United Kingdom, and Sweden, while the Second Congress was attended by 160 physicians representing 31 countries. These congresses have attracted worldwide press attention, and have fostered coordination among national physicians groups. Congress working papers on the medical consequences of nuclear war have been widely distributed to world leaders in government, medicine, and education. The Third Congress of IPPNW was held in June of 1983 in the Natherlands. The conference brought together more than 300 physicians delegates from more than 40 countries.

Communication with World Leaders. IPPNW and its national affiliates have communicated with world leaders about the dangers of nuclear war and have brought relevant medical information before many national agencies including the U.S. Congress, Canadian Parliament, British Parliament, U.S.S.R. Ministry of Health, and Hungarian Academy of Sciences. IPPNW has also made representations to many international organizations such as the World Health Organization, the World Medical Association, and the Papal Academy of Sciences. In addition, representatives from IPPNW have met with Secretary-General of the United Nations Javier Perez de Cuellar, who commended IPPNW's efforts on behalf of World peace and asked that IPPNW become an ongoing rccource to the United Nations.

Informing the Public. IPPNW has sponsored an historic television broadcast in the Soviet Union that featured three American and three Soviet physicians in a roundtable discussion of the medical consequences of nuclear war. This comprehensive, unedited discussion was seen first by tens of millions of citizens in the Soviet Union, then by millions more in the United States, Finland, Holland, Sweden, and other countries. IPPNW physicians have also written articles and editorials in numerous medical and lay publications, spoken at hundreds of meetings and gatherings, including the massive rally held in New York's Central Park in June of 1982, and helped to design curricula on nuclear war for leading medical schools in many countries. The working papers generated by the delegates of the First Congress of IPPNW have been edited and collected in a recently published book, Last Aid: The Medical Dimensions of Nuclear War (1982, W.H. Freeman and Co.). A quarterly newsletter, IPPNW Report, is distributed worldwide.

The signature appeal may be sent either to Dr Ps Kamath or to Dr K Balakrishnan FRCP, BRINDAVAN, PATTATHANAM, QUILON, KERALA. For further details of the IPPNW the above may be contacted

The arms race

Reprinted from **Unesco Courier,** November 1970

On September 21, 1970, five of the six living Nobel Peace Prize winners—Lord Boyd Orr, Lester Pearson, Philip Noel-Baker, Linus Pauling and René Cassin—presented a declaration on peace and disarmament at United Nations headquarters in New York calling for a moratorium on the development and deployment of new offensive and defensive strategic nuclear weapons systems as a first step towards full disarmament. The sixth Nobel Peace Prize winner, Ralph Bunche, endorsed the declaration though he did not sign it because of his position in the U.N. Secretariat as Under Secretary-General. The United Nations hopes to make the Seventies a "Disarmament Decade" in a renewed effort to halt and reverse the insensate arms race in which the real cost of world military expenditure, trebled between 1949 and 1968.

In this issue, which is largely devoted to the question of armaments and peace research, Nobel Peace Prize winner Philip Noel-Baker presents a picture of the current arms build-up on the basis of the findings of the Stockholm International Peace Research Institute (SIPRI) published in its Yearbook of World Armaments and Disarmament.

The Arms Race escalation of total madness

by Philip Noel-Baker

Nobel Peace Prize, 1959

Photo © Lombardi Enzo, Viareggio

DWIGHT D. Eisenhower was not only President of the United States; he was also Commander-in-Chief of the greatest army, and victor of the greatest battle, in human history. After four years in the White House, he said in a press conference in 1957: "I know of nothing that has occurred in our time where greater optimism must be maintained.. than in this whole business of beginning disarmament... The alternative is so terrible that you can merely say this: All the risks you take in trying to advance are as nothing compared to doing nothing, to sitting on your hands."

On an earlier occasion, Eisenhower said:

"War in our time has become an anachronism. Whatever the case in the past, war in the future can serve no useful purpose."

Since he spoke these words, almost every president and prime minister in the world has re-echoed them, and has declared that a nuclear war might exterminate mankind. Scientists, beginning with Einstein and Cockcroft, and weapons-experts, from Oppenheimer and Isidor Rabi to Sir Solly Zuckerman and Herbert York, have ardently, even passionately endorsed this view.

But, nevertheless, the governments have gone on sitting on their hands. Khruschev's and Kennedy's great disarmament plans were destroyed by militarist opposition. The arms race has continued with unparalleled fury; world military expenditure, in real terms, has increased by more than 60 per cent since 1957; the numbers of nuclear warheads have increased much more—perhaps they have been multiplied by 10.

Much worse, wars have raged in various quarters of the world, wars in which the dead and mutilated must be reckoned in millions—and often mutilation is more terrible than death.

No-one outside the institutes of self-styled "strategic analysts" really doubts that there is a causal connexion between the arms race and the wars; that if a Treaty of General Disarmament had been made by a compromise between Kennedy's and Khruschev's Draft Treaties of 1962, the world would now enjoy unbroken peace.

The U.N. General Assembly in 1969 declared that the 1970s must be the Disarmament and Development Decade. Since then the Secretary-General has been engaged in a vigorous disarmament campaign.

In his report to the General Assembly in 1969, U Thant said: "The world now stands at a most critical crossroads. It can pursue the arms race at a terrible price to the security and progress of the peoples of the world, or it can move ahead towards the goal of general and complete disarmament, a goal that was set in 1959 by a unanimous decision of the General Assembly... If it should choose the latter road" (i.e. general disarmament), "the security, the economic well-being and the progress, not only of the developing countries, but also of the developed countries, and of the entire world, would be tremendously enhanced."

On May 22, 1970, U Thant said to a conference in New York: "Progress... in the field of disarmament can be achieved *only if there is a strong political will on all sides* to undertake the policies and measures that could

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PHILIP NOEL-BAKER, *Nobel Peace Prize, 1959, has devoted many years to research on problems of peace and disarmament and has written widely on the subject. Readers will recall his special study on Science and Disarmament published in our August-September 1967 issue, "War or Peace?".*

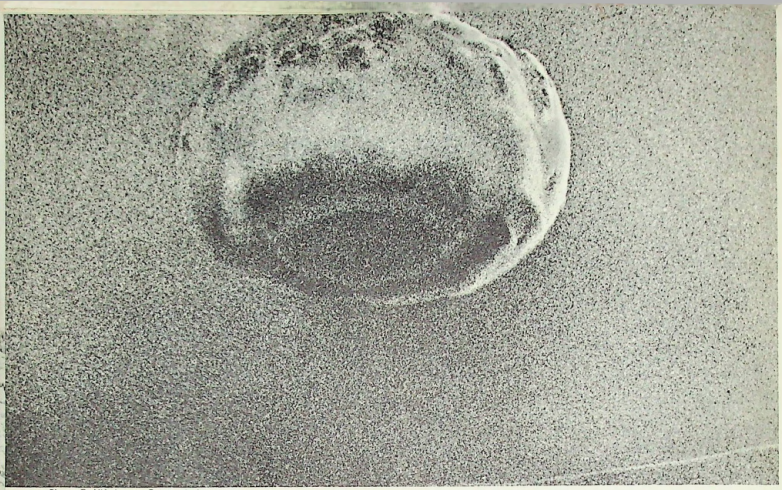
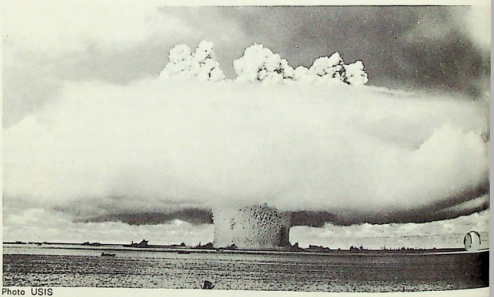


Photo © UK Atomic Energy Authority

Photo USIS



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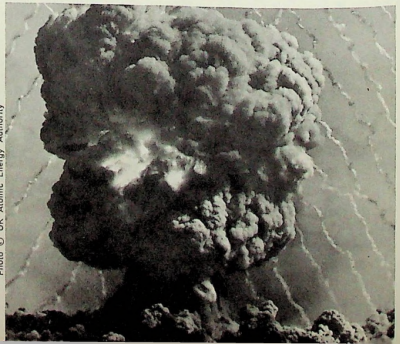

Photo © UK Atomic Energy Authority

Photo USIS

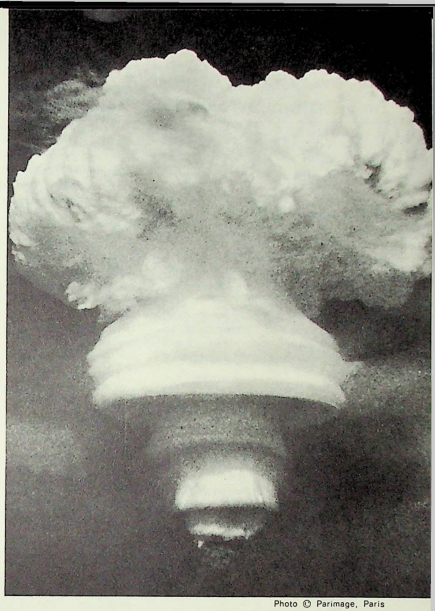

Photo © Parimage, Paris

Poisonous mushrooms

The malignant crop of atomic mushrooms shown here is a tiny sampling of the hundreds of nuclear test explosions that have blasted harmful radioactive substances into the atmosphere during the past 25 years. Countries which signed the Nuclear Test Ban Treaty in Moscow, in 1963, agreed to discontinue all nuclear tests in the atmosphere, under water and in outer space. Yet the Moscow treaty, " does not appear to have had much success in reducing the amount of nuclear weapon testing," reports the SIPRI Yearbook of World Armaments and Disarmament. "From available data," it says, "it appears that the average annual number of tests by all nations before the treaty was 40. The annual average since the treaty has been 46." Since they concluded the treaty, the USA, USSR and UK have exploded no nuclear devices in the atmosphere, although underground nuclear tests have increased in number. But certain countries that did not sign the Moscow Agreement have carried out atmospheric tests since 1963 (top right, nuclear explosion in Mainland China; bottom right, French nuclear explosion).

Photo © A.F.P., Paris

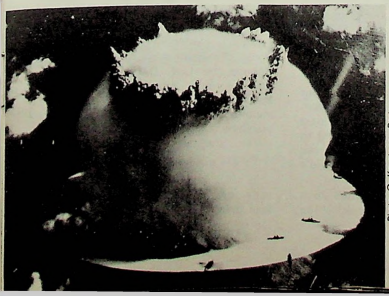

Photo © Keystone, Paris

For every dollar spent on arms only 30 cents for public health

lead to agreements. If we are to make real progress toward disarmament, *governments must approach this subject in a new spirit.* They must stop questioning the seriousness of purpose of others and think how they can demonstrate their own."

In the same speech, U Thant said: "There is another aspect of the Disarmament Decade which... has been largely overlooked... I refer to the need for greater publicity concerning both armaments and disarmament, so that knowledge concerning these matters can penetrate the conscience of the people."

"Penetrate the conscience of the people."

Yes, foreign policy, armament policy, has been controlled for the last tragic decade by those in the Establishments of almost every nation who believe that armaments can promote national security and national greatness, and who believe that disarmament and the abolition of war are not only utopian, but even ignoble. Only a great tide of world opinion can destroy their power.

THIS is the significance of SIPRI's (*) great "Yearbook of World Armaments and Disarmament." SIPRI's authority has been firmly established by its other works; but the Yearbook is, and will remain, its chef-d'œuvre. The product of a dozen first-class brains, from a dozen countries, working within the Institute itself, who are re-inforced, when needed, by experts from outside.

The sections on military expenditure, which open the Yearbook, more than justify this claim. Chapter 1, which sets out the trends of military expenditure in the world at large, in certain regions and among certain groups of countries, and even of some individual "Great" Powers, is a masterly piece of statistical analysis. The clarity of its exposition, re-inforced by the charts attached to this chapter, and by the detailed tables of expenditure in Part II, give a wholly new picture of the long-term history of the arms race, and of its immediate and terrifying significance today.

The constant increase of the burden of military budgets has been a main plank in the argument of those who urge disarmament. But the tables published hitherto have mostly been *at current prices and current exchange rates;* those who opposed disarmament often claimed, without proving what they said by doing the sums, that increases of expenditure were due to a rise of prices, and that, in real resources, the burden of expenditure remained the same.

The opponents of disarmament also found another way of distorting the facts. They drew up tables showing a nation's armament expenditure as a percentage of its gross national product, without explaining that the G.N.P. had much increased; thus they showed Britain's expenditure as over 10 per cent of G.N.P. in the early 1950s, and as 6.7 per cent in 1968; this left the casual reader with the impression that large reductions had been made, when in fact the burden in real resources had increased.

SIPRI puts all these muddles right. There are tables at current prices and exchange rates. There are tables at constant prices, showing the trends in real resources over many years. There are evaluations of the percentages of G.N.P. spent on armaments in different years by different powers.

These tables give a true picture of the arms race since the present century began. It is a picture that will surprise, and shock, most people.

For 70 years, since 1900, the average increase in the real burden of world armaments has been 5 per cent per year. Since 1948, the increase has been greater: 6 per cent per year.

This meant that, from 1949 to 1968, the real cost was *trebled.*

If the increase continues at the present rate, the cost will *double* again by 1980. The world total in 1968, at 1960 prices, was: $153,498 million.

In 1980, it would be: $306,996 million.

If the increase continues, at 5 per cent per annum, then, says the Yearbook: "By the early years of the next century the world will be devoting to military uses a quantum of resources which is equal to the whole world's present (1968) output."

"This is not so preposterous as it sounds", says the Yearbook. "The world is now devoting to military purposes an amount of resources which exceeds the world's total output in the year 1900."

There are also valuable comments on percentages of G.N.P.

In 1913, just before the First World War, "probably no more than 3-3½ per cent of world output was going to the military. In the early 1930s, the percentage seems to have been about the same. The average over the last 18 years... has been around 7-8 per cent—more than double the 1913 figure".

Moreover, the world's output of wealth has been increased at least fivefold since 1913, so that in real terms the resources "going to the military" have been multiplied by 10.

There are other dismal facts given in the Yearbook about this world expenditure on defence.

It is greater in amount by 40 per cent than the total sums spent by all nations together on Education.

It is more than three times the expenditure of all nations together on Public Health.

These are depressing facts, particularly to those who care about Unesco and its mission toward mankind.

But there are worse facts still to come.

The arms race is spreading to continents where it was not known before.

The figures for Africa, over the last few years, show that military expenditure there is rising by 7-8 per cent per year—more than the average for the world.

IN the developing countries of all continents, military expenditure has risen since 1960 by an average of 7½ per cent per year. The developing countries—those which are receiving economic aid from the International Bank, the International Development Agency, the U.N. Development Programme, and other sources—have spent many billions of dollars on importing "sophisticated" weapons—warships, aircraft, missiles, tanks, —from the arms-producing nations.

This is a new and an alarming fact.

In 1955, no developing country had supersonic military aircraft; today no less than 32 such nations have them.

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* *SIPRI = Stockholm International Peace Research Institute. The Institute was founded and is financed by the Swedish Parliament, which set it up to celebrate the end of a century and a half during which Sweden had had no war. It has an international Board of Governors, of which Mr. Gunnar Myrdal is the chairman.*

Final sequel to the 'Lucky Dragon'

THIS fishing boat is a hulk lying on the mud-flats of a garbage dump in Tokyo Bay, inappropriately named "Island of Dreams" (Yumenoshima). Still legible on the bow are the Japanese characters for *Fukuryu Maru*—*Lucky Dragon*. But like its resting place, the *Lucky Dragon* is ill-named. Sixteen years ago, on March 1, 1954, the boat and its crew were hit by the fallout of a hydrogen bomb explosion during a nuclear test in the Pacific.

At five o'clock on that March morning, the *Lucky Dragon* was near the Marshall

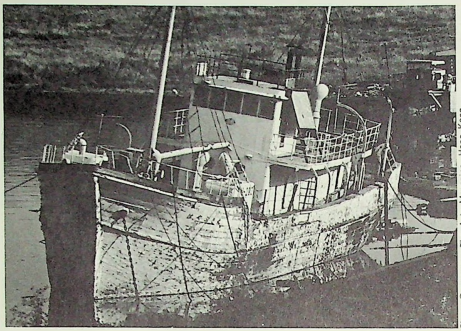

Photo © courtesy The Asia Magazine, Hong Kong

'LUCKY DRAGON' *(Continued)*

Islands fishing for tuna, when a huge incandescence rose above the western horizon. The fishermen watched with awe. "The sun rises in the west," one exclaimed.

Before long, the boat was showered with a drizzle of small, white flakes which clung to the crew's hair, eyes and nostrils. The vessel was 87 miles from an obscure atoll named Bikini. During their two-week journey back to Japan, the crew members were stricken with a variety of ailments.

It was not until some days after their return to port that the fishermen learned what the flash was. They were taken to hospital in Tokyo for treatment. In September 1954, Aikichi Kuboyama, the ship's radio operator died—the world's first victim of the H-bomb. (For full story see "Unesco Courier", August-September 1967.)

In the years that followed, the *Lucky Dragon* was all but forgotten. After being decontaminated several times, it was abandoned on the "Island of Dreams" garbage dump, until someone decided it should be sold for scrap.

When this became known, committees were at once formed to save the boat, and fund-raising campaigns were launched. Tokyo's Governor, Ryokichi Minobe, forbade the scrapping of the *Lucky Dragon*, and two organizations, The Japan Congress Against Atomic and Hydrogen Bombs and the General Council of Trade Unions of Japan, made plans to preserve the boat.

Painted and restored, the *Lucky Dragon* will now have its place alongside the atomic museums of Hiroshima and Nagasaki, as another reminder of the horror of nuclear weapons and their destructive effects.

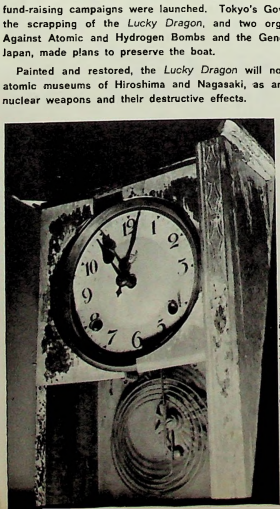

Photo © Pierre-André Pittet, Geneva

11.02 AM

The hands of this clock in Nagasaki, Japan, mark the exact instant when an atomic bomb was dropped on the city on the morning of August 9 1945. Three days earlier, an atomic bomb had levelled 4½ square miles of Hiroshima.

In 1957, no developing country had long-range surface-to-air missiles; now 19 have them.

It is this *military* expansion which has swallowed up the scarce foreign currency resources which these developing nations should have invested as productive capital in projects for *economic* expansion and social progress. In my opinion it is the real reason why the U.N. Development Decade so largely failed.

There are interesting facts in the Yearbook about the percentages of G.N.P. given to the military by two leading nations, Britain and the United States.

The U.S. figures are these:

Year	*Percentage of G.N.P. spent on Armaments*
1913	1.4
1928	1.1
1969	9.0

The U.S. is fighting the Vietnam war; nevertheless, that nearly one-tenth of its enormously increased output of wealth should "go to the military" is a fantastic thought.

Britain is fighting no war. Her figures are these:

Year	*Percentage of G.N.P. spent on Armaments*
1913	3.4
1928	3.0
1968	6.7

Double the percentage of a national output which has increased only less than that of the United States.

Nothing so demonstrates the almost incredible momentum of the arms race and the profound and all-embracing militarization of world politics, as these last figures.

The SIPRI Yearbook expands its picture of the arms race by a new and fascinating account of the technological trends and advances in the mass-destruction "weapons-systems" of the major powers, and of conventional armaments as well.

"New"? Much of the material is from already published government sources, some from unofficial sources, some from SIPRI's own researches. But "new", because no-one has yet constructed so comprehensive and so illuminating a synthesis of what is familiar, what ought to be familiar, and what so far has been virtually unknown.

The story of the nuclear competition between the Soviet Union and the United States is terrifying.

Humpty Dumpty sat on a first strike capability

Some authorities in the United States have added a new dimension to its menace. They interpret the Soviet missile SS9, with its multiple warheads, and the great increase in the number of Soviet I.C.B.M.s, not as a belated and desperate attempt to catch up with the vastly superior nuclear strength of the United States, but as an attempt to take a very dangerous lead.

SIPRI quotes a U.S. spokesman: "They (the Russians) are going for a first strike capability. There is no question about that."

This cuts at the root of the comfortable, wishful-thinking theory that the mutual deterrence of the nuclear bombs gives us security from war. SIPRI gives cogent reasons why this view of Soviet policy is not at present credible; they say that the large U.S. superiority in I.C.B.M.s throughout the period since the missiles first began to fly must have made it appear "from the Soviet point of view ... that it was the United States which was attempting to preserve a first-strike capability." And they quote authoritative sources for the fact that for ten years the U.S. have had the means to render a million square miles of urban areas in the Soviet Union uninhabitable by human beings.

BUT what General Staffs believe may be more important than the facts; their beliefs decide the policy which their governments pursue. And no doubt it is because the U.S. Department of Defense believe that the Russians "are going for a first strike capability" (i.e. for the power to destroy all the U.S. nuclear weapons before the U.S. can reply), that they are embarking on a new programme of missiles with longer ranges and with multiple warheads (MIRV). Many of the Polaris submarines will be converted to Poseidons; instead of one Polaris warhead of 600 kilotons yield, the Poseidon will have ten warheads of 50 kilotons yield (50 kilotons is 3½ times as powerful as the Hiroshima bomb). Similar "improvements" will be made in the land-launched missiles, the Minutemen.

Departments of defence prefer to take no chances.

The U.S. Department of Defense appropriated $25 million for the development of a new manned bombing aircraft in 1969, and $100 million in 1970.

They are doing vigorous research to improve the accuracy of their missiles —if the average distance from the target is halved, "the weapon yield needed to eliminate a specific target is reduced by a factor not of 2, but of 10."

They are spending large sums on research in oceanography; on so improving submarines that they can remain submerged for two months or more (what kind of human beings will the crew be when they come up?); on giving submarines the capacity to dive and cruise at greater depths—"the addition of 100 feet to the maximum operating depth of a submarine adds millions of cubic miles to the volume of space in which the submarine can navigate."

All these developments can be justified as "defensive", if you apply the method of "worst case analysis" to your weapon systems, i.e. if you accept the worst possible assumptions about the reliability of your own weapons, about the effectiveness of your enemy's defence etc. This is a method that would be tolerated in no other sphere of government; but in respect of armaments, "you must always err on the side of safety."

But, however these U.S. programmes may appear in Washington (and the ABM was only carried by the Chairman's vote in a Senate divided 50-50), SIPRI is surely right in thinking that in Moscow they will seem to justify the view that it is the U.S. which is seeking in the 1970s, as, in Soviet eyes, they did in the 1960s, to preserve a first strike capability.

If both sides believe that first-strike capability is the fixed purpose of the other, and if their military research and weapon programmes appear to the other to be devoted to this aim, the "stability" alleged to result from mutual nuclear deterrence will not be of much practical value for the peaceful conduct of world affairs. And the SALT talks in Vienna—the secret U.S.-Soviet negotiations about the possible limitation of "strategic" arms—do not seem to give much hope that the race in these long-range nuclear weapons will be ended in the early future. MIRV poses the most difficult of inspection problems; and if SIPRI is right, the point of no return may already have been passed.

MIRV and ABM are only the most dangerous of the weapon developments now under way; there are innumerable others which are dealt with in the Yearbook.

On chemical and biological warfare, SIPRI's authority is already established in the world. The Yearbook chapter on the subject will enhance it.

So will:

The section on the role of helicopters in "conventional" war;

The section on submarine warfare;

The extremely valuable section on the arms trade, and the remarkable Arms Trade Register;

The outline of the disarmament negotiations and proposals since 1945;

The compendious information given on the Moscow Partial Test Ban, The Antarctic Treaty, the Outer Space Agreement, and the Non-Proliferation Treaty;

The revealing diaries of events in the Nigerian civil war and the Israeli-Arab wars; and much more besides, with which there is no space to deal.

SOMETHING must be said, however, about the Yearbook's analysis of the post-1945 phenomenon of Government Military Research and Development. It has long been plain that Military Research and Development (R & D) is the real dynamo which drives the arms race. It is R and D which makes the arms race a remorselessly self-escalating burden on the nations' wealth. It is R and D which drives up the cost and scale of armaments from year to year.

It has long been known that vast sums were being spent on R and D. But SIPRI has brought out something profoundly significant—and new.

"Behind this extremely rapid rate of technological improvement in weaponry," says the Yearbook, "so much faster than that of civil goods, there is an enormous disparity between the two fields in research and development. .. For every $100 of military procurement (i.e. actual purchase of arms by the Government) in the United States, Britain and France, there is over $50 of research expenditure (*). For the general run of manufacturing, the research input for every $100 of output ranges from $1.9 (France) to $7.5 (U.S.). The disparity is not so great in other countries, but it exists everywhere."

* *The actual figures are: U.K. $62.2, U.S. $54; France $51.*

Moreover, the military research figures are understated—they exclude expenditure on space research and on atomic energy research. All in all, the research input for weapons is at least ten times that for civil goods and services. This conjures up visions of rotting urban ghettoes which modern engineering ought to cleanse; of starving children who ought not to starve: of rampant diseases which science could wipe out.

But worse than that:

"This tremendous research and development drive behind the advance in weaponry has an impetus of its own. Once massive funds are voted for weapons research . . . it is inevitable that further improvements will be made, and inevitable that new fields of warfare will be explored. . .

"Weapons research proliferates in another way. . .: each new weapon spurs the development of counter-weapons."

Alas, what might science do for the betterment of human life and happiness if the balance of R and D were ten to one the other way!

This Yearbook is a *sine qua non* for the proper understanding of world affairs.

Lest I have given it a colour which others might contest, let me end by quoting the words of SIPRI's Director, Mr. Robert Neild:

"The Yearbook is factual: but of course the selection of the material and the way in which it is presented implies a set of valuations, and we should make them explicit. Obviously the staff—drawn as they are from many different countries—have differing views on a wide number of questions of world armaments and disarmament. The common elements in their approach may be summarized thus:, that the rise in world military spending, and more particularly the constant technological acceleration in weaponry, is highly dangerous, and that the attempts so far made to slow down, halt or reverse the process have been incommensurate with the danger; that arms competition, though it is not the sole or main cause of world tensions and conflicts, is an important independent factor which increases and exacerbates tensions: and that arms limitation or disarmament could help considerably to reduce these tensions."

Amen. ■

The SIPRI Yearbook of World Armaments and Disarmament 1968-1969, prepared by the Stockholm International Peace Research Institute, is published by Almqvist & Wiksell, Stockholm, Humanities Press, New York and George Duckworth & Co., Ltd., London. Prices, hardback and soft cover respectively: 45 and 32 Kr.; $12.00 and $6.50; £5 and £3.)

IMPORTS OF MAJOR WEAPONS BY DEVELOPING COUNTRIES

(millions of U.S. dollars)

Importers :	1950	1958	1968
Greece and Turkey	20	380	50
Middle East (including the UAR)	20	240	640
North Africa (Algeria, Libya, Morocco, Tunisia)	—	—	30
Sub-Saharan Africa (the rest of Africa excluding South Africa)	—	—	30
South Africa	5	10	70
Indian Sub-continent (Afganistan, Ceylon, India Pakistan)	40	340	200
Far East (excluding Mainland China, Japan, North Viet-Nam and the Republic of Viet-Nam)	90	350	70
Central America (All countries from Panama north to the USA)	—	10	—
South America	40	140	100
TOTAL excluding North Viet-Nam and the Republic of Viet-Nam	220	1,470	1,200
North Viet-Nam and the Republic of Viet-Nam	—	30	470
TOTAL	220	1,500	1,670

Tables taken from the SIPRI Yearbook of World Armaments and Disarmament. *Figures rounded to nearest 10, or to nearest 5 when under 10. Values calculated at constant 1968 prices.*

EXPORTS OF MAJOR WEAPONS

to areas in table above (North Viet-Nam and the Republic of Viet-Nam excluded)

(millions of U.S. dollars)

Exporters :	1950	1958	1968
USA	60	800	290
USSR	40	140	380
UK	70	230	210
France	—	110	220
Canada	20	5	40
Italy	—	20	30
Mainland China	—	80	10
Federal Republic of Germany	—	10	5
Czechoslovakia	—	5	—
Japan	—	10	5
Sweden	—	30	—
All other	30	40	10
TOTAL	220	1,470	1,200

Moreover, the military research figures are understated—they exclude expenditure on space research and on atomic energy research. All in all, the research input for weapons is at least ten times that for civil goods and services. This conjures up visions of rotting urban ghettoes which modern engineering ought to cleanse; of starving children who ought not to starve; of rampant diseases which science could wipe out.

But worse than that:

"This tremendous research and development drive behind the advance in weaponry has an impetus of its own. Once massive funds are voted for weapons research . . . it is inevitable that further improvements will be made, and inevitable that new fields of warfare will be explored . .

"Weapons research proliferates in another way. . .: each new weapon spurs the development of counter-weapons."

Alas, what might science do for the betterment of human life and happiness if the balance of R and D were ten to one the other way!

This Yearbook is a *sine qua non* for the proper understanding of world affairs.

Lest I have given it a colour which others might contest, let me end by quoting the words of SIPRI's Director, Mr. Robert Neild:

"The Yearbook is factual: but of course the selection of the material and the way in which it is presented implies a set of valuations, and we should make them explicit. Obviously the staff—drawn as they are from many different countries—have differing views on a wide number of questions of world armaments and disarmament. The common elements in their approach may be summarized thus: that the rise in world military spending, and more particularly the constant technological acceleration in weaponry, is highly dangerous, and that the attempts so far made to slow down, halt or reverse the process have been incommensurate with the danger; that arms competition, though it is not the sole or main cause of world tensions and conflicts, is an important independent factor which increases and exacerbates tensions: and that arms limitation or disarmament could help considerably to reduce these tensions."

Amen. ■

The SIPRI Yearbook of World Armaments and Disarmament 1968-1969, prepared by the Stockholm International Peace Research Institute, is published by Almqvist & Wiksell, Stockholm, Humanities Press, New York and Gerald Duckworth & Co., Ltd., London. (Prices, hardback and soft cover respectively: 60 and 32 Kr.; $12.00 and $6.50; £5 and £2.10.)

IMPORTS OF MAJOR WEAPONS BY DEVELOPING COUNTRIES

(millions of U.S. dollars)

Importers :	1950	1958	1968
Greece and Turkey	20	380	50
Middle East (including the UAR)	20	240	640
North Africa (Algeria, Libya, Morocco, Tunisia)	—	—	30
Sub-Saharan Africa (the rest of Africa excluding South Africa)	—	—	30
South Africa	5	10	70
Indian Sub-continent (Afganistan, Ceylon, India Pakistan)	40	340	200
Far East (excluding Mainland China, Japan, North Viet-Nam and the Republic of Viet-Nam)	90	350	70
Central America (All countries from Panama north to the USA)	—	10	—
South America	40	140	100
TOTAL excluding North Viet-Nam and the Republic of Viet-Nam	220	1,470	1,200
North Viet-Nam and the Republic of Viet-Nam	—	30	470
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Federal Republic of Germany	—	10	5
Czechoslovakia	—	5	—
Japan	—	10	5
Sweden	—	30	—
All other	30	40	10
TOTAL	220	1,470	1,200

Super-arms for developing countries

MILITARY expenditure in the developing countries is only a small fraction of the world total, but it seems to have risen rather faster than world military expenditure as a whole and to have been accelerating recently.

The spread of existing sophisticated weapons through the Third World is a very significant aspect of the arms competition there. This "horizontal" proliferation is the complement to the technological arms race which is perhaps the most important feature of the arms competition in the developed countries. More and more developing countries are acquiring fighters, ground-to-air missiles, and so on. The Third World countries do not, for the most part, produce these sophisticated weapons themselves; the weapons are supplied by the industrial nations.

Some Third World countries, such as Israel and India, are beginning to produce more sophisticated weapons; but these weapons are usually produced under licence with a substantial proportion of imported components.

The arms competition in the Third World would be very different if it were not for the fact that the great powers are seeking influence there. They may be looking for strategically placed allies, they may be anxious to support regimes friendly to them against internal armed opposition, or they may wish to protect their economic interests or to gain general support for foreign policy (in the form of votes in the United Nations, for example). One of the main methods of exerting influence is by supplying arms.

There are some important qualifications about the figures and information discussed here and shown in the tables opposite. The figures are, as far as is known, the first comprehensive quantitative estimates which show how the trends have changed in the past two decades. They are based on incomplete unofficial information—official figures are virtually non-existent.

The tables are limited to the supply of major weapons: ships, aircraft, armoured fighting vehicles and missiles. Because no support equipment and no other weapons are included, they represent only a part—but an important part—of the arms trade.

The figures are constructed to represent the "real" transfer of resources. They are based on comparable values for comparable items, using such criteria as speed, weight, type of engine, date of production. They do not take into account differing prices or differing terms for individual transactions, such as aid, credit, loans or subsidies. That is, they attempt to measure the quantum of resources represented by the weapons, not the cost in foreign currency paid by the recipient country.

"In drawing conclusions from these figures," says the SIPRI report, "we have allowed for their wide margin of error. In dealing with the arms trade with these countries, it seemed right to construct the best picture we could, using our own judgement on information from all kinds of sources. The alternative—using official information only—would have meant that little or nothing could be said on a matter of great international importance.

"There is also a caution on the use the military expenditure figures. They cover the military expenditure of the countries out of their own domestic resources: military aid is included in the budget of the donor countries."

Major weapon supplies to Third World countries have been rising even faster than their military expenditures. The long-term trend from 1950 to 1968, has been for the supply of weapons to increase, in volume terms, by some 9 per cent a year, against 7 per cent a year for military spending. It has not been a smooth rise over the eighteen years: there was a high point around 1958, when United States military aid was at its height, and there has been a rapid increase since 1962. In 1968 deliveries of major weapons to the Third World countries, at $1,700 million, were higher than ever before: they were around $300 million, or 15 per cent, above the 1967 figure.

A growing number of Third World countries have acquired supersonic fighters, anti-aircraft missiles and helicopters for military use. The helicopter is becoming more and more important in the weapons inventory of the great powers and this is also true for Third World countries.

The two main areas responsible for the increase in major weapon supplies since 1962 have been the Middle East and North Viet-Nam and the Republic of Viet-Nam. In 1968, these two areas accounted for 70 per cent of total major arms deliveries. In the Middle East, it was not only the re-equipment which followed the Six-Day War which made up the massive influx of weapons: there were extensive arms purchases by Saudi Arabia, Iran and Kuwait. In addition, there were in this period significant increases in major arms supplies to South Africa and the four North African countries.

The pattern of the short-term increase from 1967 to 1968 was a little different. Again, it was dominated by the Middle East, but in addition there were notable increases in arms supplies to the Indian sub-continent and to South America: in both these areas the trend had previously been falling.

The United States, the Soviet Union, Britain and France dominate the market for major arms exports. During the 1950s these four countries accounted for 80 per cent of major arms supplies to the Third World. During the 1960s this proportion had increased to 90 per cent, and it is still rising.

The United States share of major arms supplies to the Third World has fallen both absolutely and relatively since the end of the 1950s. Since 1960, the emphasis of US military assistance policy has shifted from the defence of states from possible external attack to the defence of governments from possible internal insurrection: developing countries have been encouraged to acquire counter-insurgency equipment rather than sophisticated conventional equipment.

Such items include helicopters, trainers, patrol boats, refurbished World War II combat aircraft, which are relatively inexpensive. The Arms Trade Register for 1968 shows that a large part of the equipment supplied by the United States in 1968, particularly in Latin America consisted of these items.

Major arms supplies from the Soviet Union have risen throughout the period. In the last few years, the Soviet Union has exported roughly the same quantity of major weapons as the United States. The most rapid increase in Soviet major arms supplies occurred in the second half of the 1950s. Between 1954-58 and 1959-63, major arms supplies from the Soviet Union doubled. Between 1960-64 and 1964-68, they rose by only about 10 per cent.

The first arms agreement with Egypt was made in 1955; it was followed soon after by a similar agreement with Syria. In 1958 the Soviet Union began supplying arms to Iraq and Indonesia, and a little later to Africa. Arms supplies to India and Cuba began in 1960. Although major arms supplies to India and the Middle East have increased substantially in recent years, the total Soviet rise has been relatively small because of a considerable reduction in supplies to Indonesia and Cuba, which reached their height in 1962.

In the short term, major arms supplies from both the United States and the Soviet Union have risen, particularly in the Middle East. The Soviet Union has been meeting the replace-

ment requirements of the U.A.R. and Syria, while the United States has been supplying sophisticated equipment to Israel, Jordan and Iran.

Britain and France together account for approximately 20 per cent of total major arms supplies during the period. The British share has fallen since the end of the 1950s. The level of supplies from France has risen throughout the period, though not continuously; it is now approaching equality with the level of British supplies.

During the 1950s, a large proportion of British arms were supplied to countries which had had traditional military ties with Britain, or to ex-colonies. Many of these traditional recipients have turned to other sources. The U.A.R. and Iraq turned to the Soviet Union, Jordan is receiving more and more weapons from the United States, and India from the Soviet Union. An embargo has been placed on British arms supplies to South Africa, which has consequently turned to France

In the short term, there have been rapid rises in both British and French major arms supplies. In 1968, Britain and France accounted for 35 per cent of total major arms supplies. France has determinedly expanded its markets in South Africa and in Latin America and South Asia. The embargo on Israel has been accompanied by an increase in orders from and deliveries to the Arab countries. France continues to supply arms to French ex-colonies A large part of the recent increase in British major arms supplies has consisted of deliveries to the oil rich countries of the Middle East.

Among the other suppliers, Canada, the Fed. Rep. of Germany and Italy have increased their exports in the last few years. Major arms supplies from Italy and Canada were also high during the 1950s, in relation to their current level. Canada was selling Sabre fighters, built under licence from the United States, during the 1950s; it is now selling Canadian built and designed transports. Italy is selling trainers and helicopters. During the 1950s, Italian exports consisted primarily of ships.

The rise in major arms supplies from the Fed. Rep. of Germany to countries outside Europe has consisted of surplus equipment. Iran and Venezuela, in particular, have purchased large quantities of ex-Luftwaffe F-86 fighters.

The Swedish defence industry is comparable in sophistication to those of Britain and France. However, Swedish exports of major weapons to the Third World have been extremely low and have fallen to an almost negligible amount during the 1960s. This is probably the result of the increasingly restrictive Swedish arms trade policy. ■

The above text is abridged from the SIPRI Yearbook of World Armaments and Disarmament 1968-1969, published by the Stockholm International Peace Research Institute.

10th ANNIVERSARY OF U.N. DECLARATION ON THE INDEPENDENCE OF COLONIAL PEOPLES

TEN years ago, the United Nations General Assembly approved the Declaration on the Granting of Independence to Colonial Countries and Peoples. All peoples, it declared, had the right freely to determine their political status and to pursue their economic, social and cultural development.

The importance of this historic Declaration was recalled recently by M. René Maheu, Director-General of Unesco, on the occasion of the 25th anniversary of the founding of the United Nations. Speaking in Geneva on behalf of 21 international organizations of the U.N. family (1), he declared :

"It was within the United Nations that the idea and the process of decolonization took definite shape. The Trusteeship Council and the Fourth Committee of the General Assembly, in particular, have been largely instrumental in bringing about the emancipation of many peoples formerly under colonial rule.

"The accession of these peoples to independence, however, has not only profoundly altered the composition of the international community and the relations among its members, it has also highlighted a number of problems which had never previously appeared in their true colours and in all their gravity.

"I refer to the problems of underdevelopment. Mankind has suddenly realized both that development has been the privilege of a minority instead of being, as it can be, the condition of all, and that most of the countries seeking to achieve it were unable to do so by their own unaided efforts.

"In this respect, a tribute must be paid to the Economic and Social Council, the organ of the General Assembly mainly responsible for the development of this new awareness that has changed the spirit of our times. The Council hammered out the idea of integrated economic and social development and secured acceptance of it not only as a possibility but as a duty devolving upon each individual country and upon the international community as a whole...

"... The world is still dominated by too many rulers and groups who do not suit their actions to their words, who preach peace while waging or preparing for war, who exalt justice while tolerating discrimination and flagrant inequality, who pay lip service to progress while diverting to armaments enormous sums which they could more usefully spend on development, both in their own country and abroad..."

During the past year, the "Unesco Courier" has on many occasions described the successes and setbacks, the aims and hopes of the global struggle for the development of the under-privileged countries. Our February and October 1970 issues were largely devoted to the problems of development and our January issue dealt with education, an integral part of economic and social development.

(1) *The International Labour Organization — the Food and Agriculture Organization of the United Nations — the United Nations Educational, Scientific and Cultural Organization — the World Health Organization — the International Bank for Reconstruction and Development and its two affiliates, the International Finance Corporation and the International Development Association — the International Monetary Fund — the International Civil Aviation Organization — the Universal Postal Union — the International Telecommunication Union — the World Meteorological Organization — the Intergovernmental Maritime Consultative Organization — the International Atomic Energy Agency — the General Agreement on Tariffs and Trade — the United Nations Conference on Trade and Development — the United Nations Industrial Development Organization — the United Nations Children's Fund — the United Nations Development Programme — the United Nations Relief and Works Agency for Palestine Refugees in the Near East — the Office of the United Nations High Commissioner for Refugees — the United Nations Training and Research Institute — the World Food Programme.*

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A NUCLEAR WAR AND INDIA

Talk of a nuclear holocaust usually fails to invoke a sense of doom in India. This is because there is a general feeling that the war will be fought between the Great Powers only, and that too, in Europe; and even if we do have a nuclear war it is only an alternative to dying of hunger. These are just illusions. A nulcear war anywhere in the world will involve India. Prevention of all wars and a stop to armaments will not only ensure that we do not die of a nuclear war, but will also not die of hunger or communicable disease. If the money spent on our sophisticated arms imports is used for the supplies of clean drinking water for the next ten years there would probably be no water borne diseases in India.

The atom bombs of the type used in Hiroshima and Nagasaki had an explosive power of kilotons of TNT (thousands of tons of TNT) Hydrogen bombs developed a decade later have an explosive power of megatons (millions of tons). A single thermonuclear bomb has an explosive power greater than that of all the explosives used in all wars since gunpowder was invented. The present day nuclear arsenals have an explosive power 5000 times greater than that of all the explosives used in the Second World War. No country on Earth could survive an all out nuclear war. It is estimated that such a war would take place by the end of this century, a bare sixteen years from now. That such a war has not taken place as yet is now consolation for it need take place just once for the planet to be destroyed. It is painful to realise that we may the last generation on this earth and that subsequently there would be no one to watch the beauty of the sunrise

...2/-

or the mysticity of the sunset.

India lies in the Northern Hemisphere approximately between the latitudes 10^{o} and 35^{o}. It is believed that a nuclear war will be fought in Europe between latitudes 40^{o} and 60^{o}. This places us in India in a relatively unenviable position.

The effects of a nuclear explosion are mainly due to a blast wave (which is almost half the total energy released) the heat flash and radiation. The consequences of each of those would depend on whether the blast is exploded in the air (air burst) or on the ground (surface burst). We may not get the effects of the blast and thermal waves, but we certainly would be affected to a great extent by the global radioactive fallout. In fact, it is unlikely that any country in the world escape the global radioactive fallout, no matter where the nuclear war is fought. The upper atmosphere would be injected with radioactive particles and these would descend all over the globe in weeks and months. By this time only the long lived isotopes, particularly strontium 90 and cesium 137, would be significant. The effects of these over years would be cancer and genetic defects.

Our grain reservoirs would not survive the holocaust - the grain would be radioactive and unfit for consumption. Crops too would not be spared. Insects would rapidly consume the crops. Protection against insects is mainly by birds and insecticides. Birds are less resistant than insects to radiation and would not survive. And insecticides not being stored underground would become radioactive.

It would be difficult to quantify the atmosphere disturbances.

...3/-

Millions of tons of particulate matter would be injected into the atmosphere. The dense clouds so formed would obscure the sun, causing a fall in temperature and reducing photosynthesis in plants. A drop of even 1 or 2 degrees Celsius in the average temperature in the Northern Hemisphere would seriously affect crop growth. Oxides of nitrogen would be liberated too during a blast. If they entered the trophosphere more ozone would be produced which would reduce plant growth. If the oxides of nitrogen entered the stratosphere the ozone would be depleted giving rise to all the problems associated with an excess of ultraviolet radiation, specially blindness and skin cancers.

So no matter how we look at it we in India stand to lose in a nuclear war. In fact, it is foolish to think just in terms of India when a nuclear conflict is concerned. If India must survive a nuclear war then the entire world must survive or we all die together. Only when this is fully realized can we impress upon our leaders and military strategists of the consequences of nuclear war. And unless there is a global understanding of this problem and urgent steps are taken towards complete global disarmament we in India cannot think of marching into the future with heads held high.

THE PEACE MOVEMENT AND THE THIRD WORLD

Eboe HUTCHFUL

Introduction

The resurgence of the peace movement in the West is undoubtedly a major political event of the early eighties. The growth of the movement and its gathering momentum since 1980 have been made forcefully obvious in massive peaceful demonstrations (400 000 in Amsterdam in November 1981,550 000 in Bonn, thousands more in Tokyo, London, Ottawa) as well as in not-so-peaceful protest (riots in Berlin, bombings in France, Germany and Italy). Even more than in the 1960s the movement enjoys an extremely broad base of support, cutting across the traditional sociopolitical categories - women, youth, labor, clergy, environmentalists, progressive intelligentsia, and even political conservatives - all more or less radicalized by their perceptions of the danger of an increasingly nuclearized and militarized environment.

This strength has posed a serious challenge to the power of the bourgeois state at a critical time, and it is being met by mobilization of the repressive state apparatus (1700 polizei in Bonn alone), contemplation of special security legislation and suspension of certain civil rights, etc. A movement on a similar scale has not so far developed in the Soviet Union and Eastern countries (although it does exist), not least because of the determined opposition of the governments there to such manifestations of independent protest (note East Germany's recent expulsions of peace protestors).

Militarization-nuclearization: symptoms of fundamental social contradictions

To describe this phenomenon in the singular number"movement" is to misname it. It is only in the broadest sense that any association embracing socialists, the Greens Party, and the National Conference of Catholic Bishops can be seen to constitute a single movement. This heterogeneity is a source of both strength and weakness. Obviously, it has made possible some unity among diverse social strata over minimum programs to defuse the nuclear threat; it has marshaled a popular constituency which no government dare ignore. At the same time, it inhibits an objective understanding of the root cause of the nuclear threat

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Department of Political Science, University of Port Harcourt, Harcourt, Nigeria.

today and leads to utopian and contradictory "solutions." For nuclearization is only a symptom, not and disease. Fundamental solutions cannot be pegged at the level of immediacy (whether in the form of a "freeze," specific controls over nuclear weaponry, or disarmament proposals) but must be sought in the eradication of the social contradictions producing nuclearization and militarization.

This is where the difficulty begins. While some view the nuclear threat in moral and theological terms (and even within the churches there is no consensus on the practical implications of such arguments), others see it as excesses basic to conditions of production and distribution under advanced capitalism, and increasingly under Soviet socialism. In this sense, the struggle for "peace" actually reflects a split within Euro-American capital and its constituency over how to approach the deepening contradictions of contemporary capitalism: a fascist rightwing seeks final confrontation with the forces of socialism and is ready to extirpate social struggles with nukes; a liberal-theologian approach treats the problem as a "moral and religious issue" and, like all religious thought, sees no systemic roots of militarism; and, finally, a progressive wing sees nuclearization as the cumulation (and deadliest manifestation) of the excesses of capitalism.

Immediate cause of peace protests

The immediate cause of the peace protests is less controversial and can be traced to (a) the development of a new generation of sophisticated and super-accurate nuclear weaponry(soviet SS-20s, American cruise and Pershing II missiles) with "first-strike" capability; (b) NATO plans to restore the nuclear balance in Europe by installing 572 intermediate-range nuclear missiles on European soil beginning December 1983: 108 Pershing II and 96 "Tomahawk" cruise missiles in West Germany, and cruise missiles in Britain (160), Italy (112), Belgium (48) and the Netherlands (48); (c) the emergence of right-wing governments in the West (particularly the Reagan Administration in the US) that seem prepared to contemplate not just deployment but actual use of nuclear weapons; (d) the substantial propaganda of the Reagan Administration that "limited" or "protracted" nuclear war is not only possible but winnable, scenarios of civil defense under nuclear attack and instruction on how to survive a nuclear war, repudiation of SALT II and revival of cold war rhetoric; and (e) prolonged stagnation and crisis in world capitalism, and the

potent absurdities of Thatcherism and Reaganomics, e.g. increasing unemployment in order to stimulate "economic revival," cutting old age benefits and social welfare in order to increase arms production.

Old contradictions seem all the more intolerable: large-scale investment in weapons capable of more and more complete devastation as a "condition" for peace, arms control treaties that result in intensified arms race, billions of dollars in payments to European and American farmers to curb production when millions are dying of starvation in the world, "development" predicated on probably irreversible ecological damage, etc.

SuperPower rivalry and nuclear blackmail

Yet, in spite of the groundswell of support in the West the peace movements have evoked no corresponding movements in the Third World. Does this mean that "peace" is irrelevant to Third World countries? Yes, it is - as long as the question is framed within the context of the immediate concerns of the peace movements. Both in terms of distance and reality, the nuclear issue seems remote, and even irrelevant, in relation to the daily struggle of the Third World masses for survival. Even so, some countries of the Third World (India, China, Brazil, Argentina, Israel, South Africa, etc.) have developed nuclear capability. The apparent lack of concern about the dangers of nuclearization (indeed, support for it, considering that some other Third World countries are aspiring to acquire such capability or are under pressure to do so) appears paradoxical in the light of the thesis of this paper that far from being peripheral to the nuclear confrontation, the Third World is, in fact, central to it. This would become obvious if one first decisively rejected, as one must, the illusion that America's aggressive nuclear posture is in response to warlike Soviet intentions against Europe or America. The Reaganite hawks justify renewed American armamentism in terms of the necessity to prevent "spread of totalitarian power," to promote "defense of free institutions," and to defeat Kremlin attempts to "get power over the whole world."[1] Yet, the essentially defensive intentions of Soviet nuclear policy have consistently been stressed both by the Soviet leaders themselves and by responsible American commentators. Even at the height of the cold war, in the 1960s this was implicitly admitted to be the case:

The theme of Soviet aggressiveness has been repeated so often and so loudly in the past during the last quarter-century that it is now accepted by most Americans as a fact-as little to be questioned as night following day. And yet, paradoxical though it may seem, we know of no serious analyst of Soviet society and Soviet policy who really believes it.[2]

More recently, even normally anti-Soviet sections of the American press have admitted that

Despite their willingness to rely on brute force, the Soviet leaders have shown no inclination to risk nuclear war with the United States. By nature they tend to assume the worst and to prepare for the worst, which is why they arm as they do.[3]

Moreover, Soviet nuclear weapons have been confined to Soviet soil, not deployed on the national territory of third parties, as are American missiles (even, as now, against considerable domestic opposition). Nuclear blackmail has consistently been American rather than Soviet policy, although, given no other choice to guarantee its national security, the Soviet Union has accepted the nuclear challenge so thoroughly that it may have outstripped the Americans (or so the Americans say).

Paradoxical growth of East-West trade

In wpite of temporary setbacks (Czechoslovakia, Afghanistan, Polant) Soviet relations with Western Europe over the last two decades have been characterized by peaceful coexistence and expanding trade, industrial, scientific and cultural exchanges. While it remains true that "commercial transactions between East and West take place in a highly complex and volatile environment, subject to recurrent cycles of conflict and accommodation,[4] an undeniable feature is its consistent growth. Between 1966 and 1972 Soviet exports to NATO economies grew by an average of 11.3% per annum and imports by 10.5%. In 1966, Soviet exports and imports to and from the West constituted about 22% and 25% respectively of total Soviet world trade; in 1972, the figures were 22% and 28%. In 1902, Soviet trade with the West had increased to 31-6% of the total (compared with 14.1% for the underdeveloped countries).

These expanding commercial relations should be understood against the background of the problems of both capitalist and socialist production in Europe. With American domination of the world capitalist market, increasing competition from the Japanese, and stagnation in their domestic economies, European

governments and firms (as well as those of Canada and Japan) were encouraged to exploit Eastern markets. The West German "economic miracle" also found an export outlet to the East. For these smaller European economies the socialist countries offered a "vast and rapidly expanding market" for commodity exports as well as "lucrative prospects for industrial, technological and managerial cooperation."[5] For the Soviet Union, lagging technological development in nonmilitary industries, a series of bad harvests and persistent problems of agricultural production, chronic shortages of consumer goods, etc., led to large food imports, procurement abroad of high technology goods, advanced machinery and equipment, machine tools, etc. The principle governing these exchange was that of peaceful coexistence, the assumption that "the economic system of both communism and free enterprise will survive into the indefinite future," and that "neither side will probably dismantle its own social structure or try to overwhelm the other with military force."[6] According to Pisar:

> Today, the prevailing view rejects the notion of the two hostile, non-communicating economic orbits as not only untenable, but downright harmful to the interests of the East.[7]

In the late sixties and early seventies, with Czechoslovakia hardly behind them, there was a "considerable increase" in long-term trade, industrial and scientific cooperation agreements between the East and the West in Europe. This included large-scale joint ventures between capitalist firms and state organizations in Yugoslavia, Rumania and Hungary; mammoth agreements with West German industry (and also with Italian and Austrian firms) for delivery of large-diameter rolled steel and construction of pipelines in return for supplies of Soviet natural gas; and agreements with Japanese firms for developing Soviet Far Eastern resources. After 1962, there was the transfer of a large and growing quantity of Soviet patents to UK, US, etc., and particularly to France. The largest beneficiaries of this "opening to the East" were West Germany and a number of individual European firms, such as Fiat(Italy), SECAM and Renault (France), ICI,BAC, and Leyland (Britain). Considerable liberalization of trade with the East (and evasion of NATO restrictions) took place among most Western European countries, further liberalization being constrained more by "fundamental differences between the economic systems" and by fears of disruption of Western markets by the sales practices of Eastern state trade organizations than by any ideological differences. Individual EEC governments and banks competed to extend

liberal export credits to Poland and other Eastern countries (total credits of more than five-year duration already exceeded $3 billion by end 1971), leading to fears that this would subvert the "common commercial policy" of the EEC and erode its competitive position in relation to Japanese and American exporters.[8]

With this evidence (not to mention the just concluded "Conference on European Security and Co-operation") a nuclear confrontation, let alone "exchange," hardly appears likely or imminent in Europe, even without underestimating the recklessness of the belligerent Reagan Administration in Washington.

Real causes of European nuclear scare

Clearly, the real cause and function of the European nuclear scare need to be sought elsewhere. The real reasons are: (1) the erosion of the American hegemony in the Third World by the tide of revolutions- revolutions supported militarily by the Soviet Union; and (2) the fear of attenuation of the American empire in Europe, arising out of the paradoxical combination of a European peace movement and unprecedented growth in Soviet military power. TIME has accurately (if unwittingly) identified the "sequential triumph of leftist revolutions" in the Third World as the fundamental problem for America.[9] Nuclearization is only the ultimate attempt to stem these revolutions; it is itself only a single aspect of a more generalized militarization of the international environment occurring in response to these revolutionary struggles, a process of militarization, the bleakest aspects of which are manifested precisely in the Third World.[10]

Dependence on Third World strategic materials

To understand this requires some understanding of the contradictions of the capitalist system, at the center of which stands America. Since its mercantile genesis, modern capitalism has always been an international system, and could only grow and survive as such. Postwar developments made this even more true.

The technological revolutions in the nuclear, aerospace, electronics and other industries made possible an unprecendented growth in the scale and complexity of capitalist production in civil and military industries. These advances accentuated the importance of basic energy sources, created a demand for new mineral raw materials and raised the strategic significance of traditional and nontraditional metals (vanadium, titanium, molybbenum, tungsten, uranium, thorium, etc.), many of which existed in inadequate quantities or not at all in the national territories of the main capitalist countries. This has sharply increased the dependence

of the main capitalist countries on external sources of supply of strategic and other materials, much of it lying in the Third World countries. The United States, traditionally the most self-sufficient of the Western capitalist countries in the area of raw materials, is dependent on imports to an absolute or "critical" degree for a large and growing range of strategic materials. Current US import dependence is 100% for thallium and thorium, over 90% for tantalium, mica, and asbestos, 80% for nickel, columbium, flourine, graphite, platinum and bauxite, between 60% and 75% for cobalt, manganese, chromium, tin and mercury, and about 50% for zinc and tungsten.[11] Military applications form an important proportion of total US consumption of these imports, ranging from about 25% to 26% for thallium and germanium, to over 15% for copper, cobalt and thorium (mainly in aircraft and aerospace engines) and 8%-10% for manganese, tungsten, chromium, antimony, nickel, tantalium, beryllium, cadmium and zinc. For some of these metals, such as manganese (indispensable for the removal of sulphur impurities during steel manufacture) and cobalt (used in jet engines, missiles, gas turbines and generators for corrosion resistance at extremely high temperatures), there are simply no substitutes. Shortages of these materials will have serious consequences for US GNP and military power.[12] It has been estimated that the US has within its own borders only 1%-10% of the reserves necessary to meet demand up to the year 2000; with only 6% of its present population, the US will require 50-100% or more of the known reserves in the capitalist world.

The dependence of Western Europe and Japan on imports is still greater. For example, West Germany imports 100% of its chromium, copper, manganese, antimony, platinum, asbestos, and a high proportion of its energy needs. The picture is not substantially different for Japan and the other West European countries. On the other hand, the Soviet Union and China are self-sufficient in most minerals and raw materials, including oil. These two countries also contain the bulk of the world's reserves of many strategic materials.

Investments abroad

Postwar advances in capitalist productive powers also and made possible the concentration of capital in larger and larger units. These developments were summed up in the emergence of the giant American corporations. The rising organic composition of capital

and falling rate of profit at home, the much larger profits to be made abroad (from a combination of cheap labor and energy, virgin markets, lower taxes, etc.), and the need for new of guaranteed sources of raw materials drove these corporations to extend more and more of their operations outside the confines of their home territory. The structure and operations of a typical large multinational today are demonstrated by Texaco (1981 total assets: $27.5 billion, 55% held outside the US; total revenues (1981): $59 billion. Net income: $2.3 billion 60% derived from overseas operations). Texaco's assets include oil and gas exploration and exploitation interests in 6 Western hemisphere and 22 Eastern hemisphere countries, ownership or part-ownership through subsidiaries and affiliates of 50 refineries in 30 countries, and extensive marketing interests in petroleum products, petro-chemicals and natural gas in 150 countries.

A similar concentration of assets and internationalization of their business operations are manifest in the banking system. In 1971, the 13 largest US banks together controlled a total of $195 billion in assets and maintained 822 foreign affiliates; in 1976, the 10 largest banks controlled $348 billion in assets and 1069 foreign affiliates. The largest bank, Bankamerica Corporation (1976 assets: $72.2 billion), derived 15% of its total profits from foreign operations in 1971 and 40% in 1976; Citicorp, the second largest (1976 assets: $63 billion) and the one with the most extensive foreign lending operations (much of it concentrated in the Third World), derived 40% of its profits in 1970 and 72% in 1976 from operations abroad.

These tendencies toward outward expansion of capital characterized the motion of capital as a whole, although it was most marked in the case of the leading imperialist country. American direct investment abroad grew from $56.6 billion in 1967(53.8% of all foreign direct investment) to $137 billion (but only 47.6% of the total) in 1976. Similar growth, but on a smaller scale, occurred in the same period for the UK (from $17.5 to $32.1 billion), West Germany ($3.0 billion to $19.9 billion), Japan ($1.4 billion to $19.4 billion) and France ($6.0 billion to $11.6 billion).

Contradictory pulls

This export of capital occurred under inherently contradictory pulls: (i) growing rivalry between the leading capitalist power; (ii) competition between capitalism and socialism; and (iii) growing confrontation between imperialism and national liberation. Under the conditions of monopoly, capital could not maintain its rate of surplus value without producing these revolutionary condition; it could not internationalize itself without at the same time internationalizing the class struggle.

While socialism (the product of the contradiction between socialized production and private property) is the logical product of capitalism as such, national liberation (the conflict between the growing international reality of capital and its form as national private property) is specific to monopoly capitalism. National liberation found a natural ally in socialism. Soviet military power armed revolutions; in turn, the Soviet Union sought to promote its national security through support for anti-imperialist struggle and extension of the zone of socialism. The result was a string of successful revolutions: first North Korea, North Vietmen, and Cuba, then (since 1975) Cambodia, South Vietnam, Angola, Mozambique, Iran, Nicaragua, Zimbabwe, and now El Salvador.

With its huge and sprawling investments in the Third World, the unusually large profits accruing from these investments, and its dependence on foreign sources of strategic and other resources, the US stood to lose heavily from these revolutions. Its response was to set up a global military machine, enter into alliances with repressive and reactionary regimes, and intervene against revolutionary movements wherever they raised their heads. The internationalization of capital in its monopoly phase thus product its necessary corollary in millitarism. Baran's and Sweezy's remark that "the real battlefield between capitalism and socialism have for years now been in Asia, Africa and Latin America - in Korea, Vietnam, Algeria, Cuba, the Congo" is no less true now than when it was first made (in 1966).

Growing revolutions abroad, persistent stagnation at home - these were the two realities that swept President Reagan and a number of right-wing governments into power in the West.

The crisis at home and abroad accelerated existing tendencies toward militarization in the capitalist countries. Prolonged recession led to greater emphasis on arms production to sustain employment and the balance of payments. With their monopolistic conditions, long-term limitless R&D, and guaranteed profit margins, defense contracts were an ideal way to escape the consequences of a general fall in the rate of profit. But with the increasing technical sophistication and scale of production, prohibitive R&D costs and unprecedented rate of obsolescence and growing competition abroad, the main arms manufacturers could not arm themselves without at the same time arming the rest of the world. Military capital, like all capital, is ruled by the logic of expansion. On the other hand, more and more armamentism becomes the key to containing the spreading revolutionary fires and arresting the decay of the capitalist hegemony. Reagan's threat to "draw the line at El Salvador"and the growing cycle of US military intervention and intimidation in the Third World since his ascent to power is only too clearly demonstrated by the record (from 1982 only), as tabulated below.

Objectives of the armamentist policies

Previous experience has persuaded the US that it cannot hope to win these wars of liberation. This is the significance of Haig's threat to "go to the source of revolutionary unrest" (i.e. the Soviet Union and Cuba). It is this light that the nuclear "scare" created by deploying Pershing II in Europe should be seen. Its objective is not to provoke a nuclear war in Europe. (In this sense, the Reagan Administration's belated protests of peaceful intentions may be genuine.) On the contrary its real objective is, first, to frighten the Soviet Union into anxiety over its own territorial security in order to force it to withdraw support to national liberation struggles. This accounts for Reagan's proposal to "spend the Soviet Union into oblivion" (i.e. to reduce it to economic exhaustion and force cessation of "military adventures" abroad). The nuclear talk became necessary because of the American misunderstanding (misrepresentation?) of "detente" as a moratorium on Soviet support for liberation struggles (cf. the accusations over Angola), and, because of the failure of successive strategic concepts (massive retaliation, balance of terror, etc.) as a subtle maneuver to oblige the Soviet Union to recognize the sanctity of the American sphere of influence.

US military interventions

Name/Location of Military Exercises	Participants	Target(s)
1. Berbera (Somalia) November 1982	US naval, air ground forces	Libya, Ethiopia, Middle East
2. "Operation Bright Star" December 1982	US(RDF), Oman, Somalia, Sudan	As above
3. "Ocean Venture 82"	US naval units(60 ships)	Cuba, Grenada
4. "Team Spirit 83" February 1983	US, South Korea	North Korea
5. "Operation Big Pine" February 1983	US, Honduras	Nicaragua
6. "Readex 83"	NATO Units	Caribbean region
7. Mediterranean February 1983	US Sixth Fleet(nuclear carrier'Nimitz')	Libya
8. Pacific, Atlantic Coasts off Nicaragua July 1983	US naval units(2carrier groups, battleship group)	Nicaragua
9. "Operation Bright Star" August 1983	US, Egypt, Somalia, Sudan, Oman	As with previous exercises
10. Mediterranean July-August 1983	US Carrier Fleet, AWACS	Libya, Chad
11. Chad August 1983	US arms, equipment; French, Zairean intervention forces	"Libya-backed" rebels
12. "Big Pine II" Nov.-Dec. 1983	US, Honduras	Nicaragua

The second objective is to half the process of European integration in order to halt the decay of America's European empire (particularly West Germany). The European empire is, indirectly, a key to the control of a yet larger empire beyond, particularly in Africa.[13] Piser argues that "progressive integration of the area (Europe) is accepted as an established fact" by Western and Eastern Europe. If this is in any sense correct, such integration would have major geopolitical implications, the most obvious loser of which would be the United States. Given the increasingly suspect commitment of the Soviet Union and Eastern Europe to socialist transformation at home and abroad, and the limitations of the socialist division of labor as it is presently constituted, the possibility of such an integration should not be discounted.

American nuclear brinksmanship should therefore be as seen as a reaction to the threat, not of a European war, but of a European peace. Harris notes, quite properly, that "the underlying aim of American defence policy (is) to control Western Europe as much as Eastern Europe," and that exaggerated estimates of Warsaw Pact force levels are an essential ingredient of this.[14] The American missile ploy appears to be working. As Pravda (1/8/83) warned West Germany:

The deployment of American missiles will lead to a dangerous growth in military confrontation. There will also be a certain complication of relations with the countries who (sic) have accepted the American nuclear presence. This particularly concerns West Germany, whose government has accepted the deployment of the first-strike weapon Pershing-2. The military threat for West Germany will be greatly multiplied. Its well developed contacts with Socialist states will be threatened, and it will only be able to see East Germany across a bank of missiles. (Emphasis added.)

The European "missile debate" must also be seen in terms of interimperialist rivalries and the different needs of the main capitalist nations relative to the Soviet Union and East Europe. Short on energy and raw materials, unable to compete elsewhere against America and Japan, European capitalism finds Eastern markets increasingly crucial to its survival. With a relatively small military industry, Western Europe cannot hope, and does not wish, to compete militarily with the Soviet Union. America,

however, with its prodigious military machine whose sole raison d'etre has been for almost four decades the "Red threat," has powerful entrenched interests against normalization. The same military machine is the ultimate guarantee of American leadership of the Western alliance, the pretext for keeping European communists (and Third World radicals) out of power. It is also the protective umbrella under which American capital penetrated, and continues to dominate, Europe and the rest of the capitalist world. While European peace offers important economic benefits to West Europe, it will be hard to achieve because it necessitates painful readjustments in American psyche, economy, dominant interests at home and power profile abroad.

However, America is not the only superpower that is reacting to the threat of peace with increased armamentism. The consequences of peace would be only slightly less profound for the Soviet military-industrial complex that has subordinated all economic rationality to itself. Partial reintegration into world capitalism has actually enhanced the USSR's militaristic profile abroad. The most important brake on Soviet trade with the West has been the persistent balance-of-payments problem and shortage of hard currency. To fill the gap the Soviet Union has intensified arms sales to Third World countries. Next to crude oil, arms are the largest single Soviet source of hard currency. Recently, to maintain oil exports to the West, the Soviet Union has stepped up arms-for-oil deals with the Middle East: in 1982, Libya more than tripled its oil export to Soviet Union in order to liquidate its huge arms debt to the USSR. The drift in Soviet policy from arms-for-liberation to arms-for-commerce logically follows from the rapprochement with capital and the abandonment of autarky.

Conclusion

This analysis should show that Third World anti-imperialist struggles are actually the reverse side of peace movements in the West; they are in many ways the functional equivalent. However, the objectives of liberation struggles are not necessarily consistent with some of the major ideological trends within the peace movements. To the extent that "peace" is conceptualized as a moratorium on social struggles, or as the unfettered expansion of capital mediated by an equilibrium state, it can only be ultimately indifferent, if not hostile, to struggles for national liberation. Such liberation is driven to take recourse to armed struggle,

which seems antithetical to "peace." but "peace" is not merely the abolition of the more horrendous forms of armamentism; it is the eradication of the social contradictions that constitute the systemic roots of armamentism. This can only occur through the evolution of a world order whose active principle is the control by peoples and social groups over their conditions of life and self-realisation. Only thus can today's awesome technology(presently enslaved by capital) be liberated from the compulsive urge to fashion weapons of destruction and redirected to the fulfillment of human needs.

However, there are certain short-term objectives which can be adopted by both the Euro-American peace movements and the progressive groups in the Third World to defuse the growth of armamentism. These include:

(1) Securing soverignty over strategic resources, many of which have direct military application - such as thallium, germanium, garnet, thorium, uranium, etc., of which Third World countries have substantial reserves. Practical policies to advance national sovereignty and control over these resources could constitute a potent peace policy,[15]

(2) Supporting resistance against stationing of foreign military bases and deployment of nuclear weapons on national soil, and/or movement of nuclear missiles across or over national territory, airspace, or waters;

(3) Supporting the demand for declaration of nuclear-free zones.

Working together for the achievement of the limited short-term goals will go a long way toward strengthening both movements and national liberation struggles and making them into a force to reckon with.

Notes

1. See interviews in Time Magazine, 29 March,1982,pp.14-15.
2. Paul A. Baran and Paul M. Sweezy, Monopoly Capitalism: An Essay on the American Economic and Social Order (Penguin, 1975), p.164.
3. Time Magazine, 29 March, 1982.
4. Samuel Piser, Coexistence and Commerce: Guidelines for Transactions between East and West (New York: McGraw Hill, 1970), p.2.
5. ibid,
6. ibid.,p.1.
7. ibid.,p.23.
8. Dietrich A. Loeber, East-West Trade: A Sourcebook on the International Economic Relations of Socialist Countries and their Legal Aspects (New York: Oceana Publications, 1976).
9. Essay, 8 August, 1983.
10. For this militarization and its social basis as it occurs in Africa, see my "Trends in Africa" in Yoshikazu Sakamoto and Eric Johansen (Eds.), Militarization and Society(World Order Models Project (forthcoming).
11. Helge Hveem, "Militarization of Nature:Conflict and Control over Strategic Resources and Some Implications for Peace Policies," Journal of Peace Research xvi, 1,1979.
12. ibid,p.7.
13. France is particularly useful here. For a discussion of the role of France as a subimperial power for the United States in Africa, see Galen Hull, "The French connection in Africa: Zaire and South Africa," Journal of Southern African Studies 5, 2, 1979. Chad today shows up this role very well.
14. Nigel Harris, Of Bread and Guns; the Crisis in the World Economy (London: Penguin, 1983),p.222.
15. For a discussion of this, see Hveem, "Militarization of Nature" (Note 11).

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11-5

THE POLITICS OF NUCLEAR ENERGY

Alan Roberts

The political importance of nuclear power

Modern capitalism has turned increasingly towards technological "advances" that are suspect in the extreme. They are marked by their dubious or plainly negative contribution to human welfare, and by their destructive effects on the enviornment.

There are some whose harmfulness is now widely recognised - as, for example, the replacement of efficient public transport by a commitment to the private car, the switch to detergents, the massive use of pesticides, the waste of energy in packaging (particularly the non-returnable bottle and the aluminium can).[1]

It is now clear, however, that one particular development - the nuclear power industry - looms above all others, in its ominous implications for the future of humanity, and in its significance as an issue on which mass action against the system's irrationality is likely.

Its predominance derives, firstly, from the sheer magnitude of the economic commitment involved. The leading capitalist countries intend to generate most of their electrical power by nuclear means before the turn of the century, necessitating an unprecedented speed of construction Over the next decade alone, the US government hopes to see nuclear capacity increased eight-fold; France and Japan aim at roughly fifteen-fold growth. These programmes imply that the USA, for instance, is to spend well over a trillion (million million) dollars on the nuclear industry in the next two and a half decades.[2] It has been estimated that, if the 1985 target is achieved, the nuclear power industry will absorb over fifty per cent of gross US capital formation over the next decade.

Next in importance is thr transparency of the irrationality involved. It is not a matter of waiting till consequences difficult to foresee have come to pass - as, for example, it was necessary for the polluting effect of detergents actually to show themselves, or for the cities to become

congested, polluted and deformed by the automobile. The damage inherent in the nuclear development can be clearly foreseen at this very moment.

The third feature is one of special significance for social change: it concerns the response of the populations in the advanced capitalist countries once they are reached by the arguments against nuclear power. Outstanding here is the example of Sweden, the only country where the issue has been made the subject of more or less formal nation-wide discussion. These discussions, carried on in the course of the year 1974, saw the population swing from approval of the nuclear programme to better than two-to-one opposition. As a result, the government cut its ten-year nuclear target to one-seventh of its former size (from fourteen reactors to two).[3]

Similar responses on a more local scale have been evident in the USA, where the nuclear industry openly expresses its fear that nuclear moratoria (federal or state) will be imposed as a result of public opposition.[4]

Thus it is not simply a question of a valid issue, implying a struggle for all concerned with humanity's future. The campaign against the nuclear commitment also has the character of a transitional demand, striking at the very assumptions of consumerist society, and yet understandable to and acceptable by the people affected.

In countries of the Third World, the political context of the nuclear issue is different but the validity of the struggle is no less clear. It is necessary to emphasise this point particularly, since the proponents of nuclear power often advance arguments allegedly based on the interests of a power-starved Third World - arguments which, as we will see, could hardly be more specious.

Why the nuclear programmes are unacceptable

The dangers associated with nuclear power have been adequately explained in a number of publications, and here we will simply refer the reader to them.[5] They fall under the following main headings:

1. Unscheduled discharges of radiation to the environment, in amounts exceeding the low levels prescribed in normal operation.

2. Catastrophic releases of fuel or waste materials, following on a "melt-down" of the fuel after an accident.

3. Deliberate release (or the threat of it), of radioactive materials, as a measure of terrorism or criminal extortion.

4. Environmental damage arising from nuclear wastes (whose disposal remains an unsolved problem).

5. Undesirable political and social measures adopted to cope with these hazards.

The possible magnitude of some of these dangers can be judged from the simple facts concerning the highly toxic element plutonium. The maximum permissible annual intake of plutonium is at present one millionth of a gram, a quantity known to be capable of causing cancer (and considered too high a risk by many authorities, including Britain's Medical Research Council).[6] But the most common type of nuclear reactor, in normal operation, over one year, produces about 200 kilograms of plutonium.

Of course, stringent precautions are taken to ensure that this and other radioactive poisons are contained and never reach the atmosphere. But no system of containment can be perfect, nor verified with absolute accuracy. (Today, for example, the inventory of plutonium in a reactor cannot be checked to better than 1%.)

Suppose then that, by the end of the century, when upwards of 2,000 reactors are envisaged, a small fraction of the plutonium generated in a year "leaks" to the atmosphere - whether by accident or malevolent design. If the leak is as small as one hundredth of one per cent of the total, this still constitutes a maximum permissible dose for every person in the world, ten times over.

The nuclear programme thus embodies a proposal to organise power production around stocks of highly poisonous substances,

in quantities almost unimaginably vast in relation to their toxicity. To accept such a programme, one would need to be supremely confident of the social system in which it is to be implemented - confident both of its ability to maintain unprecedentedly high standards of technical skill with absolutely infallible rigour, and of its political and social stability over many generations. The reader can be presumed to lack such confidence.

Despite the quite extraordinary and often ingenious safety routines implemented by the nuclear technologists, whose efforts to achieve the impossible must compel admiration, the safety of the US nuclear industry has already been the target of damaging criticisms. These concern the workings of about fifty reactors in the world's most industrially advanced country; what can be expected when perhaps 2,000 reactors are operating in dozens of countries throughout the world?

Some indication of an answer to this question was given by Jean-Claude Leny, managing director of Francatome. It took the form of a broad hint to investors, that the profitability of nuclear power in France would not be allowed to suffer, - like the American industry's - from an exaggerated concern for safety ...[7]

As for the possibility of malevolent activity, the infant nuclear industry of the USA can already record, amongst other incidents, a threat to crash a highjaked plane into a reactor, a series of apparent sabotage attempts in a re-processing plant, and the selection of nuclear plants for terrorist blackmail attacks by followers of Charles Manson.[8]

It should be remembered that the possible damage arising from nuclear catastrophes is not confined to the existing population in the country of occurrence.

The very nature of the radioactive threat lends itself to dispersal in space over national and even continental boundaries, and to persistence in time so that generations remote from the present suffer illness and death (the genetic effects of radiation). The lesson from the USA in particular is that the industry's safety standards will tend to be

proportional to public concern over the issue; in this light, the struggle against nuclear power can be seen also as a simple struggle for human survival on the planet.

The disposal of waste materials from reactors - and of the worn-out reactors themselves - remains an unsolved problem. Its magnitude can be gauged from one figure alone: the annual wastes from an average reactor today contain 1,000 times the radioactivity of the Hiroshima bomb. While research proceeds on possible methods of permanent disposal, the industry contents itself with "waste management" - that is, retrievable and (it is hoped) secure methods of storage. Here it should be noted that the cost of this "temporary" storage (which is by no means at a satisfactory level of security) will rise in the next two and a half decades to some seven billion dollars in the United States alone. It is easy, then, to understand the fear expressed by US Environmental Protection Agency experts, of "the possibility that an interim engineered storage system may become permanent solely due to economic costs".[9]

To understand the ominous implications here, one should first note that the interim methods make the poisonous waste "retrievable" - or in other words, accessible. Thus they continually invite malevolently-inspired acquisition or atmospheric release. Also, the time scale of the "permanent" storage required is not in dispute: the long-lasting component of the wastes (particularly plutonium) must be kept rigorously clear of the environment for hundreds of thousands of years - half a million, for safety. This poses the unprecedented problem of finding a storage which will not be disturbed by the geological processes that occur over such a time span. Research has not yet proved that such storage exists. Here, once again, an issue of sheer survival is involved, in the struggle to prevent such irresponsibility towards future generations.

The nuclear industry has generally treated critics with disdain, making concessions to them reluctantly and only afterpublic opinion has been roused. But in recent years, some of the more far-sighted proponents of nuclear power

have started to recognise the strength of the opposition's case, particularly in the area of "nuclear malevolence". Their proposals for coping with nuclear hazards constitute in themselves an equally ominous political and social threat.

Thus the US Atomic Energy Commission has proposed a special federal police force devoted to the security of plutonium plants and shipments. It has complained of recent court rulings protecting individual privacy, and requested legislation which would facilitate security checks on nuclear industry personnel.[10]

With the projected growth of the industry, the number of workers affected by such restrictions of civil rights could run into the millions. Already, according to the New York Times, Texas state police keep dossiers on opponents of nuclear plants.[11]

The dangers involved here should not be underestimated. A few kilograms of plutonium make an ideal weapon for blackmailing a whole city, since it effectively disperses itself in small particles once exposed to the air. Even graver is the real possibility of constructing a nuclear bomb from plutonium in a reactor's waste, impurities would make it inefficient but, as an experiment has convincingly shown, little skill would be needed to achieve a weapon with the destructive force of about 100 tons of TNT.[12] This would be within the capacity of "amateurs", any government with nuclear power plants would have the facilities to manufacture weapons 100 times more deadly.

After an extortion threat, whether successful or not, an atmosphere of hysteria could well be envisaged, in which authoritarian "law and order" proposals would be difficult to combat. They would even have a certain rationality, inside a globally irrational context.

The many levels of irrationality

The risks just outlined justify the verdict that a major development of nuclear power is irrational, if our criterion is the welfare of humanity. But this is far from the only sense in which we can justly apply the epithet "irrational" to capitalism's nuclear perspectives.

It should first be appreciated that the current nuclear programme is not a long-term solution to the problems of power generation, even in the opinion of capitalism's own analysts. It is projected as merely bridging the gap between the present period marked by rapidly diminishing stocks of oil, and the situation in perhaps three decades or so, when alternative sources of energy will be commercially viable.

The tapping of the sun's energy is one important such alternative, to which capitalism is now belatedly starting to devote increased research and development funds. The primary aim here is to find ways of reducing the capital costs of large-scale solar power plants.

For reasons discussed below, solar power is still seen as less attractive than fusion power - a variety of nuclear plant working on a different principle from the current models. Existing "fission" reactors rely on a controlled version of the nuclear reaction - the "splitting" of a heavy atom such as uranium or plutonium- which in its convulsive release produced the explosion of the Hiroshima bomb. A "fusion" reactor would be based on taming the nuclear reaction underlying the hydrogen bomb, in which light elements "fuse" together to form a heavier element. Steady progress is being made in the research on controlled fusion, particularly since a Soviet breakthrough in this field some years ago - the "Tokamak" development. It is generally believed, however, that several decades will elapse before commercial fusion reactors enter into service, even after a basic design has proved itself in the laboratory.

Thus present nuclear programmes are supposed to justify themselves by their contribution to power needs in the next few decades. But it is precisely in this short term that there arise the most serious doubts of the programme's utility, because of the severe shortage of rich uranium ores.

The industry's major hope here lies in the breeder reactor, whose operating core is wrapped in a "blanket" of natural uranium. Such a reactor will convert the bulk of this uranium into a suitable fuel (normally, less than one per cent of it is available), thus producing (or "breeding")

more fuel than it uses up. The world supplies of "burnable" uranium could thus be effectively increased perhaps 70 times over.

Before agreeing with the US administration that breeder reactors thus represent the solution to the nuclear fuel shortage, some facts should be noted. The inherent dangers of the breeder reactor vastly exceed those of the current models, and justify the greater concern and opposition of aware scientists.[15] A whole series of technical difficulties have resulted in repeated postponements of the expected date of operation of a commercial breeder, the latest estimate (probably optimistic) now landing in the 1990s.

The significantly higher capital costs, as compared to today's power stations, are likely to result in yet more delays before the buying reluctance of electrical utilities is overcome. And even then, a breeder will take somewhere between 20 and 40 years to produce enough fuel for one reactor.

Thus, reliance on the advent of breeders to "stretch" fuel supplies represents a dubious gamble. Yet what the industry is thereby gambling on, is the whole cost-competitiveness of nuclear power.

It is irrationality of another sort which emerges here: the nuclear programme is not even rational on capitalism's own criterion of cost efficiency. Reactors already planned are not assured of a fuel supply which can keep them competitive. Thousands of billions of dollars are to be invested in the hope that something will turn up.

Even with the cheap uranium supply available today, the industry can establish the competitiveness of new plants only by ignoring well-established trends, that would send the price of nuclear-generated electricity skyrocketing. The most important of these trends are, firstly, the staggering escalation in the capital cost of nuclear plants, and secondly, the severe drop in efficiency of nuclear plants after about five years' running.

In May 1975, the Friends of the Earth showed how woefully the relevant utility had underestimated costs, when they testified against the proposed Rancho Seco 2 reactor near Sacramento (California). Adopting realistic figures for capital cost, interest rates and capacity factor (i.e. efficiency), and for operation, maintenance and decommissioning, the FOE calculation showed that the true cost of a unit of power was nearly four times the figure submitted by the utility.[16]

A study of the Grenoble Institute has shown that, in France, nuclear-generated electricity cannot compete with oil at today's prices. In the heating of a household, for example, we can deduce from the study that oil will be cheaper so long as its price remains below $45 a barrel (price in early 1977: approximately $16).[17]

The escalation in capital cost (we consider its explanation later) shows no sign of abating. Of course, that of coal-fired plants also shows an increasing trend, but nothing like as severe - a 1975 study estimated that the difference in price between a coal and a nuclear plant was itself increasing by $19 per kilowatt per year.[18] In other words: every year the price of a 1000-megawatt nuclear plant leaps another $19 million above that of its coal-burning rival ...

The curves of capacity factor against reactor age also show a dismal trend: that the efficiency is low and becoming even lower.[19] All this may make the nuclear commitment seem extraordinary enough; but we have not yet mentioned the most astonishing irrationality of all. Some preliminary remarks are needed.

The power output of a generator of any sort can never represent pure gain, since some power is inevitably consumed in building and running it. In the case of a nuclear reactor, a great deal of power is required merely to set it up in business - to build the station, mine and mill the initial fuel supply, etc. A most important part of this power input occurs at the stage where natural uranium is treated so as to increase the fraction of it which can be "burnt" as fuel - the "enrichment" process.

All this means that the station will be running for some time before it has "paid back" the power used to set it into operation. Calculations of this "break-even" time have been carried out for various reactor designs; they indicate that about two years of normal operation will be needed to repay the power input for construction.

Now consider the effect of a rapid nuclear programme, with the number of reactors doubling every few years. To see this effect, let us adopt some definite (though fictitious) figures: suppose a reactor's "pay-back" time is one year (this is unrealistically low), and that the number of reactors is doubling every year (this is unrealistically fast). Suppose also that a reactor takes a year to build (instead of the actual six to nine years).

In year one, no reactors are operating but one is being built; so no power is produced, but one year's output is consumed. In year two, one reactors is operating, but two are under construction, so one year's output is produced, but two are consumed. In year three, three reactors are operating but four are being built; so three year's output is produced, but four are consumed ...

If the calculation is continued it will be found that the programme uses up more power than it produces, in every year of its operation. Of course, in the real world such a programme must come to a halt at some stage, the number of reactors cannot go on doubling each year indefinitely. It is at this point that the nuclear industry will become a net power producer; but until then, it will actually be a net consumer of power.

In the real world, also, the figures are not as they are given in the example. But the effect still persists in a modified form, even after we insert the correct data for power input in operation and building time. We still find that the programme will not "break even", in the sense of producing more power than it consumes for a certain number of years.

Just how many years, will depend on a number of factors: the type of reactor, its operating efficiency, the grade of ore mined, the power consumed in regular operation .

But the most detailed calculations available[20] suggest that, inserting the figures appropriate to current programmre, this "break-even" time can easily exceed 20 years.

But this is precisely the period in which the nuclear programme is supposed to compensate for the exhaustion of oil supplies, while the world awaits the arrival of fresh power sources. In other words, the nuclear programme will quite possibly consume more power than it produces, in the very period when it is supposed to be the key factor in power generation-!

It should be pointed out that a programme with oil and coal-burning stations[14] substituted for nuclear, but expanding just as quickly, would make an even worse showing It is the sheer speed of the projected construction programmes which determines their short-term energy inefficiency. But of course, no one plans to build conventional power stations at such a breakneck pace - since no one has the illusion that such a programme would solve any "energy crisis". This illusion attaches only to plans for nuclear power stations, when one "forgets" the energy needed to build them; to puncture the illusion, the sort of energy analysis sketched above is required.

Before arriving at an overall judgement on capitalism's nuclear project, we should appreciate the element of uncertainty which runs through the above analyses. Some of the needed data - what fresh reserves of uranium will be discovered, for instance, or what long-term efficiency (capacity factor) will be achieved by nuclear stations - can only be estimated. Some of the relevant calculations require time and manpower that have not yet been devoted to them, so that only suggestive approximations are available.

However, this very absence of reliable information is itself highly revealing. Let us adopt some of the criteria commonly advanced, within a framework of capitalist assumptions, for implementing a new technology, and consider how they are met in the case of nuclear power. Let us see what preconditions should be fulfilled to justify the investment of capital involved.

First, the safety of the new industry should be sufficiently guaranteed, as to obviate the risk of the whole development being aborted at some future date. (This could occur, for example, as a sequel to the catastrophic release of radio-active material, by a plant accident or malevolent design. The public reaction could well make it politically impossible to continue operation of the existing plants, and force the abandonment of the large amounts of capital they represented.)

Secondly, the programmes adopted should actually achieve their declared goals: that is, to produce significantly more power than they consume, in the vital period of the next few decades.

Thirdly, the electricity produced should be competitive in cost with that generated by "conventional" (oil-or-coal-fired) stations.

Fourtly, plants should not be projected unless they are guaranteed a suitable supply of fuel over their working lifetime.

Fifthly the financial mechanisms should exist that will enable the "consumer" (i.e. the electrical utilities) to obtain the capital needed to buy the reactors concerned.

It is when we review these reasonable criteria that there emerges the full irrationality of capitalism's nuclear plans: it has not been demonstrated that they satisfy a single one of these basic requirements.

At best, the nuclear industrialists can be regarded as undertaking a colossal gamble. They are gambling that no catastrophic accident will occur in the short term, despite the narrow squeaks already in the record. They are gambling that fresh high-grade ore reserves, or a technically and commercially viable breeder reactor, will be available in time. They are gambling that the trend to ever-higher capital costs, and the decline with age in the efficiency of the functioning reactors, will be reversed, or economically compensated for by increased cost of conventional fuels.

In the USA, they are even gambling that "something will turn up" in the way of finance, to permit the purchase of reactors by the electrical utilities. (Early in 1975, some 60% of reactor orders in the USA had been cancelled or postponed, mainly because of the refusal of finance houses to lend the purchase money.)[21]

It is true that capitalist enterprises have been known to "gamble" before this - to spend on research and development or to launch on the production of a new commodity whose market was not assured. But we remind the reader of the sums involved in this particular gamble - well over a thousand billion dollars in the remainder of this century, in the United States alone.

It would be easy to conclude that the gods of history, with the destruction of capitalism high on their agenda, are staging their proverbial prologue of induced lunacy. But a pat verdict of "guilty but insane", even if supported by the evidence, hardly goes far enough; it is also necessary to understand.

The attempt to reach even a partial understanding is mandatory, and not only because of the importance of the nuclear programme in itself, both economically and politically. There is another issue involved: that of the dynamic of the capitalist economy in the present period. It may be that the nuclear industry can serve as a paradigm showing - in not-so small miniature - the emergence of new trends or changes in the relative weight of ones already known.

The Energy Company's Gamble

There are few industries, even today, as heavily monopolised as the nuclear industry. When one says "pressurised-water reactor", one says Westing-house; and "boiling-water reactor" likewide means General Electric. And these two types, built by the two giants directly or through subsidiaries and licensing agents throughout the capitalist world, account for over 85% of the nuclear-component industry.

The powerful pressure of these multi-national corporations exerts itself even on those countries possessing their own proven reactor designs. Thus Francis Perrin, formerly the French high commissioner for atomic energy, has recently complained of the "monolithism" of the French nuclear programme (even while rubbishing the anti-nuclear campaign as "based only on totally false assertions" and on declarations "devoid of all objective value"). He recalls General de Gaulle's decision (December 12, 1967) to proceed with the construction of two large reactors of a French design (graphite-moderated, gas-cooled, fuelled by natural uranium) that has elsewhere proved itself. The blocking of this decision he lays to the account only of some unnamed highly-placed civil servants, also responsible for the present plan to instal "almost exclusively" the pressuriesed-water reactors of ... Westinghouse.

He calls, but without much apparent faith in the likelihood of success, for the French programme to include more "diversification", a feature not sufficiently provided by the present inclusion of some boiling-water reactors from.. General Electric.[22]

The weight of the multi-nationals has been felt even in Britain, the country whose own design of gas-cooled reactor pioneered the commercial generation of nuclear electricity. Hot debate raged after the Central Electricity Generating Board and the National Nuclear Corporation both recommended a switch to the American light-water reactor. But under intensive questioning before a House of Commons Select Committee, they were unable to justify their recommendations, and the Government decided not to switch for the time being, at least.

The revelations from Lockheed and other firms have made notorious one of the processe by which the multi-nationals "conquer" foreign markets: old-fashioned bribery of influential natives. It should not be assumed, however, that this is always the predominant factor. Sheer size counts for a great deal - as illustrated in the unhappy case of the design of an international computing language.

The world's experts agreed on a suitable language, and devoted much effort to its elaboration. But their eugenic offspring, Algol runs a very poor second in its breadth of social acceptance to the inferior language, Fortran - which was born with a silver spoon in its mouth, sired by the market-dominating IBM.

In another direction, a still vaster oligopolistic structure is shaping up, as the leading oil companies complete their transformation into what has been accurately described as "energy companies". Already in 1971, the oil giants were responsible for the milling of some 40% of US uranium ; their coal production amounted to 20% of the US total, and their acquisition of coal reserves guaranteed their future dominance in the industry (one oil company alone - Humble - was the nation's second largest coal owner). In the nuclear field, Gulf Oil (with the third largest assets - about $9 billion - of any oil company) had set up Gulf General Atomic.[23]

This latter company threatens Britain's lead in gas-cooled reactors, and already in 1972 there was "consternation in the nuclear industry" as a consequence, according to one writer.[24] Gulf promises delivery of high-temperature gas reactors (an advanced design) around 1980.

But if this represents competition with the dominant light-water American reactors, is similar consternation apparent among the ruling giants. Hardly; the chairman of Gulf General Atomic, E.Brockett, happens to sit on the board of Westing house also.

A thrust towards monopolisation is built into the nuclear project. A single plant of today's typical size - a thousand megawatts of electrical power - costs upwards of half a billion dollars, and smaller units are neither readily available nor called for in quantity. Companies with assets not running into the billions can hardly hope for a sizeable share of such a market, nor risk the investments needed to establish themselves.

The dynamic of capitalism's nuclear project has been spelled out - with some naive admiration - by Simon Rippon, the editor of a technical journal noted for its fervent, not to say fanatical, nuclear partisanship.

> "... The big industrial concerns have not entered the business for quick profits - indeed, most of the companies that have entered the nuclear business around the world have been shaken to their foundations by losses on early projects and few can see dramatic profits in the future. For the most part the position of industry is that the long term direction of energy supply is going to be increasingly in the direction of nuclear power and therefore for the well-being of their company they must establish a foothold in this sector of the business in spite of the heavy initial costs." [25]

It may be doubted whether the "foothold" is being seized as reluctantly as Rippon makes it sound. For the larger giants, nuclear power spells centralisation, size, growth. The prospect before them is an intoxicating one: the power industry swollen to a size unheard of, its relative weight in the economy enhanced several times over, and all of it within the grasp of one or two amicably-coexisting combines.

The power industry as a whole can of course anticipate such an increase in its relative share of the gross national product, since the power needs of industrial capitalist society grow faster than the GNP itself. In Japan, for instance, official projections are for a growth of 4% in the GNP, compared to 6.2% for the electrical output.[26] Using this data, a simple calculation shows that the proportion of the GNP represented by electricity output (i.e., its relative weight in the economy) will be double what it is now, in a little over 30 years.

It is only this perspective which can explain the gambles they are taking, and pressuring governments to take. They are not really gambling that no catastrophes will occur, that no hitches will hold up the breeder reactor when it is needed, that the nuclear project will remain cost-competitive.

What they are really gambling on - and from their viewpoint, it is a "rational" risk to take - is that their economic and especially their political weight in society will be so massive, that society has no option but to make their bets come home.

It is the next decade which is crucial for this outcome. By 1985, the nuclear share in electricity production is designed to reach, in the leading capitalist countries,

the 10% level or close to it (the USA, 13%; the EEC, 17%; France, 30%).

Within the present structure of industrial capitalism, it is hard to envisage a situation in which such proportions of the power supply could simply be switched off, no matter how powerful the arguments in terms of human welfare or even of economic efficiency.

Perhaps a catastrophic "melt-down", releasing millions of curies of radioactivity, killing tens of thousands of people, damaging property to the extent of billions of dollars? Studies by the American Atomic Energy Commission have shown that accidents could well have such a scope.[27] But if society really depends on the nuclear branch of its power industry in order to continue along its accustomed path, and if this path can still claim an overall acceptance then an alternative to a shutdown would be the adoption of "firm measures", allegedly ensuring that such disasters could not recur.

Such measures, whose shape was sketched in the AEC report mentioned earlier, would be repressive and authoritarian in the extreme; and there can be little doubt that among the movements heavily repressed would be any spreading panic or mobilising action in connection with nuclear power.

But if nuclear power reveals itself as unarguably wasteful, Suppose the tendencies for nuclear plants to decline in efficiency with age, and to require more and more capital for their construction, become so pronounced that, on economic grounds they should simply be replaced by non-nuclear methods of power generation. Would not this be a situation disastrous to the nuclear industry, one in which their gamble had definitively failed?

Possibly - if they allowed such a situation to arise. But, as a Harvard-MIT study pointed out in the Technology Review:

> "The price of usable energy from oil, coal or uranium now has little to do with the marginal production cost of any of these resources... Instead, the price of energy from alternative technologies is the result of a complicated process of assigning relative values to a variety of energy-producing resources and technologies /by those who either control or require these resources and technologies. This process is both intensely and inherently political."[18]

In assessing the degree of control over energy prices, it is vital to realize that we are not dealing with an isolated handful of reactor manufacturers - more and more, the Energy Company becomes a powerful reality, and the relative pricing of the various methods of electricity generation falls increasingly under its control. "Free competition" between the various primary fuels started to lose its reality many years ago, as the oil companies moved over into the mining of coal, of uranium, into the processing of uranium and - through subsidiaries and affiliates - into the building of reactors. Their influence will be exerted to fix prices that reflect, not the resultant of competitive forces, and not the realities of cost of effectiveness but simply the interests of their own needs for expansion, investment and profit.

Thus, if the nuclear industry is gambling, it knows in advance that the dice will be loaded in its favour. And even if its luck turns unexpectedly bad, and the table runs against it incessantly, there remains a further and decisive recourse: it can have a word with the management ...

Consumerist capitalism needs the power industry; it even needs its continuous and sizeable expansion. The State which administers that system never runs on the basis of one-capitalist-one-vote, or even one-million-dollars-one vote; always some animals in that particular jungle play the role of the king of beasts. The Energy Company, more than half nuclearised by the turn of the century, will certainly supply a king or two, perhaps even a king of kings. Such personages do not need to fear bankruptcy, or even a missed dividend. If even the smaller predators like Lockheed, Boeing or Gruman can depend on sympathetic intervention by the State in their hour of need, what will be beyond the power of the Energy Company?

Indeed, nuclear power has already benefited crucially from State support, and not only in the billions lavished on research and development, whose results the corporations simply take over. Another important parcel of "aid" has been delivered by the US government plants enriching uranium. The Westinghouse and GE reactors require fuel that has passed through this expensive process, and their success in penetrating the market is due in no small measure to the artificially-low price assured by what amounts to a concealed State subsidy; an advantage which has not gone un-noticed by their competitors:

> "Ned Franklin, chairman and managing director of Britain's Nuclear Power Company ... maintains that the price of uranium enrichment is now fixed by essentially political considerations. Enrichment is dominated by the US, which supplies most of the enrichment requirements of the western world. According to people working in the US's nuclear industry, the prevailing price of enrichment is about half what it would be if the industry had to build new facilities and operate them at a profit.
>
> "The problem is that enrichment is subsidised by the use of old plant that was paid for as part of the weapons programme; enrichment plants are supplied with subsidised electricity; and there is no charge research and development."[28]

With such marks of favour already acquired, there seems little that the Energy Company needs to fear - unless, of course, it confronts an enemy whom even the State must treat with caution.

Creating the "objective facts"

The socialist movement has suffered for many generations from the illusion that technology is value-free. Adopting a misleading schema in which an essentially non-political "base" (the forces of production) is to be simply taken over and endowed with a different "superstructure" (socialist relations of production), it has failed to appreciate the political content of that technological base.

Even Lenin is on record as succumbing to this error, when he went so far as to laud the Taylor system (time and motion study) and urge its adoption in the Soviet Union. It should be noted that a question mark must now be put over the "technological rationality" of the assembly-line method itself;

can it really be justified even on the narrow criterion of "stepping up production"? This most alienating of all technological practices needs re-examination in the light of recent industrial experiments (particularly in Sweden) based on a self-managed working team, rather than a single worker permanently assigned to one stultifying operation on the line.

That technology and the line of development of technology, are alike political, is nowhere more evident today than in capitalism's nuclear project. It is illuminating to consider the non-nuclear alternatives for power supply, their undesirability from monopoly capital's viewpoint, and the way that an apparently inevitable technological progress along nuclear lines is actually the result of highly political decisions.

A source of nuclear power has supplied mankind with the overwhelming bulk of its energy throughout history; it is the sun, a giant reactor successfully employing the fusion process without pollution and without wasting non-renewable fuel reserves (over a time scale of several billions of years, at any rate),. Serious studies of the world's energy problems almost invariably urge the priority of research and development in the field of solar power as the most attractive prospect for mankind.

But it might be asked: how real is this prospect of solar power? What are the technological data on its practicability as a large-scale resource? How does its level of development compare with other energy sources, and what is its promise in the short term?

Questions such as these are posed at the wrong level; they seek as answers a recital of "bare" technological data, not themselves embodying politico-economic decisions, but supplying embobying politico-economic decisions, but supplying the value-free facts on which such decisions can be based. It is true that there are circumstances (very restricted, and usually of little social interest) in which such a dichotomy of fact and value has a relative validity; but the present questions are not located in a context even remotely appropriate to such a division.

Large-scale nuclear reactors actually exist; nuclear power moved out of the laboratory many decades ago, into the province of the architect and the engineer. Large-scale solar plants, on the contrary, remain in the anteroom of research and development. Is this a "bare" technological fact? Only in the most abstract sense; in the real world, the genesis, understanding and future implications of this "fact" must be sought in the sphere of political economy.

For there is no autonomous, independently evolving sphere of "technological progress" which thus made nuclear plants arrive before solar. Nuclear technology was developed in response to conscious decisions on the allocation of manpower and funds - inspired originally by the search for more destructive weapons, and later by the attractiveness for monopoly capitalism of the peculiar qualities of nuclear power.

The failure to allocate corresponding resources to solar power research was the complementary decision that helped to create the "technological facts" as they now exist. And of course, similar remarks can be made about projects to tap the earth's subterranean heat (geothermal power), or to utilize the tides.

Thus the facts are purely technological only in abstraction, inside a conceptual schema that isolates from its social context an abstract history of "technological progress". In the concrete world of things as they have been and as they are, these facts are born already "dressed" in a political-economic penumbra that accompanies them always, determines their significance and points to their future possibilities.

This can be seen very clearly, when we consider the prospects of solar power vis-a-vis nuclear, over the next couple of decades. The "facts" involved here are being created right now, and a glance at US budgetary allocations will show us what facts the Energy Company hopes to bring about: for every dollar spent this year on solar research, more than eight dollars will be spent on one nuclear project alone - the breeder reactor.[29]

It is not hard to understand why monopoly capital is so lukewarm towards solar power. The latter lends itself admirably to

decentralisation, small installations, a minimum investment of capital; these are fatal flaws from the viewpoint of the giant corporation. The "technical" advantages - inexhaustible energy supply, absence of pollution, longevity of the installation, low maintenance expenses - cannot compensate for these inbuilt deficiencies ... It has been well said, that solar power would fare very differently if only General Electric could buy the sun!

The sad fact is, however, that solar leases are not yet open to takeover bids; and so the corporations are doing the next best thing: planning to build their own sun ... For there is some corporation interest in solar power, provided the inbuilt vices just mentioned can be eliminated, and the project made capital-intensive, large-scale, highly centralised. These are precisely the qualities of the Satellite Solar Power Station, emanating from Arthur D. Little Inc., Grumman, Raytheon and Textron. A giant satellite a kilometre across will absorb sunlight, convert it to microwave radiation and beam it down to a seven-kilometre receiver on the Earth's surface, generating from three to 15 times the out-put of a single large nuclear plant.[30]

In principle, the solar power source can be a highly flexible device, adaptable in size to meet a wide range of demand and providing access to power for the most isolated community. A minimum of capital investment can provide a self-sufficient source for an indefinite period, and one uniquely compatible with ecological requirements.

These features can hardly be recognized in the satellite project, which achieves the near-impossible: a solar power source demanding an enormous capital investment, suitable for insertion into only the very largest national electricity grids, taking no advantage of solar radiation's great suitability for direct heating of homes and work-places, and delivering, with its giant receiving antennae, an insult to the environment on a new and monstrous scale.

We do monopoly capital an injustice, then, if we evaluate its nuclear programme as nothing more than a technological project. Quite apart from its inherent hazards to humanity,

its adoption would then become incomprehensible in view of the serious doubts as to nett energy production, security of investment, reliability of fuel supply and cost-competitiveness.

But actually it must be seen as a project in a much wider sense: namely, as a social project, predicated upon a definite social structure and aiming to develop that structure in a definite direction.

The social structure concerned is that of capitalism in its consumerist phase, where a widening gap - between a potential for self-managing fulfilment, and a reality of hierarchical repression - is papered over with a policy of consumerist concessions. Destruction of the environment is implicit in such a society; this connection has been analysed in some detail elsewhere, and will not be further discussed here.[31]

The power needs of such a society are vast and ever increasing, and it indeed faces a 'crisis' in the prospect of exhaustion of oil reserves, combined with a severe pollution problem from coal-burning power sources. But, for reasons which will be clear from the discussion above, the giant corporations which dominate its technical development can hardly be enthusiastic about the rational lines of solution advocated even by its own experts: elimination of wasteful energy consumption, reduction in the growth of the electrical power industry, development of alternative sources such as solar, geothermal and tidal power.

It is true that nuclear power, too, has its disadvantages - it may, for example, weaken the fabric of social control by the destructive or blackmailing opportunities it creates for dissident groups. But in lending itself to centralisation, expansion, and domination by a few industrial giants, it accords well with the dynamic of consumerist capitalism - which would be hard put to accomodate policies of energy conservation and the strangling of growth.

Of course, the system will have to adjust itself to the peculiarities of this new power source. The Energy Company may have to distort market and pricing mechanisms more

grotesquely still, to nudge along the consumption of nuclear-generated electricity and the purchase of nuclear reactors. Massive and direct State intervention may be required to ensure the industry's future, with the perhaps grudging consent, or even against the opposition, of industrialists in other sectors. And measures of social discipline will almost certainly be called for, restricting civil rights and limiting the activities of protest movements, to provide the safeguards needed once society depends for its life-blood - electrical power - on one or two thousand incredibly poisonous sources. Such expectations may well appear repugnant, but they cannot be dubbed fantastic; they are solidly based on existing values and assumptions, those which demand the constant expansion of the commodity market and, to an even greater extent, of electricity output.

But these values and assumptions do not go unchallenged, and there is nothing fatalistically inevitable about the scenario sketched above. We have been looking at the political economy of capitalism today; but a different political economy is also shaping itself, already in conflict with its older rival and by no means invariably vanquished. We must now look at the forces behind this alternative view, take note of their accomplishments up to present and estimate their possibilities in the future.

The Political Economy of Contestation

Opposition to the construction of nuclear power plants has developed, over the last five years into a world-wide campaign of significant scope and impact. Despite the power of the corporative forces committed to the nuclear programme, the journals of the nuclear industry overtly and repeatedly express the fears roused in them by the achievements and potential of their opponents.

"Things can't get worse or can they?' was the gloomy title of an editorial in Nuclear News (April 1975), which went on:

> "The likelihood of a nuclear moratorium, either national or in one or more states, is difficult to assess. Judged from the discussion of it among observers of the Washington DC scene, and from the amount of activity on the state level, the situation is not encouraging for the light-water reactor industry, and is much worse for the breeder reactor."

A writer in Nuclear Engineering International (July 1974, p.579) raised a similar possibility: "However unjustified, public opposition to nuclear energy may rise to such levels that forecast installation programmes have to be scrapped..".

Superficially, some of the nuclear industry's major troubles seem unconnected with the anti-nuclear opposition. We have seen how, in early 1975, about 60 percent of the nuclear plants on order had been deferred or cancelled - a severe blow to the Administration's nuclear plans forming part of "Project Independence". This setback is usually attributed to the "cash squeeze" of the time, which made Wall Street reluctant to lend the electrical utilities the capital with which to purchase reactors.

It is true that some orders for "conventional" power stations were likewise affected; but even so, the finance houses do not seem too enthusiastic about the economic future of nuclear-generated electricity. Nor are they alone in their doubts.

Robert F.Gilkeson, chairman of the Edison Electric Institute was reported as saying at the April 1975 American Power Conference that "it is impossible in present circumstances to build a power plant that will yield a satisfactory return on investment."[32] After analysing the poor performance of the older reactors, David Comey doubts if the banking community will be willing to finance the nuclear programme, and suggests that General Electric, Westinghouse and other nuclear firms may "join Lockheed, Boeing and Grumman on the rolls of corporations bailed out of costly technological misadventure by the taxpayers."

It might seem that here, at any rate, we have unearthed some "bare" technological facts which, despite all their contortions and figure-juggling, the nuclear corporations cannot conceal. Nuclear power is just too costly, and that's that ... Or is it? Let us investigate a little more deeply:

Nuclear power stations are usually situated well away from the densely populated areas in which the electricity is actually consumed. This entails a two-fold economic penalty, as Hohenemser points out:

First, that part of the energy released which is not converted into electricity becomes pure waste, since the consumers are not sufficiently near to allow this energy to be used for residential and commercial heating and cooling. Thus the very promising concept of a "total energy system" cannot be realised, and the surplus energy becomes waste heat whose disposal is a problem. But the energy thus wasted is more than double the electrical energy utilized.

Secondly, the additional distance over which electricity must be transmitted means additional investment in transmission lines, and additional losses in energy.

Furthermore, conservative operating procedures are adopted to prevent possible accidents; operating costs rise because of the need to protect workers from radiation. As Hohenemser sums it up: "The accident risk, though small, leads to large economic penalties."

It will be apparent that these economic penalties cannot be regarded as solely economic in origin. The pressures which force the nuclear station to be sited remotely, or to adopt stringent and costly precautions, depend intimately on the level of popular suspicion of nuclear power, and of legal-political activity based upon that suspicion.

Thus it is difficult to interpret these economic difficulties of nuclear power as pure "technological data". But further analysis makes the point emerge even more sharply:

Perhaps the most important single factor telling against the economic future of nuclear power is the continuing escalation in capital cost of the nuclear plants, as compared to coal-burning plants. The reasons for this escalation have been carefully analysed in Technology Review (February 1975) by Bupp (Harvard) and Derian, Donsimoni and Treitel (MIT).

They find that total cost is strongly correlated with the length of the licensing period - i.e. the time elapsed before the plant is licensed by the Atomic Energy Commission (AEC) to enter into operation. Under US law, citizens can "intervene", on safety, environmental and other grounds, to oppose the granting of the licence or secure its postponment.

It is this intervention process, they show, which carries the responsibility for prolongation of the licensing period and the correlated rise in capital costs:

> The American administrative and judicial processes afford --- critics ample opportunity to impede the rate of reactor commercialisation. The principle consequence has been dramatic cost increases. The extreme critics of nuclear power have been at least partially successful in their efforts to force a downward re-evaluation of the social value of reactor technology.
>
> "...The issue here is not merely technical or economical, but is inherently political: Present trends in nuclear reactor costs can be interpreted as the economic result of a fundamental debate on nuclear power within the US community. Beyond its economic effects, the real issue of this debate is the social acceptability of nuclear power ..."

(It should perhaps be recalled that critics of nuclear power are not free to hold up construction at will; they must show that the particular project fails to satisfy environmental requirements, existing radiation-release standards, AEC regulations ... And it is precisely this kind of deficiency that they have been able to establish, time and again.)

Perhaps the second most ominous trend, for nuclear-power competitiveness, is that of declining capacity factor (efficiency) as plants grow older. A detailed study of the reasons for this decline is still in progress, but some contributing factors are already apparent, which are associated with the radioactive dangers in a nuclear plant and the public consciousness of them. For instance, the discovery in September 1974 of cracks in the cooling pipes of a US reactor resulted in the shutting-down (for inspection) of all reactors of the same type; this would hardly have been done in the case of conventional power stations. Nor would it have been done, in all probability, if the public were less inclined to associate danger with the word "nuclear".

Unprecedented maintenance difficulties can arise in nuclear reactors; the simple welding of a crack becomes a large-scale operation in which hundreds of workers have to be deployed, when the crack occurs in a region of such high radioactivity that each worker can remain there for no longer than a few minutes ... Here again, the long campaign

which forced the AEC to tighten up its radiation standards, and the heightened public awareness which resulted, should not be overlooked as a relevant factor.

We see, then, that the Energy Company has not got the field to itself; there are other political choices and actions which are significantly affecting the "bare economic facts" of nuclear power production. And of course, their effect on the political decisions in this field is even more noticeable - as shown, for example, by the severe reduction in the Swedish nuclear programme for the next decade (from 14 reactors to two) already mentioned above.

We will not go on to list the successes of the anti-nuclear campaign in such other countries as Japan; the above is enough to show that significant effects can be achieved. This is all the more remarkable, being given that most of the radical left, in most of these struggles, have followed a policy of more-or-less benevolent abstention.

It should be said, in conclusion, that the anti-nuclear movement is likely to find its path much thornier in the future. The year 1975 must be recorded as the year of the great backlash, when the nuclear industry geared itself up on an international scale to launch a well-organised counter-offensive.

In Washington, a pro-nuclear rally was scheduled for the middle of May - "The first time that the industry, which has traditionally avoided direct action on its own behalf, has set out to make itself heard", according to a supporter. This rally was to unite representatives of the Atomic Industrial Forum, the non-profit utilities, the National Association of Electric Companies (Investor-owned utilities) and the national rural electrical co-operative association.[33]

In April, the European Nuclear Society met in Paris, at a conference reported as though it were a similar propagandist rally.[34] Westinghouse assigned a team of propagandist in Pittsburgh to the job of "rebutting" environmentalist objections to nuclear power stations.[35] The Atomic Energy Commission in Australia - a country with no commercial reactors - ran an internal study course

for its staff, slanted towards the justification of nuclear power. (The export of uranium is a current issue in Australia.)

In launching this propaganda offensive on a global scale, the corporations tacitly acknowledge both the importance of the nuclear development for the immediate future of consumerist capitalism, and their appreciation of the strength of mass suspicion in its regard. It is vital that the left show an equal appreciation of these factors, participating wholeheartedly in the anti-nuclear campaign and strengthening its connection with the overall struggle against an irrational social system.

The left is hampered in fulfilling this role by the misleading theory (among others discussed further on) that the technological sphere evolves autonomously, independent of political action. The philosophical defects in this view have been surveyed above; after considering the particular case of the nuclear power industry, we can see how woefully it fails to explain the facts and the dynamic of this major component of capitalist planning in the decades to come.

Of course, the traditional marxist view never entirely overlooked this phenomenon; but it was usually content with a mere mention of the existence of "reciprocal interaction" or of the "mutual independence" of the various sectors of the social "totality". The analysis itself usually proceeded in a strictly one-way direction, with the political exercising little if any direct influence on the technological or economic.

It would be wrong to claim that this method has now lost all validity; but it is apparent that, in the case of nuclear power, it does not give even a good first approximation to the truth. It is difficult to conceive of this holding good only for one special and exceptional case, when that case looms so large in terms of economic significance and investment allocation. Are we not rather looking at a paradigm of capitalism's development in this present phase, with deep lessons for the left and its programme of radical reconstruction?

Whatever the misconceptions of some of its practitioners, marxism could never have been properly interpreted as a variety of economic determinism, in which technological development exerted a one-way influence on the remaining structures of society. Marxism separated itself decisively from such theories by its standpoint of class analysis, so that the technological sphere can be effective only when mediated through the prevailing class interests.

The interests of the capitalist class are not to be conceived as simply the making of a fast buck. They include also the preservation of a structure of industry which will enable the capitalist system to continue; and it is precisely this continuance of the centralised, large-scale, ever-expanding economy, based on a market of "created demand", which the environmental crises today put in serious doubt.

In this situation, the larger investment decisions must be seen as political decisions, in which the longer-term interests of the system must take precedence over narrowly conceived "economic" interests. But as political acts, they become vulnerable to the attacks of political opponents - a vulnerability which the outstandingly irrational nuclear industry knows only too well, as it nurses its wounds and lashes back.

Thus, in intervening in struggles over the shape of the economy the left should not be hampered by any lingering compunctions, perhaps based on recollection of the "Luddite" period, of the "utopian machine-wreckers" (recollections which are revealed as absolute by the facts above, and which were generally inaccurate historically in any case). Otherwise, they will be leaving unchallenged some of the most significant political decisions of the giant corporations, carrying immediate threats to the world of today and even sowing the seeds of disaster for humanity's whole future.

A Digression: the USSR and the "Third World"

The analysis above is focused on the advanced capitalist countries, and should not be extrapolated beyond them. The other major sectors of the world merit a separate if briefer discussion.

With a total list of only 25 plants, including those under construction or on order, the nuclear programme of the USSR is insignificant in comparison to that of the USA, which is some 15 times greater in power output. Indeed, France's alone outstrips the Soviet's in capacity (by about 50 percent).[36]

This lesser level of development is not to be explained by an initial technological lag - the first Soviet nuclear station opened in 1958, ahead of every other country in the world save one (Britain).

Nor does it stem from any ideological aversion to nuclear power. Official Soviet doctrine sees no problem in the inherent centralized nature of nuclear power; no problem in the superhuman standards demanded for safe operation in the long term: no problem in the disposal of radioactive wastes.

Indeed, the absence of genuine public discussion on the issues involved in nuclear power has allowed the Soviet nuclear industry to "solve" its disposal problems with a breathtaking lightmindedness: high-level radioactive wastes are simply pumped under pressure into deep permeable zones. Thus they are irretrievable; in insecure liquid form; and moreover (because of the high pressure of the injection), a threat to the stability of the whole region; disposal methods with these objectionable features would never be permitted in the USA or Europe.[37]

In explaining the Soviet tardiness in nuclear development, one cannot overlook the abundance of its coal, oil and hydropower resources. But the absence of private ownership also seems relevant here, saving the USSR from some of the more spectacularly irrational features of capitalism's technological policies. At least its power supply will not be shaped by the imperial adventures of an Energy Company.

The situation of nuclear power in the Third World is of direct relevance to the controversy in the industrially advanced capitalist countries. For defenders of nuclear

power there often rest their case on the needs of Third World countries; short of coal, faced with rising oil prices, and yet starved of energy for their economic take-off, their only hope, allegedly, is the power of the atom.

This argument is either cynical or simply ignorant. A United Nations analysis has revealed the true situation, referring first to the Third World's

> " ...very poor infrastructure of technology and non-availability of trained manpower to handle the reactors and other nuclear plants. The probability of nuclear accidents and consequently of dangers to human environment are bound to be far greater in these countries. Further it is doubtful whether these countries could afford to spend an additional $3-4 billion towards the foreign exchange cost of nuclear facilities during the next 25 years which will be the years of financial stress in these countries arising from pressure of population and scarcity of food. Moreover, the small size of the national electric power grids can integrate only small nuclear power plants which are at present not being manufactured ..." [38]

This last point is at present vital: the leading corporations are simply not interested in building reactors small enough to fit Third World needs. And they appear to remain adamant despite pleas by nuclear protagonists in the specialist literature, and even by leading figures at the September 1974 conference of the International Atomic Energy Authority.[39]

Evidently they prefer to fight one battle at a time. Once the developed "heartland" has been conquered for nuclear power, it may be time to think of the outskirts.

The people of the Third World have no interest in speeding up the process of their "nuclearisation"; the UN comments above show this clearly enough. Financially, the higher capital cost of nuclear plants would deepen their dependence on the imperialist countries, who are skilled in exacting a political price for "development loans". Technologically, an important part of their industry would be in the hands of metropolitan experts for several decades. Economically, even a medium-sized plant would usually constitute by itself a high degree of concentration of power supply, and favour a centralisation of industry and a grandiosity of construction squarely

opposed to the real needs of the bulk of the population. (When the majority of the population have no access to a power point, the arrival of a nuclear plant can hardly do otherwise than distort the economy further. What benefits have flowed through to the mass of people in those underdeveloped countries already boasting nuclear stations - Pakistan, India, Spain?)

The Role of the Left

In the campaign against nuclear power -- as in most of the campaigns on environmental issues -- it has been exceptional to find the political vanguards actually in the van. Those with a pro-Moscow orientation have usually endorsed nuclear power as wholeheartedly and irresponsibly as the Soviet bureaucracy itself. Others have remained on the sidelines, or grudgingly joined in at the rear, because of ideological suspicions about the movement's purity in general, and its compatibility with their programme in particular.

In its most extreme form, this supicion leads to a dismissal of the anti-nuclear struggle - indeed of environmentalist issues in general - as a trendy middle-class phenomenon that does not interest the working class, and hence is no concern of the true revolutionary, who will concentrate on the real issues: those at the point of production and in the realm of State power.

Such a class characterisation of the environmentalist movement has greater difficulty reconciling itself with the facts now, than it might have had a few years ago; a weakness more serious still, is the implied judgement of an issue, not on its merits as a valid transitional demand, but on its present level of working-class penetration.

It might be worth pointing out how neatly this attitude reverses the approach to social problems that was typical of Karl Marx. Absorbed above all else by humanity's need for the overthrow of capitalism, Marx had an eagle eye - whether as journalist or as theoretician - for movements which contained the seed of revolution. Seeing the revolutionary potential of the working class, he thereafter focused his theoretical and practical activity on the needs and development of the working class movment.

The attitude we are examining turns this upside down. An attachment to the role of the working class - or rather, to a particular selection from Marx's writings about it in his day - serves it as a reason for ignoring what was Marx's first concern: evidence of revolutionary potential in any movements or strata in the contemporary world. If such schools of thought turn a blind eye to the environmental movement, their vision is not much keener when it comes to the liberation movements of women, blacks or gays. Eventually, after the passage of time, some Galileo may be able to persuade them to look through his telescope. But they will need first to be be convinced that the sights they will see can somehow (perhaps tortuously) be reconciled with the true reality - which for them (as it never was for Marx) is constituted by their doctrine.

A widespread climate of such opinionscan exert a damaging influence - as it appears to have done even to a talented and perceptive analyst such as Hans-Magnus Enzenberger.

His article, "A Critique of Political Ecology", dissects and exposes some of the best-publicised "doomsday ecologists", such as Ehrlich, in a study of considerable value. But the reader will search in vain for any recommendation that the left should participate in, and endeavour to guide, mass movements to defend the environment - from nuclear contamination or anything else.[40]

Despite Enzenberger's clear recognition of the possibility of what he calls "ecological rebellions" and "uncontrollable riots", he is uneasy about the "dangers" of participation by the left, and can only recommend that " a long process of clarification will be necessary ..."

By confining itself to the study and to a role of instruction from afar, the left will indeed avoid the risk of being "used" - just as an army is in no danger of being tricked and outmanoeuvred if it keeps clear of the battlefield. But, specialising from environmental issues in general to the nuclear question in particular, it must be asked whether the ground should really be surrendered to the enemy so easily.

The historical import of the nuclear power programme derives from the current plight of modern capitalism: based firmly on consumerist values and concessions, it sees the development of that consumerism heading inexorably towards the destruction of the environment. The coming exhaustion of oil reserves is one harbinger of the crisis, and has prompted a reckless acceleration of the nuclear programmes, in an attempt to ensure, at whatever cost, that consumerist capitalism will have available the centralised sources of power it needs.

The struggle over nuclear power thus poses questions about the very shape of society itself - as any intervention in this struggle quickly reveals. For it is impossible to adopt a purely negative stance, attacking nuclear power but proposing no alternative energy policy.

Many of the reformist critics understand this well, and offer programmes which envisage the attainment of social energy goals without the use of nuclear power, but which usually involve sizeable reductions in energy consumption by various methods of conservation.

But such a conservation policy would represent an extraordinary historical 'turn" by a consumerist capitalist society, wedded as it is to continual expansion; a society, moreover, in which the relative weight of the "Energy Company" grows day by day. Can such a society significantly restrict its energy consumption over a whole business cycle for example, in a time of recession, will it throttle down on vitally needed expansion plans, simply because they are energy-expensive? And what would be the social and political reverberations of such energy-conserving policies as were adopted?

These important questions usually get scant consideration from moderate advocates of conservation. In contrast, those already convinced of the need for radical social change are less inhibited, and will not play down the severe strains which an energy crisis implies for capitalism today. But their own social project will not escape a similar critique, unless it has at least the

basic outline of a solution to the problem - unless it can point to the satisfactions it envisages as replacing the dubious rewards of the commodity culture.

One project which sketches such a solution is that of self-managed socialism. The substitution of the principle of self-management for the present dominant principle of hierarchy in every walk of life - a substitution possible only if the power of the capitalist is overthrown and that of the bureaucrat severely limited at least - implies on the level of the individual, the possibility of changing the values one lives by. If new channels of self-expression and autonomous action can be opened up in every social sphere, beginning with the factory floor, it will not be so crushing a catastrophe if beer must be brought in bottles rather than in energy-expensive aluminium cans.

This point has been made in greater detail elsewhere.[41] It illustrates how the campaign against nuclear power must be finally unconvincing, unless it is prepared to delineate an alternative social path, a credible one that does not lead to a poisoned world. A receptive atmosphere for such an exposition is created by the striking irrationality of the nuclear programme, which must condemn by association the system that gives rise to it, and encourage the consideration of rational alternatives.

Footnotes:

1. Discussed in The Closing Circle, by Barry Commoner, Jonathan Cape 1972.
2. "Nuclear Electric Power", by David J.Rose, page 359. Science, 184 19 April 1974.
3. Nuclear News, April 1975, p.80. (The ruling Swedish Social Democrats subsequently lost the general election in which their remaining plans for nuclear plants were severely challenged.)
4. Nuclear News, April 1975, p.33 (editorial)
5. The best source here is Non-nuclear futures, by Amory B.Lovins and John H.Price (Ballinger Publishing Company, Cambridge Mass), October 1975, which contains an encyclopaedic list of references.
6. Nature, 253, p.385 (February 6, 1975, editorial)

7. Investir, March 24 1975. Quoted in Basquet. Le Nouvel Observateur, April 21 1975, p.46.

8. For the latter two incidents, see respectively Environment, 16, October 1974, page 21, and Time, September 22, 1975 ("Fromme: 'There is a Gun Pointed'").

9. "The Hidden Commitment of Nuclear Wastes", by W.D.Rowe and W.F.Holcomb. Nuclear Technology, 24, December 1974, p.286.

10. "Plutonium Recycle: The Fateful Step", by J.G.Speth, A.R.Tamplin and T.B.Cochran. Bulletin of the Atomic Scientists, November 1974, page 15.

11. Ibid., page 20.

12. New Scientist, March 27, 1975, page 799.

13. A 1000 Megawatt (electrical) reactor requires about 4,500 tons of uranium over its lifetime. Thus a world total of 2,000 reactors (one of the lower estimates) by 2,000 AD would need some 9 millions tons; but the estimated world inventory extractable at less than $39 a kilogram is 4 million tons. (See e.g. "World Uranium Resources", by L.G.Poole, Nuclear Engineering International, February 1975.)

14. See the discussion in Speth et.al (ref.10 above)

15. See e.g. "A Troublesome Brew", by Sheldon Novick, and "A Poor Buy", by T.B.Cochran et.al, both in Environment, 17, June 1975.

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23. "The World Energy Market", by B.C.Netschert, Bulletin of the Atomic Scientists, October 1971.

24. New Scientist, August 17, 1972, page 334.

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39. See Nuclear Engineering International: "Market considerations of medium/small nuclear power reactors", by J.Greason (page 37), and "The case for developing small power reactors", by G.Webb (page 39), both January 1974; "IAEA General Conference asks why no small reactors for developing countries?"

40. "A Critique of Political Ecology", by Hans-Magnus Enzensberger, New Left Review No.84, March-April 1974.

41. "Consumerism" and the Ecological Crisis, by Alan Roberts, Spokesman Pamphlet No.43, 1974.

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11-6

COMMUNITY HEALTH CELL
47/1,(First Floor)St. Marks Road
BANGALORE-560 001

THE FINAL EPIDEMIC

THE MEDICAL CONSEQUENCES OF NUCLEAR WAR

—P S KAMATH

Physicians for Social Responsibility (India)

ARMAMENTS AND HEALTH

The worldwide military expenditure of over 600,000 million dollars annually, over one million per minute, is greater than the total income of the poorer one half of the world's people. Much of this rapidly increasing spending is due to arms purchases by developing countries where infant mortality rates are eight times as high and life expectancy half as long as in the rich countries. Ten million people are killed by water related diseases and 50 million more will die because of malnutrition. Four hours of world arms spendings are equivalent to the World Health Organization's inadequate annual budget of 250 million dollars; two days of arms spending would fund immunisations for 750 million children. The WHO's campaign to eradicate small pox took 10 years and $300 million - as much as the world spends every five hours on arms. Saving the amount used for twenty days of arms spending for each of the next 10 years would provide safe water for all the world's people.

A thermonuclear conflict in any form and on any scale will inevitably lead to irreversible destruction of the environment and the death of hundreds

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of millions of people. There will be grave consequences for the life and health of all countries of the world without exception. Future generations would also be affected and their fate would be determined in a world of fire, water and radiation. The effects of nuclear attacks on the human population and the environment have been described in detail in the publications of the 'International Physicians for the Prevention of Nuclear Warfare' —IPPNW. Much of what follows is borrowed or extrapolated from these publications.

NUCLEAR WAR : THE CONSEQUENCES

It is estimated that nuclear war is inevitable by the year 2000 – a bare 16 years from to-day. The fact that it has not yet happened is meaningless for it need happen only once. And when it does it would constitute the ultimate human and environmental disaster.

The consequences for a city like Bangalore would be disasterous if it be the target of a nuclear strike even with weapons which would now be 20 years old. The blast, fire storms, and ionising radiations from the detonation of only two nuclear weapons would kill 1,052,000 people out of a projected population of 3 million. Of those surviving the immediate explosion, approximately one million would die from the injuries they would receive. Of the estimated 6560 doctors, 4850 would be killed, 1070 would be injured and only 640 will be able to function normally. This would mean approximately 1700 acutely injured persons to each functioning physician. If each

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physician spends only 10 minutes on the diagnosis and treatment of each victim and worked for 20 hours a day, it would take 14 days for every injured person to be seen for even the first time.

The assessments are conservative for they do not explore unpredictable longer range effects. They exclude even natural consequences that are inevitable; long-term climatic changes, degradation of the stratospheric ozone layer, radioisotope contamination of food and crop failures resulting from altered insect ecology.

Among those exposed in utero, teratogenicity and mental deficiency will most surely occur, manifesting in future generations deformed and mentally retarded children. Survivors would also face the overwhelming challenge of water and food contaminated by infectious organisms, which, together with the damage to their immune systems, would lead to the spread of infectious diseases in epidemic proportions. Without antibiotics fatalities would be high. In addition, failure to meet minimal total energy needs and poor access to food with high quality protein would have a serious long term effect. Without protection from exposure to the extremes of heat, cold and other environmental hazards, basic requirements for survival would be lacking. Crowding would potentiate the spread of airborne, enteric and parasitic infections. Regressive individual and group behaviour and deleterious effects on mental health could be expected.

With the loss of supporting infrastructure after a nuclear war, there could be no effective public health response to counter epidemics,

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to immunize the population, and to address environmental and sanitary hazards. The physician would lack the means to relieve pain or to provide adequate surgical or medical intervention.

In sum, the survivors of a nuclear war would face polluted water, inadequate food supplies, and all of the problems of infection without adequate health care or support services.

NUCLEAR WAR : THE 'SOLUTIONS'

The only medical solution is prevention. Physicians would always be willing to assist in planning for the medical management of technological and natural disasters such as floods, fire and earthquakes. However, there is no effective defence for nuclear war. Civil war plans lead the public into an illusion of survivability. Given the ethical considerations against giving false and damaging hopes to patients, physicians should speak out as a matter of conscience against such illusions as nuclear civil war defence. Even a sophisticated, prohibitively expensive shelter can provide possibility of immediate biological survival for only a few. Moreover, these would create new problems inherent in a shelter situation - inadequate ventilation, illumination, water, food, and waste disposal, complicated by the spread of infectious diseases and the proliferation of psychological problems and their intensification by over-crowding. Taking into account the extremely high number of wounded, burned and irradiated; the disruption of communication systems; the unavailability of food and water; the loss of medical facilities, personnel and supplies;

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and the persistence of radiation, civil defence would be totally ineffective in promoting population survival in the event of nuclear war. The survivors of the nuclear age would comprise a diseased and faltering remnant, scattered in a devastated land. Striking everyone and everything, the nuclear storm would spare neither hospitals nor medical personnel. Those of us responsible for health protection and medical care would be unable to provide any effective medical assistance.

NUCLEAR WAR : EFFECTS ON THE BIOSPHERE

Human existence depends upon a great complexity of fragile ecological and social interactions, among them the production, storage, and distribution of food, of energy, and of water. Damage to the human environment by a nuclear war would disrupt not only our agricultural systems, but also the less directly managed terrestrial and marine ecosystems. These impacts on humankind, although difficult to quantify or even to predict fully, would in some respects dwarf the direct health impacts.

The inevitably grave human losses that would result from a nuclear war, together with far-reaching radioactive contamination, large scale crop fires and forest fires, heavy losses among livestock and wildlife, global debilitation of marine resources, widespread destruction of energy, irrigation, and transportation systems, extensive soil erosion and desertification, and other environmental and social impacts, would lead to the destruction of our civilization.

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The massive self-propagating wildfires associated with a nuclear war would engulf cities, fuel depots, forests etc., and thereby generate huge amount of soot, the light scattering and absorbing aerosol. Recent studies suggest that this pall of smoke might block out more than 90% of the solar radiation and substantially lower surface temperatures throughout the northern hemisphere for weeks if not months. Crop losses would be catastrophic.

The damage to various species of plants and animals from ionizing radition likewise could lead to serious agricultural problems and important ecological imbalances. Radioactive contamination of plants, animals and food products may make them unsuitable for human consumption. The likely depletion of the stratospheric ozone layer would permit an enhanced flux of damaging ultraviolet radiation to reach the ground for a period of at least several years with a resulting increase in known UV effects: sunburns, eye damage, impairment of the immune system, and other adverse consequences to humans, lifestock and wildlife; and also to the death of some crops and other vegetation.

In conclusion, such an all-out exchange would eclipse all ecological catastrophes of recorded history. Coming gen rations would inherit a violated biosphere, an earth poisoned by radiation. The long-term environmental effects of the nuclear blasts would also afflict children of the future. Indeed, given what is known, and even more important, all that is still unknown about the effects of multiple nuclear explosions, there is the risk that human life on our planet would cease to be.

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Nuclear war would destroy in a single stroke achievements of thousands of years of human effort.

Since physicians would have no remedy for the foreseeable medical consequences of a nuclear war, the only effective action is prevention.

A NUCLEAR WAR AND INDIA

Talk of a nuclear holocaust usually fails to invoke a sense of doom in India. This is because there is a general feeling that the war will be fought between the Great Powers only, and that too, in Europe; and even if we do have a nuclear war it is only an alternative to dying of hunger. These are just illusions. A nuclear war anywhere in the world will involve India. Prevention of all wars and a stop to armaments will not only ensure that we do not die of a nuclear war, but will also not die of hunger and communicable diseases. If the money spent on our sophisticated arms imports is used for the supplies of clean drinking water for the next ten years there would probably be no water borne diseases in India. In fact, it is foolish to think just in terms of India when a nuclear conflict is concerned. If India must survive a nuclear war then the entire world must survive or we all die together. Only when this is fully realized can we impress upon our leaders and military strategists of the consequences of nuclear war.

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"We shall require a substantially new manner of thinking if mankind is to survive."

- Albert Einstein

INTERNATIONAL PHYSICIANS FOR THE PREVENTION OF NUCLEAR WAR (IPPNW)

IPPNW is a Federation of Regional and National Physicians groups working together to apply their medical expertise to the problem of preventing nuclear war and controlling the nuclear arms race.

The Physicians for Social Responsibility (PSR), India, is the Indian organisation coordinating the activities of this movement in our country. For further information on IPPNW and PSR (India), write to Dr K Balakrishnan, Brindavan, Pattathan, Quilon (Kerala) and or Dr P S Kamath, St John's Medical College Hospital, Bangalore 560034 (Karnataka).

A call from IPPNW/PSR to be signed by all those friends —medical and non-medical—is modified and included here. Please sign, tear off and send it to one of the above addresses to show your solidarity with the movement.

The IPPNW has suggested (June 1983) the following addition to the Hippocratic Oath:

> "As a physician of the 20th century, I recognise that nuclear weapons have presented my profession with a challenge of unprecedented proportions, and that a nuclear war would be the final epidemic for humankind. I will do all in my power to work for the prevention of nuclear war."

The Fourth Congress of IPPNW is on June 4-8, 1984 in Helsinki, Finland (theme: Physicians insist: Nuclear War can be prevented).

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THE INTERNATIONAL PHYSICIANS' CALL FOR AN END TO THE NUCLEAR ARMS RACE

As physicians and those interested in health, we wish to express our professional concern over the unprecedented threat to life and health posed by nuclear weapons, a threat that hangs over hundreds of millions of people. The increasing accumulation of destructive power and the development of even more sophisticated weapons greatly increase the risk of nuclear war.

If even a single nuclear weapon is exploded over one of our major cities, hundreds of thousands will be killed. If many nuclear weapons are exploded, radioactive fallout and disturbance of the biosphere will cause suffering and death - particularly from starvation, radiation illness, infectious disease and cancer - without regard to national boundaries. The remaining medical facilities and personnel will be inadequate to help the wounded. An all out nuclear war would end our present civilisation.

The cost of the arms race is not only the vast sums being diverted to armaments in a world where tens of thousands of human beings die each day of treatable diseases. The cost is also in the great psychological damage that is being done, particularly to young people and children who fear they will have no futures.

We recognize that to reach agreements to end the nuclear arms race and avert the introduction of nuclear weapons into any conflict represents a major political task. We regard such agreements as crucial and urgent since the threat of nuclear war is the greatest

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challenge to health and survival that humanity has ever faced. As physicians and health workers, we believe a nuclear war would be the final epidemic.

Name	Designation	Address
1.		
2.		
3.		
4.		

DETACH HERE

Past appeal 16 :

(a) Dr. K. Balakrishnan,
Physicians for Social Responsibility - India
"Brindavan", Pallathuram,
Quilon, Kerala

(b) Dr. Patrick. S. Kamath,
Dept. of Gastroenterology,
St. John's Medical College Hospital
Sarjapur Road,
Bangalore 560034.

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4. Effects of Nuclear War on Health and Health Services.
WHO (1984)

International Physicians For
the Prevention of Nuclear War, Inc.

225 Longwood Avenue
Boston - MA 02115
U.S.A.

(617) 738-9404
Telex:
4430017 IPPNW

Indian affiliate

Physicians For Social Responsibility, India
"Brindavan"
Pathathuran
Quilon, Kerala
Tel 5836, 5521

President: Dr. K. Balakrishnan
Member: Dr Patrick-S. Kamath

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1. Updates
2. Bibliography
3. Proceedings of Second/Third Congress
4. Working group report on Socio-economic effects of the Arms race on health

COMMUNITY HEALTH CELL
326, V Main, I Block
Koramangala
Bangalore-560034
India

23/8/84

11-7

Dear Patrick,

Enclosed a letter from Anjum of CED on the counterfact. What is the progress? Are you interested in any of those references? We are forwarding some material we have in our documentation cell for your reference. In spite of your busy schedule hope you can work on this project. Could you write the introduction and send it to me to forward it to Anjum. The perspective with which it is written and the overview of the Indian situation are particularly relevant.

Send me the materials after you have finished with them.

How about coming over one evening to discuss the matter? Mondays/Wed/Thurs after 3pm are ideal!

Best wishes

Ravi

P.S The mfe form/membership are still due !!

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4. After the Bomb - Can life go on?

Goldsboro, North Carolina January 24, 1961

Four days after John F Kennedy became president, a B 52 fell apart in midair, killing three out of eight crew members and releasing two 24 megaton nuclear bombs. (All the bombs dropped on Germany and Japan during world war II totalled 2.2 megatons). One bomb parachuted to the ground and was recovered, but the other two fell free and landed in waterlogged farmland, never to be found. When the recovered bomb was studied, it was discovered that five of its six safety devices had failed

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Damascus, Arkansas Sept 19, 1980

An Air Force repairman doing routine maintenance in a Titan II ICBM silo dropped a wrench socket, which rolled off a work platform and fell to the bottom of the silo. The socket stuck the missile, causing a leak from the pressurized fuel tank. The missile complex and surrounding area were evacuated. Eight and a half hours later, fuel vapors ignited, causing an explosion which killed an Air Force specialist and injured 21 others. The explosion also blew off the 740 ton reinforced concrete - and - steel silo door and catapulted the nuclear warhead 600 ft into the air.

There has never been an accidental detonation of US nuclear weapons. But detonations have occured of conventional high explosives which are used to trigger the nuclear material. Several explosions have damaged the nuclear device allowing radiation to escape into the air.

Wallace A, Wallechinsky D, Wallace I
The Book of Lists # 3. Bantam Books 1983; 94-96

20 miles Northeast of Cambridge, England July 27, 1956

A US B 47 practicing a touch-and-go landing at Lakenheath Royal Air Force Station went out of control and crashed into a storage igloo housing three Mark 6 nuclear bombs, each of which had about 8000 lbs of TNT in its trigger mechanism. Four airmen were killed, but fire fighters were able to extinguish the blazing jet fuel before it ignited the TNT. In the words of one Air Force General, "It is possible that a part of eastern England would have become a desert" had the TNT exploded.

Nuc'ear bulletin No. 1

The Worldwide Threat Of Nuclear Technology.

HEALTH AND SOCIETY GROUP

Introduction

In the West, particularly within the last few years, a fresh awareness is steadily growing of the dangers posed by nuclear technology. The seed of awareness has yet to germinate in India. At first glance it may seem that India is so overwhelmed by the basic and immediate problems of poverty that these issues are of secondary importance, Also, some will try to justify the existence of the Indian atomic bomb in reference to the conceived threat from Pakistan and the development of nuclear reactors in reference to pressing power shortages such as Calcutta is experiencing every day.

This article is the first of a series. Our aim is to bring the question of nuclear technology to the forefront. It is in fact extremely relevant to India today for the following reasons :

1. Expenditure on nuclear technology both military and for power, represent huge sums of money which could be positively used to promote economic and social development.

2. The nature of nuclear technology is such that it poses a threat to the whole of mankind and not simply to certain people or places.

3. In possessing both nuclear weapons and power stations India has a responsibility along with other nuclear nations to find a way out of the nuclear nightmare.

4. The nuclear business is controlled by the highly indnstrialised states and their multinational corporations and therefore in following the nuclear path, India is enhancing her neo-colonial status.

We hope that the information given will be widely read and distributed.

September, 1981

The Worldwide Threat of Nuclear Technology.

"The atom bomb has changed everything except our mode of thinking." —Einstein.

When America tested an atomic bomb on the population of Japan on the morning of 6th August 1945 the Atomic Era began. It could be the last era of civilization. What happened on that day could be repeated on a much vaster scale threatening the lives of men, women and children everywhere.

Hiroshima.

The atomic bomb which fell on Hiroshima weighed about two kilograms and was little larger than a cricket ball. It killed approximately 50% of the population ; 140, 000 people died instantly. There was first a searing flash of light brighter and hotter than a thousand suns. At 1,000 yards the surface of granite melted and all life was incinerated.

"Suddenly a glaring whitish, pinkish light appeared in the sky accompanied by an unnatural tremor which was followed almost immediately by a wave of suffocating heat and a wind which swept away everything in its path. Within a few seconds the thousands of people in the streets in the centre of the town were scorched by a wave of searing heat. Many were killed instantly others lay writhing on the ground screaming in agony from the intolerable pain of their burns. Everything standing upright in the way of the blast—walls, houses, factories and other buildings, was annihilated...Hiroshima had ceased to exist."

—Japanese journalist.

Fires sprang up in all directions and were swept by tornado winds into a single firestorm which raged for six hours burning everything combustible within two kilometres. Survivors overcome by the intolerable heat and raging thirst ran in panic to the rivers and drank the poisoned water. Within a month they too died. Apart from their gruesome and repulsive injuries the total and absolute destruction disorientated even active survivors and destroyed their will and capacity for living . Not only human lives on an unprecedented scale but all services, hospitals, fire stations, factories, transport and every environmental factor that makes life liveable were gone in seconds.

Beyond the area of total destruction, radiation sickness from the radioactive fallout leading to vomiting, bleeding and convulsions killed many more within days. Today they are still dying at the rate of two thousand a year from leukaemia and other forms of cancer. The incidence of abortion and malformed offspring as a result of genetic damage from the fallout increased.

Nuclear Weapons today.

The Hiroshima bomb had a destructive force of 20,000 tons of TNT. Today bombs are commonly 1 megaton or 11,000,000 tons of TNT, that is fifty times the size of the Hiroshima bomb. Fusion bombs of up to 65 megatons have been produced.

The explosion of a megaton bomb will cause the buildings to collapse in an area of about 100 square miles when the blast arrives. Within 300 square miles firestorms will develop. Soon after the explosion an area of 50 miles by 10 miles wide will be contaminated with enough radiation to give a quickly lethal dose to anyone in the open. Eventually an area of over 4500 square miles will be contaminated.

The nuclear arms race

"As a military man who has given half a century of active service I say in all sincerity that the nuclear arms race has no military purpose. Wars cannot be fought with nuclear weapons Their existence only adds to our perils because of the illusions which they have generated."—Mountbatten, 6 weeks before his death.

In their efforts to produce more and more lethal weapons the two superpowers have amassed enough nuclear weapons to destroy every city in the world several times over. They number over 50,000.

If the Americans loose 40% of their present stock every man, woman, animal and insect in the U. S. S. R. would be dead. The country would be a radioactive desert. And the other 60% would do no Russian enemy harm ; you cannot hurt a Russian who is already dead. The fallout from the 40% would go up to 40,000 ft. and, caught by the upper winds would go, if the wind was from the west to China and Japan, and if the wind was from the east to Britain, the U.S and Canada. In all probability the Russians would have retaliated in kind and a war would escalate in which the country initiating the action would be destroyed along with the enemy and the whole of human civilization would be put in jeopardy within a matter of minutes.

"Hundreds of thousands of burned and otherwise wounded people would not have any medical care as we now conceive of it ; no morphine for pain, no emergency surgecy, no antibiotics, no dressings, no skilled nursing, and little or no food or water.

Delayed radioactive fallout would render large areas of land uninhabitable for prolonged periods of time, making it impossible to produce the food upon which the survival of whole populations would depend.

The earth will be seared, the skies heavy with lethal concentrations of radioactive particles, and no response to medical needs can be expected from medicine."

—from the proceedings of the First Congress of the International Physicians for the prevention of Nuclear war.

Inspite of the horror of nuclear war, there is constant readiness to launch an attack. One nearly did occur during the Cuba Crisis in 1962. The instability and unreliability of the policy of 'deterrence", of possessing nuclear weapons in order to deter an enemy from attacking, was shown then when we came within a hair's breadth of nuclear war all over a single Soviet ship crossing an arbitary line America had drawn around Cuba. Bomber fleets are on 24 hour alert, some are always airbourne with armed nuclear war heads, and tens of thousands of nuclear missiles are poised to strike. Each member of a missile crew is provided with a pistol and given instructions to shoot anyone who appears likely either to fire the missiles without authorisation or not to fire them if authorised.

Accidents

On November 9, 1979 all the American early warning systems around the world went on alert for six minutes. Three squadrons of planes took off armed with nuclear weapons. Twice again on June 3 and 6, 1980 two computer errors nearly led us into a nuclear war. The false alerts were traced to a defective component worth 46 cents. Over 100 near accidents have been recorded in the past 30 years.

There is a proposal to by-pass radar operators, the President and launching personnel by a piece of wire. Within two years the technologists at the Pentagon will have finished developing a

system called 'Launch-On-Warning.' That means that when the reconnaissance Satellite detects something in Russia—maybe its a missile going off, may be it's an accident, may be it's nothing-it sends a message back to a computer and then to all the missiles in America which go off within three minutes. Then the e will be no chance to check for false alerts. There is no human input or intervention.

Accidental war has, so far, been avoided but accidents involving nuclear weapons have not.

On 23 January 1961 a B-52 bomber carrying two 24 megaton nuclear bombs crashed near Goldsboro, North Carolina, U S. According to Dr. Ralph Lapp, former head of the U. S Office of Naval Research, one bomb was removed from the wreckage, the other from a field near by where it had fallen without exploding. When the recovery team examined this second bomb, however, they discovered that five of the six safety interlocks had been triggered by the crash. Only one single switch had prevented the explosion of a 24-megaton nuclear bomb. On 17 January 1961 another B-52 this time carrying four 20-25 megaton hydrogen bombs crashed near Palomares, Spain. One landed undamaged but the conventional detonating devices on two others exploded scattering plutonium over a wide area. This necessitated the removal of 1, 750 tons of radioactive soil and vegetation. (It was buried in Barnwell, S. Carolina where the rain will leach the plutonium into the Savannah River. The fourth bomb fell over the Mediterranean and was only recovered after an intensive three month long underwater search.

Many more accidents are covered up in secrecy.

Apart from accidents there have been losses of nuclear materials. In 1978 the Nuclear Regulatory Committee in the U. S. announced that over a ton of plutonium was "missing". Plutonium is used to make bombs. Even 99·9% control of American nuclear weapons inventory, which is far greater than in fact exists, would still leave fifteen warheads unaccounted for. One of these is enough to kill hundreds of thousands of people.

Fallout from tests.

There have been over 1, 200 nuclear tests since 1945. It is reasonable to believe that already as many people have been killed from the fallout around the globe from the testing of nuclear weapons as were killed by the two bombs dropped on Japan. In 1954 a radioactive cloud drifted over some Pacific islands and a Japanese fishing trawler well outside the testing area. Many islanders sustained burns and permanent abnormalities and all the crew came down with radiation sickness. One of them died.

In 1969 Dr. Sternglass, Professor of Radiation Physics at the University of Pittsburgh, delivered a paper stating that according to his studies some 400, 000 infants less than one year old had probably died as a result of nuclear fallout between 1950 and 1965.

The most lethal radioactive element plutonium-239 according to Dr. John Gofman former Assistant Director of the AEC (Atomic Energy Commission) Lawrence Radiation Laboratory, is so deadly that between 116,000 to 1, 000, 000 cancer deaths will occur from its fallout in the U. S. alone.

Thinking the unthinkable.

As the stocks of weapons have grown to exceed by far the number that could be justified as a deterrent, new concepts of nuclear war have had to be developed to warrant further expansion of nuclear forces. The competition has moved towards the production of smaller size with more punch for the pound and much greater accuracy.

Missiles can carry strategic nuclear weapons 6, 000 miles in less than 30 minutes. Fired from the other side of the world, they can hit within a few hundred feet of the target.

Now the idea that nuclear war could be deterred by the horror of it is giving way to a different official concept that these weapons can be perfected to fight against the enemy's weapons and destroy them. Instead of "deterrence" and "assured destruction", nuclear war is to have a more thinkable image, "counter force." It is highly inprobable that all the enemy's forces could be wiped out ; even one submarine left after destroying all other weapons simultaneously would be enough to inflict completely unacceptable damage on the attacker. And yet this concept, more dangerous still, provides rationale for the actual use of these weapons in war.

Governments in the West are preparing the public to accept the possibility of nuclear war and creating the cruel illusion that it may be possible to survive it by promoting laughable civil defence publicity. Around the country in Britain, and other countries, secret Government bunkers are hidden, "regional seats of Government" in the event of nuclear war.

Proliferation and the arms trade.

Six nations are known to possess nuclear weapons : U. S., U. S. S. R, Britain, France, China and India. Eighteen other countries have them stationned on their soil or provide bases for ships or planes that transport them. South Africa and Israel almost certainly have the capacity to produce nuclear weapons also.

In the shadow of the U. S.—U. S. S. R. arms race local rivals are engaged in contests of their own. The nuclear arms spiral has had consequences for beyond the boundaries of the U. S , Europe and the Soviet Union. For the nuclear arms spiral has been accompanied by an equally spiralling conventional arms race. Both the U.S. and the U.S.S.R. have sought to arm other countries to the same degree as they continue to arm themselves. Between 1968 and 1975 arms exports of the U. S. rose over 1, 200% and have climbed even faster since then.

The cost.

The money required to provide adequate, food, water, education, health and housing for everyone in the world has been estimated at 17 billion dollars a year. It is a huge sum of money... about as much as the world spends on arms every two weeks.

The amount of money spent on arms and armies throughout the world is difficult to conceive of. It is :

Ten thousand million rupees per day.

In today's world :

* 500 million people are starving to death. 2 billion people do not have clean water to drink. Water-related diseases kill approximately 10 million people every year.

Yet two governments in three spend more on the military than on health.

* The training of military personnel in the U.S. alone costs twice as much per year as the education budget for the 300,000,000 schoolage children in S. Asia.

* Research on new weapons receives eight times as much public money as research on new sources of energy.

* Close to 50% of all the world's scientists are in some way involved in military research and development.

* In two days the world spends on arms the equivalent of a year's budget for the United Nations and its specialised agencies.

* The world's military expenditures are today greater than the gross national product of all Africa and South Asia combined.

The developed countries have been very successful in creating markets for their arms in the developing world. The percentage of the national budget of developing countries spent on arms has risen steeply over the last few years. Military expenditure exceeds expenditure on health in developed countries ; it is often three times as much in developing countries. Developing countries totalled 9% of world military expenses in 1960, in 1977 it was 18%.

Inflation and unemployment.

The diversion of resources away from economic development and urgent social needs is all too glaringly obvious. This "permanent war economy" has also effects in hidden ways, not easily reducible to numbers and therefore often ignored. Military spending is an important cause of inflation and unen ployment. Military spending overheats the civilian economy by generating

more spendable income than goods and services to absorb it. It depresses investment which in turn thwarts economic growth and prolongs inflationnary pressures. Comparison of military expenditure of the developed countries and their manufacturing productivity shows an inverse relation between the two. The highest rates of military spending are associated with relatively low growth of productivity, the lowest rates of military spending with high gains in productivity.

Official calculations for the U. S. economy indicate that for the same expenditure of funds up to twice as many people can be employed in schools, health services, building homes and transport systems as through military budgets.

The road to destruction.

Between 1960 and 1980 there have been 83 wars and interventions. With the superpowers often supplying the weaponry for these conflicts the chance of their involvement escalating to direct confrontation increases. And, as the countries involved in conflict seek more and more lethal weapons, this leads ultimately to the desire for nuclear weapons for themselves. The superpowers wish to retain a monopoly in their nuclear arsenals but the means for other countries to make their own bombs are not hard to come by. Wherever there are nuclear power stations operating there is both the material and the technology to construct nuclear bombs.

Both technologies for nuclear bombs or the production of power are based on the fissioning of uranium, the splitting of uranium atoms into sub-atomic particles releasing energy. Nuclear power reactors produce fairly large quantities of a by-product, plutonium, from which nuclear weapons are pro uced.

A power plant may produce 500 pounds of plutonium in a year. A bomb requires only 10-20 pounds. Therefore any nation possessing a reactor could theoretically make 20-40 atomic bombs annually. It is not by chance that the entire U. S. nuclear weapons programme is run by the Department of Energy.

India very effectively demonstrated the link between nuclear power and nuclear bombs in May 1974. Using plutonium extracted from an experimental reactor bought from Canada "for peaceful purposes", India built and detonated the subcontinent's first homemade nuclear bomb.

College students have succeeded in designing functional bombs from documents available publicly. The designs call for metal fixtures bought at local hardware stores and an amount of plutonium that can easily be concealed in a shopping bag.

Today there are 565 nuclear power stations in 39 countries. By the year 1985, it has been calculated, 40 countries will be in a position to manufacture atomic bombs given the political will to do so.

The possibility of making nuclear weapons from nuclear power is by no means its only danger. Even taken on their own terms nuclear reactors, indeed all aspects of the nuclear fuel cycle, are seen to be as devastating as the nuclear weapons used against Japan. The only difference between nuclear weapons and nuclear reactors is that one goes off with a huge blast while the other releases its radioactivity slowly, quietly, over time. But the effects are the same.: environmental damage and human death and mutation.

Information compiled by Janet Aitken from :

1. "From Hiroshima to Harrisburg" by Jim Garrison.
2. "Nuclear Madness" by Dr. Helen Caldicott.
3. "World Military and Social Expenditures 1980" by Ruth Leger Sivard.
4. "Atomic bombs and human beings" by Arthur Booth,
5. "The effects of a nuclear explosion " by Andrew Utting.
6. "What nuclear war would mean" Speech by Philip Noel-Baker in March 1980.
7. Speech made on 11 th May 1979 on presentation of Louise Weisse Foundation Peace Prize by Earl Mountbatten.
8. Proceedings of the First Congress of the International Physicians for the Prevention of Nuclear War, March 1981.

* * * *

In preparation :

Nuclear bulletin 2 : "Radiation—the greatest public health threat of all time."

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Nuclear Bulletin No. 2

RADIATION

The Greatest Public Health Threat Of All Time

Health And Society Group.

Introduction

It is difficult to exaggerate the danger posed by radiation ; it is difficult to imagine something that could present a greater threat to life on earth. Yet, we cannot perceive its presence through our senses and its effects are insidious. It is only when the full reality of its nature has penetrated our consciousness, our imagination and our understanding that we realise the extent of the danger we are facing. There are many reasons why this understanding has failed to reach the vast majority of people.

1 Relatively few people in the world have witnessed the immediate effects of high dose radiation. For most people Hiroshima is a far off place and what happened there a past event. But for those who live there or have visited since 1945 it is a constant reality. Besides Hiroshima, other fatalities from high dose radiation have taken place within the confines of nuclear power stations or nuclear weapons factories. The relatives of the thousands of people around the world who have died of the long-term effects of lower doses of radiation or the parents of deformed babies, are not usually able to trace the cause of their grief to a source of radiation.

2) The Atomic Age began only 36 years ago and considerable uncertainty still exists concerning the long-term effects of radiation. The latency period of cancer is 12 to 40 years and genetic mutations do not often manifest themselves for generations so we have barely began to experience the effects radiation can have on us.

3) Once radiation has leaked into the environment it is impossible to control. Since we are dependent on the environment for our food, water, air, we cannot avoid contamination. There is no protection and no effective treatment. Radiation can persist in the environment of hundreds of thonsands of

years. When the full horror of this dawns on us there are many who close their minds to it : they do not want to know.

4) Another reaction to the horror is that this is a complicated subject and it is for the experts. Often associated with this attitude is a misplaced faith in the ability of science and technology to come up with a solution. The "wonders" of science have engendered a feeling that man can conquer nature whereas, in reality. our survival depends on our co-operation with nature.

5) Lastly, and most important of all, there are very powerful vested-interests at work in government and industry who do not want us to know and who publish misleading information and suppress sources of reliable fact.

We have enumerated here some of the obstacles in the way of informing people about the dangers of radiation. They are obstacles we have to overcome if we and our children are to survive. This bulletin is produced in the hope that it will help to spread awareness and in the faith that it is up to ordinary people to make their voice heard against those who are gambling with our destiny.

December 1981.

Radiation

"If present trends continue, the air we breathe, the food we eat, and the water we drink will soon be contaminated with enough radioactive pollutants to pose a potential health hazard for greater than any plague humanity has ever experienced."

—Dr. Helen Caldicott in
"Nuclear Madress."

What is Radiation?

You can't feel it, see it, smell it or taste it, but it can kill you.

All matter is made up of atoms. Some atoms are unstable or radioactive, that is, they spontaneously emit particles and energy (radiation) and go on doing so until they have changed to a stable form. This process is known as radioactive decay. The rate at which radioactive elements decay is measured in terms of 'half-life', that is, the time in which half the material originally present will decay. In this time, the emission of radioactivity will also fall by half. Some elements decay rapidly, Iodine-131, for example, has a half-life of only 8 days, while some have very long half lives, for example Plutonium-239 has a half-life of 24,400 years. Strontium-90 has a half-life of 28 years. Starting with 1 pound of Strontuim-90, in 28 years there will be $\frac{1}{2}$ pound of radioactive material; in 28 more years there will be $\frac{1}{4}$ pound and so on. In general 10 half-lives need to elapse before a radioactive element can be considered not to be dangerous.

In the course of radioactive decay atoms give off 3 major forms of radiation - alpha, beta and gamma. Alpha radiation is a stream of (relatively) slow-moving heavy particles which do not have much penetrating power. They do not usually

penetrate the skin. However they can enter the body by ingestion in food or liquids or can be inhaled into the lungs. When this happens all the destructive energy of the alpha particles acts directly on soft body tissue and the biological damage is much greater than any other form of radiation.

Beta radiation is composed of particles several thousand times smaller than alpha particles. It can penetrate a 6″ block of wood and so can pass through the skin to damage body tissue. But, as alpha radiation, it causes most serious and irreparable damage when ingested or inhaled.

Gamma radiation is similar to X-rays and has the greatest penetrating power. It can penetrate concrete more than one metre thick.

Once released into the air, waterways or the sea radioactive elements do not disperse themselves evenly but are taken up by living organisms. There they accumulate and are concentrated. For example, Caesium-137 is concentrated in fish to levels 1000 times those found in the river as a whole. Strontuim - 90 results in far higher concentration in cows and their milk than is found in the grass. The radioactivity does not die with the death of the organism or animal. It is passed on to those consuming the contaminated product and accumulates there .

How radiation harms us.

Body cells have their own specific electrical charge in order to function normally. All forms of radiation harm us by changing the normal electrical charge of an atom within our body cells. The structure of the cells is disrupted and the chemical balance needed to maintain proper functionning of the cell is altered. Sometimes the cells are killed outright or rendered incapable of cell division ; sometimes the damage is repaired ; sometimes the cell nucleus and its store of genetic information is damaged but the cell survives and multiplies in its altered form over a number of years and forms a group of cells that is eventually diagnosed as cancer. When the cell affected is a sperm or egg cell it can give rise to seriously damaged offspring in the next or subsequent generations.

Different organs and tissues in the body absorb different radioactive elements. For example Strontium-90 chemically resembles calcium and is absorbed by our bones and can cause bone cancer and leukaemia. Iodine-131 concentrates in the thyroid gland to cause cancer. Cesium-137 concentrates in muscle tissue and the ova of females. The risk is much greater for the very old and very young. Children are much more susceptible than adults and infants and the unborn are the most susceptible of all with their rapidly dividing cells and immature bodily defence systems.

Plutonium

Plutonium-239 is the most lethal carcinogen (=Cancer-producing substance) known. It is not found in nature ; it is man made. Single particles weighing one millionth of a gram, so small that they can only be seen under a microscope can cause cancer of the lung if inhaled. (When exposed to air it ignites spontaneously to produce particles of plutonium dioxide which can be inhaled.) The toxicity of Plutonium can only be understood by comparison. Potassium cyanide, pellets of which have been used in gas chambers to kill convicted criminals within minutes, is generally thought to be one of the most toxic substances available for use in capital punishment. The single particle of Plutonium just described, however, is 20,000 times deadlier than a whole pellet of potassuim cyanide. Ten pounds of Plutonium evenly distributed amongst every person in the world, would give them all a high probability of dying from cancer. Apart from causing cancer, it is concentrated by the testicles and ovaries, where it will inevitably cause genetic mutations which will be passed on to future generations. Each operating nuclear reactor produces between 400 and 600 pounds of Plutonium each year in its normal operations. It is the essential ingredient in the construction of nuclear weapons.

The degree of damage caused by radiation depends on the type, the intensity and exposure time. The amount of biologically damaging energy contained in radiation received by an organism is expressed in rems. A very high dose of radiation

say 3,000 rems or more, causes acute encephalopathic syndrome. Within 48 hours of exposure the brain cells swell and cause increased pressure inside the skull leading to delirium, fever, loss of muscle control and death. Such will be the effect of the ' **neutron bomb**" which the Americans plan to produce. A dose of 600 rems produces acute fatal radiation sickness. All actively dividing cells are killed and hence hair falls out, skin is sloughed off in big ulcers, vomiting and diarrhoea occur and then white blood cells and platelets die and victims succumb of infection and / or massive haemorrhage.

Lower doses of radiation cause leukaemia 5 years after exposure, cancer 12—40 years later and genetic diseases and abnormalites in future generations. There is also a growing body of evidence indicating that radiation produces a generalised ageing effect on the body. It accelerates the breakdown of the body and undermines resistance to disease. Data indicates that the amount of radiation received from one heavy abdominal X-ray is equivalent, roughly, to one year of aging.

Sources of radiation.

Natural "background" radiation comes from cosmic rays from outer space and from certain radioactive rock strata. Areas high in natural background radiation show a higher incidence of health problems, for example, in Kerala there is an abnormally high level of radioactive Thorium in the soil believed to be responsible for a high incidence of mongolism and mental retardation there.

Man has so far added an extra 50 percent to the natural background radiation we receive. Whereas cosmic rays are made up of gamma-like rays, man-made radiation contains more alpha and beta particles which, after ingestion in the body, are much more dangerous.

One source of man-made radiation is from medical X-rays. These have saved thousands of lives when used to diagnose and treat diseases. We are now more aware of their dangers than in the past. Mass radiography programmes once so popular are now no longer used. It has been concluded that mass X-ray screening for breast concer resulted in approx-

imately 5 percent more cancers than they detected. Dr. Alice Stewart found that one diagnostic X-ray to the pregnan abdomen increases the risk of leukaemia in the offspring by 40 percent. In the West pregnant women are seldom X-rayed.

Even more importantly, man-made radiation comes from the testing and fall-out of nuclear weapons. Numerous studies have shown health effects. For example, in St. George, Utah, U.S. child leukaemia deaths rose by 250 percent following the 1951 Nevada tests.

John Wayne, the American filmstar, died of cancer this year. He was one of a film team that shot a film in the Nevada desert. Since then members of the team are, one by one, dying of cancer.

In Alberta, Canada, the Ministry of Health noted in 1962 a significant increase in stillbirths and birth defects following the U.S.S.R. tests in 1958. Study concluded that each radioactive atom was 10 million to this 100 million times more toxic to developing embryos than molecule of even something as devastating as Thalidomide.*

As well as producing energy, nuclear reactors create large quantities of radioactive materials. Leaks of radioactivity into the environment occur, indeed some "routine" releases of radioactive waste and gas are allowed for in normal operations. Such releases occur at every stage from the mining of the raw material, Uranium, through to processing and storage of the highly radioactive waste products. The Australian Atomic Energy Commission found an incidence of leukaemia and cancer amongst white Australian uranium miners 6 times the expected norm. These considerable health risks not only effect those working but also those living nearby mining areas and nuclear facilities and also transport routes.

* Thalidomide, taken by pregnant women during the 1960's, resulted in the birth of hundreds of grossly defromed children.

Around the Big Rock Point reactor on Lake Michigan, child leukaemia rates were found to be 4 times greater than the rest of the Michigan State.

A study by the Bremen Institute for Biological Safety on the population around the Linger reactor in W. Germany. found that 10 years prior to the operation of the plant there were 30 leukaemia deaths.[1] In the 10 years after nuclear operations began (1968-78), the same population suffered 230 deaths from leukaemia, 170 of these were children under 15 years old.

Many of the radioactive elements in nuclear wastes remain potentially dangerous for hundreds or even thousands of years. We still have no safe way to store them in isolation from the environment for this length of time. Meanwhile they accumulate leaving a problem for future generations. Some waste is dumped. For example 6000 curies (a curie is a measure of the amount of radiation given off by a substance) of Plutonium may be legally dumped in the Irish sea each year. As a result, the level of radiation in the Irish Sea shows a ten-fold increase.

Accidents

Far from being as improbable as the nuclear industry would like us to believe, accidents in nuclear power reactors are a very common event.

In the U.S. in 1976 every 2½ days there was a reported failure of containment isolation at a nuclear reactor ; a reported failure of main cooling occurred 116 times that year ; failure of reactor protection 82 times ; failures of other core and containment cooling systems 528 times. Altogether, there was one failure every seventeen hours...

This incredible state of affairs becomes more credible when one learns of the design and construction faults, the cracks and corrosion of materials and radioactive leaks combined with sheer carelessness.

> Two reactor pressure vessels at San Onofre, California were found to be installed backwards.
>
> Safety instruments at Zion, Illinois, were wrongly wired.
>
> A 3000 gallon radioactive waste tank is found to be connected with the plant's drinking water system.....etc.

The picture is similar in other countries. By the late 1960's nuclear plants in Britain, the U. S., the U. S. S. R., Canada and Switzerland had all experienced major accidents. Carrying out repairs is an extremely hazardous task in which workers risk their lives and some have been killed. Sometimes repairs are impossible and the whole plant is filled with concrete and entombed as happened after the immense fire in windscale, Britain in 1957.

The most serious accident that can occur at a nuclear reactor results from the loss of coolant in the reactor vessel. The nuclear fuel in the core then heats up to such a degree that it melts forming a mass of white-hot radio-activity. This is called a meltdown. If emergency measures fail, as they frequently have, or are wrongly managed, the core begins to melt and collapse within 30 to 60 seconds. No one knows what would follow nor what, if anything, could be done. It is conceivable that it will melt its way through the floor and foundations and begin burrowing its way into the earth. Hence the name "China Syndrome." At Harrisburg, U. S., in March 1979 a meltdown was only narrowly avoided and the dangers are not over yet. The plant now contains thousands of gallons of contaminated water and radioactive gas which no one knows how to deal with.

In 1958 a huge explosion occurred at a plant in the S.Urals, U.S.S.R. Hundreds of square miles of land were so heavily contaminated that entire villages were wiped out by death and evacuation. It is now a waste land devoid of life. The map of the area has been redrawn.

Any dose of radiation is an overdose

Until 1960 the view was prevalent that there is a threshold level of exposure to radiation below which no harm can result. Nuclear reactors were built on the basis of this theory. They cannot operate without it for, as we have seen, radioactive releases are routine. But the view that low doses of radiation are safe has long since been abandoned.

The truth is that there is no safe dose of radiation because it takes only one radio-active atom, one cell and one gene to initiate the cancer or mutation cycle. Any exposure at all therefore constitutes a serious gamble with the mechanisms of life. It is important to realise that the effects of radiation build-up from one exposure to another. Successive doses of radiation add on to the damage done by the previous dose. The biological effects of receiving separate small amounts of radiation over time may be the same as receiving a large dose all at once.

The nuclear authorities have been obliged to progressively lower the permitted levels of exposure to radiation for workers in industry :

1925	52 rem / year
1934	36
1950	15
1957	5

5 rems is the equivalent of severalh undred chest X-rays. The public can at present legally receive 0·5 rem, the equivalent of 17 chest X-rays.

Even these levels are considered by some experts to be far too high.

A study at the Hanford Atomic Works in the U.S.A. involving 25,000 men and women over a period of 29 years concluded that the dose required to double a worker's risk of cancer was well below the permitted 5 rems a year. Less than 1 rem is the doubling dose for bone marrow cancer.

The cover-up

The reason that the nuclear authorities are not concerned with this evidence is quite simple—they are more interested in porfits than in health. They therefore try to suppress studies relating to the dangers of radiation. They do this by cutting off funding as in the case of Dr. Thomas Mancuso, physician and professor in the Public Health Department of the University of Pittsburg, U.S., and Dr. Irwin Bross and Dr. E. J. Sternglass, Professor of Radiation Physics. They also engage in personal attacks on these scientists quite out of keeping with the rational and objective assessment of evidence that should be the basis of scientific judgements. Information about accidents is suppressed and the damage done is disregarded. At the same time the data used to support the nuclear industry's arguments is unsatisfactory. For example it does not take account of the long latency periods of cancers and fails to recognise evidence to other blood diseases and damage to immune systems apart from cancer. The nuclear authorities arguments have been based on highly suspect experiments.

The A.E.C. (Atomic Energy Commission. It was replaced due to charges of corruption by the N.R.C., Nuclear Regulatory Commission but with no appreciable change of staff.) studies were conducted to determine whether food crops would take up dangerous levels of radioactivity from the soil. Before beginning the experiments, A.E.C. scientists made preparatory tests on a variety of soils choosing for their experiments those soils which absorbed the

least amount of rediation. Furthermore, as it was then wellknown that plants have difficulty assimilating radiation until they are acted upon by soil bacteria, the scientists cooked their soil in ovens, thus killing its bacteria. Finally the A.E.C. experimenters added the radioactive substances to the soil just shortly before the plants were harvested, there by avoiding the normal condition of plants growing from seed in contaminated soil. Not surprisingly, their conclusions showed hardly any radioactivity getting into the plants.

While continuing to assure the public that nuclear power is safe, neither government, nor nuclear industry nor insurance companies have been willing to insure the utility companies owning the nuclear reactors for the amount that would be necessary to be paid out in damages when an accident occurs.

Safety inspections by the N.R.C. in the U.S. are generally confined to spot checks a few days each year. Daily responsibility for plant inspection and radiation monitoring rests with the company. Such an arrangement is similar to allowing restaurant owners to inspect the cleanliness of their own kitchens. The fact is that the agencies appointed to regulate the nuclear industry in reality act to promote it. Falsifying records concerning the radiation exposure of workers, for example, is a common practice :

"We had these film badges we wore to indicate exposure. Every few days they'd take up the badges and send them off to the Oak Ridge National Laboratory (also run by the company) for analysis. One day a few of us men laid our badges on a smoking chunk of uranium for eight hours and turned it in. We never heard from it. They took urine samples from us every ten days. Once somebody dropped a small chunk of uranium in the urine sample. Nothing was ever said about it."

This worker from Oak Ridge, Tennessee, died in March 1980. His official death certificate asserts death from heart failure. But he had a 30 pound cancerous tumour spread around his spinal column.

The I.C.R.P. (International Commission on Radiological Protection) is now recommending an increase in permissible dose levels of between 2 to 8 times ! In their latest publication (No 26) they make the extraordinary statement : "Medical surveillance has no part to play in confirming the effectiveness of a radiological protection programme."

Ultimately the question of radiation should be a public debate about social and political issues as well as technical and scientific ones; about men and women deciding whether they are prepared to believe in the experts' latest assessment of the risk and whether, even if they believe it, they are prepared to take that risk.

Information compiled by Janet Aitken from :

1) "From Hiroshima to Harrisburg" by Jim Garrison.
2) "Nuclear Madness" by Dr. Helen Caldicott.
3) "The Big Risk, Nuclear Power" by Michael Flood.
4) "Radiation your health at risk" published by the Radiation and Health Information Service.

* * *

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Nuclear bulletin 1 : "The Worldwide Threat of Nuclear Technology." Rs. 0.75.

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Nuclear bulletin 3 : "The only way out of the nuclear nightmare" by George Kennan. Rs. 0.50.

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The only way out of the nuclear nightmare

By George Kennan

HEALTH AND SOCIETY GROUP

This is the text of the speech given by George Kennan on May 19, 1981 when receiving the Albert Einstein Peace Prize in Washington. He is Professor emeritus at the Institute for Advanced Study, Princeton, and a former US ambassador to the Soviet Union (1952-3) and Yugoslavia (1961-3).

WHAT can we do ?

Adequate words are lacking to express the full seriousness of our present situation. It is not just that the US is for the moment on a collision course politically with the Soviet Union, and that the process of rational communication between the two governments seems to have broken down completely ; it is also—and even more importantly - the fact that the ultimate sanction behind the conflicting policies of these two governments is a type and volume of weaponry which could not possibly be used without utter disaster for us all.

For over thirty years wise and farseeing people have been warning us about the futility of any war fought with nuclear weapons and about the dangers involved in their cultivation. Some of the first of these voices to be raised were those of great scientist, including outstandingly that of Albert Einstein himself. But there has been no lack of others. Every president of the United States from Dwight Eisenhower to Jimmy Carter, has tried to remind us that there could be no such thing as victory in a war fought with such weapons. So have a great many other eminent persons.

When one looks back today over the history of these warnings, one has the impression that something has now been lost of the sense of urgency, the hopes, and the excitement that initially inspired them so many years ago. One senses even on the part of those who today most acutely perceive the problem and are inwardly most exercised about it, a certain discouragement, when it comes to the question of raising the subject again.

The danger is so obvious. So much has already been said. What is to be gained by reiteration ? What good would it now do ? Look at the record. Over all these years the competition in the development of nuclear weaponry has proceeded steadily, relentlessly, without the faintest regard

for all these warning voices. We have gone on pilling weapon upon weapon, missile upon missile, new levels of destructiveness upon old ones. We have done this helplessly, almost involuntarily : like the victims of some sort of hypnotism, like men in a dream, like lemmings heading for the sea, like the children of Hamelin marching blindly along behind their Pied Piper.

And the result is that today we have achieved, we and the Russians together, in the creation of these devices and their means of deliver, levels of redundancy of such grotesque dimensions as to defy rational understanding.

I say redundancy. I know of no better way to describe it. But actually, the word is too mild. It implies that there could be levels of these weapons that would not be redundant. Personally, I doubt that there could. I question whether these devices are really weapons at all. A true weapon is at best something with which you endeavour to affect the behaviour of another society by influencing the minds, the calculations, the intentions, of the men that control it ; it is something with which you destroy indiscriminately the lives, the substance, the hopes, the culture, the civilization, of another people. What a confession of intellectual poverty it would be—what a bankruptcy of intelligent statesmanship—if we had to admit that such blind, senseless acts of destruction were the best use we could make what we have come to view as the leading elements of our military strength !

To my mind, the nuclear bomb is the most useless weapon ever invented. It can be employed to no rational purpose. It is not even an effective defence against itself. It is only something with which, in a moment of petulance o r panic, you commit such fearful acts of destruction as no sane person would ever wish to have upon his conscience.

There are those who will agree, with a sigh, to much of of what I have just said, but will point to the need for something called deterrence. This is, of course, a concept which attributes to others—to others, who like ourselves, were born of women, walk on two legs, and love their children, to

human beings, in short—the most fiendish and inhuman of tendencies. But all right : accepting for the sake of argument the profound iniquity of these adversaries, no one could deny, I think that the present Soviet and American arsenals, presenting over a million times the destructive power of the Hiroshima bomb, are simply fantastically redundant to the purpose in question.

If the same relative proportions were to be preserved, something well less than twenty percent of these stocks would surely suffice for the most sanguine concepts of deterrence, whether as between the two nuclear superpowers or with relation to any of those other governments that have been so ill-advised as to enter upon the nuclear path. Whatever their suspicions of each other there can be no excuse on the part of these two governments for holding, poised against each other and poised in a sense against the whole northern hemisphere, quantities of these weapons so vastly in excess of any rational and demonstrable requirements.

How have we got ourselves into this dangerous mess ? Let us not confuse the question by blaming it all on our Soviet adversaries. They have, of course, their share of the blame, and not least in their cavalier dismissal of the Baruch Plan, so many years ago. They too have made their mistakes, and I should be the last to deny it. But we must remember that it has been we Americans who, at almost every step of the road, have taken the lead in the development of this sort of weaponry It was we who first produced and tested such a device ; we who were the first to raise its destructiveness to a new level with the hydrogen bomb ; we who introduced the multiple warhead ; we who have declined every proposal for the renunciation of the principle of ' first use" ; and we alone, so help us God, who have used the weapon in anger against others, and against tens of thousands of helpless non-combatants at that.

I know that reasons were offered for some of these things. I know that others might have taken this sort of a lead had we not done so. But let us not, in the face of this record, so

lose ourselves in self-righteousness and hypocrisy as to forget our own measure of complicity in creating the situation we face today.

What is it then, if not our own will, and if not the supposed wickedness of our opponents, that has brought us to this pass ?

The answer, I think, is clear. It is primarily the inner momentum, the independent momentum, of the weapon race itself—the compulsions that arise and take charge of great powers when they enter upon a competition with each other in the building up of major armaments of any sort.

Is it possible to break out of this charmed and vicious circle ? It is sobering to recognise that no one, at least to my knowledge, has yet done so. But no one, for that matter has ever been faced with such great catastrophe, such unalterable catastrophe, at the end of the line. Others in earlier decades, could befuddle themselves with dreams of something called ' victory". We, perhaps fortunately, are denied this seductive prospect. We have to break out of the circle. We have no other choice.

How are we to do it ?

I must confess that I see no possibility of doing this by means of discussions along the lines of the negotiations that have been in progress, off and one, over this past decade, under the acronym of SALT. I regret, to be sure, that the most recent SALT agreement has not been ratified. I regret it, because if the benefits to be expected from that agreement were slight, its disadvantages were even slighter ; and it had a symbolic value which should not have been so lightly sacrificed.

But I have, I repeat, no illusion that negotiations on the SALT pattern—negotiations, that is, in which each side is obsessed with the chimera of relative advantage and strives only to retain a maximum of the weaponry for itself while putting its opponent to the maximum disadvantage—I have no illusion that such negotiations could ever be adequate to get us out of this hole. They are not a way of escape from

the weapons race, they are an integral part of it.

Whoever does not understand that when it comes to nuclear weapons, the whole concept of relative advantage is illusory—whoever does not understand that when you are talking about absurd and preposterous quantities of overkill the relative sizes of arsenals have no serious meaning—whoever does not understand that the danger lies not in the possibility that someone else might have more missiles and warehead than we do but in the very existence of these unconscionable quantities of highly poisonous explosives, and their existence, above all, in hands as weak and shaky and undependable as those of ourselves or our adversaries or any other human beings : whoever does not understand these things is never going to guide us out of this increasingly dark and menacing forest of bewilderments into which we have all wandered.

I can see no way out of this dilemma other than by a bold and sweeping departure—a departure that would cut surgically through the exaggerated anxieties, the selfengendered nightmares, and the sophisticated' mathematics of destruction in which we have all been entangled over these recent years and would permit us to move, with courage and decision, to the heart of the problem.

President Reagan recently said, and I think very wisely, that he would "negotiate as long as necessary to reduce the numbers of nucler weapons to a point where neither side threatens the survival of the other." Now that is, of course, precisely the thought to which these present observations of mine are addressed. But I wonder whether the negotiations would really have to be at such great length ?

What I would like to see the President do, after due consultation with the Congress, would be to propose to the Soviet government on immediate across-the-boards reduction by fifty percent of the nuclear arsenals now being maintained by the two superpowers—a reduction affecting in equal measure all forms of the weapon, strategic, medium range, and tactical, as well as all means of their delivery—all this to be

implemented at once and without further wrangling among the experts, and to be subject to such national means of verification as now lie at the disposal of the two powers

Whether the balance of reduction would be precisely even—whether it could be construed to favour statistically one side or the other—would not be the question. Once we start thinking that way, we would be back on the same old fateful track that has brought us where we are today. Whatever the precise results of such a reduction, there would still be plenty of overkill left—so much so that if this first operation were successful, I would then like to see a second one put in hand to rid us of at least two-thirds of what would be left.

Now I have, of course, no idea of the scientific aspects of such an operation ; but I can imagine that serious problems might be presented by the task of removing, and disposing safely of, the radio active contents of the many thousands of warheads that would have to be dismantled. Should this be the case, I would like to see the President couple his appeal for a 50 percent reduction with the proposal that there be established a joint Soviet-American scientific committee, under the chairmanship of a distinguished neutral figure, to study jointly and in all humility the problem not only of the safe disposal of these wastes but also the question of how they could be utilised in such a way as to make a positive contribution to human life, either in the two countries themselves or—perhaps preferably—elsewhere. In such a joint scientific venture we might both atone for some of our past follies and lay the foundation for a more constructive relationship.

It will be said : this proposal whatever its merits, deals with only a part of the problem. This is perfectly true. Behind it there would still lurk the serious political differences that now divide us from the Soviet government. Behind it would still lie problems recently treated, and still to be treated, in the SALT forum. Behind it would still lie the great question of the acceptability of war itself, any war

even a conventional one, as a means of solving problems among great industrial powers.

What has been suggested here would not prejudice the continued treatment of these questions just as today, in whatever forums and under whatever safeguards the two powers find necessary. The conflicts and arguments over these questions could all still proceed to the heart's content of all those who view them with such passionate commitment. The stakes would simply be smaller ; and that would be a great relief to all of us.

What I have suggested is, of course, only a beginning. But a beginning has to be made somewhere ; and if it has to be made, it is best that it should be made where the dangers are the greatest, and their necessity the last. If a step of this nature could be successfully taken, people might find the heart to tackle with greater confidence and determination the many problems that would still remain.

It will be argued that there would be risks involved. Possibly so. I do not see them. I do not deny the possibility. But if there are, so what ? Is it possible to conceive of any dangers greater than those that lie at the end of the collision course on which we are now embarked ? And if not, why choose the greater—why choose, in fact, the greatest—of all risks, in the hopes of avoiding the lesser ones ?

We are confronted here with two courses. At the end of the one lies hope—faint hope, if you will—uncertain hope, hope surrounded with dangers, if you insist. At the end of the other lies, so far as I am able to see, no hope at all. Can there be-in the light of of our duty not just to ourselves (for we are all going to die sooner or later) but of our duty to our own kind, our duty to the continuity of the generations, our duty to the great experiment of civilised life on this rare and rich and marvellous planet—can there be, in the light of these claims on our loyalty, any question as to which cause we should adopt ?

In the final week of his life, Albert Einstein signed the the last of the collective appeals against the development of

nuclear weapons that he was ever to sign. He was dead before it appeared. It was an appeal drafted, I gather, by Bertrand Russell. I had my differences with Russell at the time, as I do now in retrospect ; but I would like to quote one sentence from the final paragraph of the statement, ont only because it was the last one Einstein ever signed, but because it sums up, I think, all that I have to say on the subject. It read as follows

"We appeal, as human beings to human beings : Remember your humanity, and forget the rest".

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Nuclear Bulletin No. 4

The Insanity Of Nuclear Power

Health And Society Group

Introduction

Nuclear power is not just a topic for "experts". It is not just a question of radioactive isotopes. It touches our lives and our future and has implications far beyond the technical. In this bulletin, I have aimed at explaining the case against nuclear power from the point of view of health, economics, its relevancy to our energy requirements and its connection with nuclear weapons. Most of the resources at my disposal are of Western origin That does not mean that they are not relevant here. On the contrary the arguments, if anything, gain strength in the Indian context : the risks to health may be greater especially in the absence of an informed public; the economic condition of India plus the abundant potential for the development of alternative resources, make the pursuit of such a centralised, capital intensive and unreliable source of energy a nonsense. As for the connection with nuclear weapons, India demonstrated this with the explosion of a bomb in 1974. It is hoped to bring out a bulletin specifically on nuclear power in India in future.

September 1982.

The Insanity Of Nuclear Power

Many people's idea of nuclear power stations is that they produce electricity, (and more of that means "development"), that they are an example of sophisticated technology (and that is synonymous with "progress"), that they are clean (no dirty smoke), safe (a few technical problems to be sorted out in time), cheap (after the initial outlay) and unlimited (coal won't last forever). In contrast to the horror of nuclear war, war, nuclear power is seen as a socially useful application of modern scientific know-how and technology. However, when we break through the propaganda of the nuclear industry and its allies, the reality we find is very different. Nuclear reactors do not only produce electricity ; they produce plutonium which is one of, if not the most lethal substances known. It is used for making nuclear weapons and it is this which makes nuclear power and nuclear weapons interdependent and inseparable. The promotion of nuclear power, far from being a diversion of resources to peaceful purposes, is the direct pathway to nuclear arms. Nuclear power can only be called "safe" by those who are exceedingly ignorant or exceedingly callous, and can only be called "cheap" by those whose accounting and economics do not stand up to rational and independent scrutiny. Nuclear power represents a huge squandering of the earth's resources and, apart from contributing to the danger of nuclear war, nuclear power is in its own right, as dangerous as nuclear warfare.

THE NUCLEAR FUEL CYCLE

Nuclear power is not just a question of building nuclear reactors. It is a whole chain of complicated links known as the nuclear fuel cycle. All along the way there are hazards to

public health but it is the worker in the nuclear industry who is most directly threatened. This is especially true in the mines.

Mining

The nuclear fuel cycle begins with the mining of uranium ore. It is the most dangerous form of mining. In addition to the usual risks, miners are exposed to radiation in the form of radon gas.

> According to the U.S. Public Health Service, studies of uranium miners in the U.S. indicate that between 1 in 10 and 1 in 6 of them can expect to die of lung cancer while a study of 100 Navajo miners in New Mexico indicates that the ultimate mortality from lung cancer amongst them is likely to be above 50%, (although otherwise lung cancer amongst the Navajo tribe is virtually unknown.)

Even with new ventilation systems in the mines, cancer amongst uranium miners will still be well above the national average. In the French colonies of Gabon and Niger and in S. Africa and Namibia where proper ventilation is often not ensured, conditions are worse.

Milling

The purpose of the uranium mill is to extract the uranium from the ore. The end product is "yellowcake". The left-overs are called ' tailings" and are radioactive. Over the years hundreds of millions of tons of these have accumulated. These tailings are blown overland, contaminating wide areas or else they are stored in "tailing ponds". Radioactive effluent has been leaking, for example, through the dams of tailing ponds at Rum Jungle in Australia poisonning Finnis River and contaminating over 100 square kilometres of floodplain and these leaks are expected to continue for another 100 years. In Colorado U.S. tailings were used in buildings until it was found that there was an increase in congenital defects in

newborn babies and many of the buildings demonstrated high radiation levels.

> According to Dr. Walter H. Johnson, former Associate Director of the Oak Ridge National Laboratory in testimony before the Atomic Safety Licencing Board, on 21 September 1977, the loss of life among future citizens from each year's commitment to the nuclear fuel cycle is 28,000 from the mill tailings alone. This N.R.C. estimate means that by the year 2000, the annual commitment to milling uranium will mean 200,000 deaths in the U.S.

Uranium enrichment

Reactors use uranium fuel that is from 2%—4% uranium—235, yet only 0.7% of naturally occurring uranium is uranium—235. So it has to be "enriched" so that the uranium—235 content increases. The enrichment process is extremely expensive, enrichment plants are huge and consume vast amounts of energy. **An enrichment plant uses as much electricity as a city of half a million people.** The radioactive emissions and effects of the tailings in the enrichment stage are similar to those at the milling stage. 0.007% of all the uranium is released directly into the environment either as a gas or liquid effluent. Allowable radiation dosages for employees and those living nearby are high.

Fuel fabrication

When the uranium has been enriched to its desired percentage level of uranium—235, it is shipped to a fuel fabrication plant where the uranium is converted into small pellets which are placed into 12 ft. long by $\frac{1}{2}$ inch wide tubing. These are the fuel rods, 36,000 to 50,000 of which go to make up the reactor core of each nuclear power station. During the fabrication, workers are exposed to the dangers of low-level gamma radiation emitted from the enriched fuel.

Nuclear reactors

The fuel rods of the core of the nuclear reactor are surrounded by water (or gas depending on the type of reactor), and are ready to undergo fission. The nucleus of the uranim—235 atom breaks into fragments, plus heat and one or more free neutrons. The neutrons released by the splintering of each nucleus in turn break up the nuclei of other atoms. When each free neutron absorbed by a uranium nucleus is replaced by a free neutron released by another fissionning atom, the reactor goes "critical" and the chain reaction becomes self-sustaining. Control rods which absorb fast-moving neutrons regulate the speed of the process. Fission releases a tremendous amount of heat. The coolant surrounding the core acts both to cool the reactor core and to transmit the heat to boil water. The boiling water produces steam which turns a turbine (as in a conventional power station) and generates electricity. **Nuclear fission is thus a very sophisticated and expensive method of boiling water, analagous to frying an egg with a forest fire.** Only a small part of the heat produced is used, the excess heat (about 66%) is discarded into the environment damaging the ecological balance.

Uranium fission also throws off hundreds of radioactive isotopes—all carcinogenic and mutagenic, with half-lives ranging from several seconds to 24,400 years and longer.

> Each large nuclear reactor of 1000 megawatt capacity contains as much radioactivity as would be released if 1,000 Hiroshima bombs were simultaneously exploded. A release of a fraction of this can do serious environmental and human damage.

Reactors are constructed with multiple barriers in order to isolate and contain as much of this radioactive release as possible. The principle barriers are the fuel cladding around the uranium pellets, the covering around the reactor itself and the containment building in which the reactor is placed. Yet penetration of these barriers can and does occur. With all the

stresses of heat and reactor operation, splits and holes are made allowing radioactivity to escape into the coolant. So inevitable are these fracturings of the fuel rods that 1% of their radioactivity is allowed to be released into the coolant. Studies in different countries have correlated the increased radioactivity in the vicinity of nuclear reactors resulting from "allowed releases", with increased cancer and leukaemia rates. Studies have also shown rising strontium—90 levels in milk, just one source of radiation. Two things become clear :

1. The actual releases into the environment occurring are often considerably higher than admitted by the nuclear industry, and

2. What are stated to be harmless doses of radiation are in fact not harmless at all.

In February 1976 3 men with 56 years of combined work experience at all levels of the nuclear industry resigned from secure and well-paying positions as nuclear engineers at General Electric in U.S. They wrote :

"*We resigned because we could no longer justify devoting our life energies to the continued development and expansion of nuclear power—a system we believe to be so dangerous that it now threatens the very existence of life on this planet.*" During their long testimony, these men claimed among other things that the defects and deficiences in just the design of nuclear reactors alone, created severe safety hazards and that the combined deficiences "*in the design, construction and operation of a nuclear power station makes a nuclear accident, in our opinion, a certain event.*"

Reprocessing

After a certain time, (about one year depending on the type of reactor), the uranium—235 inside the fuel rods has all been fissionned. The fuel rods must be removed. They are usually reprocessed to extract uranium and plutonium. This is an extremely hazardous and messy business. All the operations must be carried out by remote control behind heavy shielding. Technical failures at these plants are commonplace. Hardly an hour passes without a repair needed somewhere.

Apart from internal contamination of workers, considerable quantities of radioactive materials in both gaseous and liquid form are released into the external environment. Reprocessing is such a difficult and risky business that it has more or less been abandonned in the U.S. Some people haven't given up though. Reprocessing plants are planned in Britain, Germany, India and Japan.

Transportation

Transportation of nuclear materials is an essential aspect of the nuclear fuel cycle. Most shipments move on regular commerce routes and in regular, conventional transport vehicles. They are subject to the same transport hazards as non-radioactive cargo including accident and theft. In some cases careful design of containers is insisted on, in some cases not. Between 1971 to '75, 36 accidents occurred in the U.S. involving radioactive materials that resulted in the release of excess radiation levels into the atmosphere.

> On October 31,1977, residents of Melun, France, discovered a concrete-encased drum bearing a radioactive-waste symbol in the middle of the city's marketplace. The drum had fallen from a passing truck. The local council was less than satisfied by French Atomic Energy Commission assurances that checks for radiation leaks had proved "totally negative".

Waste disposal

No solution has yet been found to the problem of waste disposal. Due to the immense time it takes for high-level waste to cool down and become harmless, no final resting-place has been found as no method can be guaranteed to be completely safe. Reprocessing of one ton of fuel produces approximately 5 cubic metres of high-level waste which is both thermally hot and intensely radioactive and requires continual cooling. There are tens of thousands of tons of waste so toxic that fractions of an ounce can kill or mutilate over thousands of

years. This high-level waste is accumulated and put in temporary storage. Carbon-steel tanks cannot last more than 25 years, newer stainless steel tanks more than 50 years.

> In the U.S. in 1973 more that 400,000 gallons of high-level radioactive waste seeped away from one storage facility at Hanford on the Columba River before the leak was discovered.

There was also a big leak from Windscale's storage tanks in U.K. in 1976. Low-level waste is routinely discharged into the surroundings, buried in the ground (for example contaminated plant equipment, clothing), or dumped in the sea (for example, between 1946 and 1970, the U.S. encased 47,500 55-gallon drums of low-level waste in concrete-lined steel drums and dumped them into the Pacific Ocean. One third of these drums are now leaking radioactivity into major fishing grounds.)

Every nuclear power station will eventually end up on the radioactive garbage heap because a plant can operate only 20 to 30 years before it becomes too radioactive to repair or maintain. It will become a radioactive mausoleum for hundreds of thousands of years.

Technologists have offered a number of ingenious proposals ranging from solidification of high-level waste in glass containers and burial in salt formations, to lowering waste into ocean trenches, burying it under Antarctic ice, or launching rockets loaded with it into the sun. None of these techniques have been proven to be practical or safe. In the words of Nobel Prize-winning physicist Hannes Alfven—"*If a problem is too difficult to solve, one cannot claim its solved by pointing to all the efforts made to solve it*". Faith in technology to come up with a solution is similar to a doctor reassuring a patient suffering from terminal cancer by saying: 'Don't worry, my medical training will enable me to discover a cure. Even if unbreakable, corrosion-resistant containers could be designed, any storage site on earth would have to be kept

under constant surveillence by incorruptible guards, administered by moral politicians living in a stable, warless society and left undisturbed by earthquakes, natural disasters and other acts of God for no less than half a million years.

ACCIDENTS

As we have seen "routine releases" occur all the time during the nuclear fuel cycle. "Abnormal releases" due to accidents are common also. Four points need to be stressed :

1. *Firstly*, that accidents are a frequent occurrence in nuclear power stations. Why are accidents so common ? A nuclear reactor is immensely complicated made up of millions of parts which must be made, assembled and operated with little room for error. The design of a nuclear power station is extremely complex, its construction very difficult. Various aspects of plant management are in the hands of specialists who do not necessarily understand the work of—or even communicate with—other speciality groups. No one individual or group coordinates the complete process of building and operating a reactor. Nuclear power stations operate under many untested, theoretical principles. Certain safety systems are built on the shaky test results of computer models. Many components are made of metals susceptible to failure from contact with the nuclear environment. Corrosion, cracks and leaks are common. The combination of these technical factors and the "human factor" have resulted in a fatal mixture on several occasions. This was expressed by one of the engineers resigning from General Electric when he wrote : "*We cannot design to cover the human error, and I am convinced that the safety of nuclear reactors hangs on the human factor.*" The truth of this was born out at Harrisburg where "the accident was initiated by mechanical malfunctions in the plant and made much worse by a combination of human errors in responding to it." (The report of the President's Commission). The human factor has shown itself up in sheer carelessness, for example : in one reactor a 7 hour fire knocked out emer-

gency cooling, closed down another and damaged hundreds of cables. The cause ? A candle handled carelessly by an electrician. It has shown itself up in the pursuit of profit at the expense of safety and in ignorance : The N.R.C. Chairman during the Harrisburg accident said : "*We are operating almost totally in the blind. (Pennsylvanian Governor Richard Thornburgh's) information is ambiguous, mine is nonexistent and—I don't know, its like a couple of blind men staggering around making decisions.*"

2. *Secondly*, unlike in other industrial accidents where the toll of fatalities is quickly apparent, the effects of accidents in nuclear power stations often take a long time to manifest themselves. The effects of radiation exposure are often latent. During the Harrisburg accident, one set of readings for radioactive release was greater than 1000 rems per hour. (U.S. federal safety standards set 170 millirems per year as average human exposure.) It is expected that the people of Harrisburg will suffer a high rise in leukaemia deaths from 1984 onwards.

3. *Thirdly*, a major accident (for example a "meltdown", see nuclear bulletin No. 2) is potentially far more dangerous than any other kind of industrial accident Various estimates have been given of the possible number of casualties in the event of a major disaster. The A.E.C.'s Rasmussen report of 1975 came to the conclusion :

3,300 quick deaths,
45 000 cancer cases.
5,100 genetic defects.

The report has been demolished by a number of qualified critics, for example, the U.S. Environmental Protection Agency put the death toll 10 times higher.

4. *Fourthly*, the nuclear establishment is constantly at pains to hush up and minimise any accidents that do occur. During an accident in the Enrico Fermi 1 plant. south of Detroit in October 1966, an alert went out to all local police and civil defence authorities to prepare for emergency evacuation of Detroit and other centres. So, at least, insist some of

those who received the alert. Official records now show no evidence of an alert ; the only way to reconcile the conflicting stories is to presume that a directive was subsequently issued to expunge all trace of it After the accident at Harrisburg, Ralph Nader, consumer advocate, commented : ' *For political reasons the mass evacuation that should have been carried out was not because it would have shown 150 million people watching television a picture of half a million people fleeing from a potential disaster. That picture would have terminated the nuclear industry there and then.*"

The only possible conclusion from the foregoing is that the nuclear industry is more concerned to protect its investments and profits than to promote the safety and well-being of its employees and the public.

"TOO CHEAP TO METER..."

There was a time when it was believed that nuclear power would be ' too cheap to meter". In practice, however, nuclear power has proved both expensive and inefficient.

The expense involved in building a nuclear reactor is large :

> The cost of installing nuclear power is close to twice that for coalfired generation of electricity. (ref. Charles Komanoff, independent consultant in energy economics, qucted in "The costs of nuclear power.")

In the past nuclear energy could only be presented as competitive with traditional forms of electricity generation when fuel and labour costs were low offsetting the initial outlay. In fact, however, both cost of construction and cost of fuel have soared. Costs of construction have soared when one unsafe practice after another has been exposed and forced reactor builders to make extensive changes to their original designs. Costs of fuel have risen as the mining companies

curtailled production to push up the price of uranium ore (it increased 400% in 4 years).

The nuclear industry has employed various methods in an attempt to present nuclear power as an economically viable proposition. These attempts are nothing more nor less than statistical manipulation and faulty accounting techniques. **The cost of nuclear power has been consistently underestimated.** The data, for example, of the Central Electricity Generating Board in the U.K., fails to produce figures which would enable one to make meaningful comparisons with other forms of elecity generation. Their figures for the cost of generating electricity with nuclear power :—

—do not usually include the full cost of capital.

—never include the major costs of research and development.

—have not always included interest charges during construction, or interest charges on stored fuel.

—they are based on notional operating capacities which are always an overstatement of the actual operating performances of nuclear power stations.

—the C.E.G.B. consistently understates the cost of fuel in relation to coal.

—either excludes the costs of decommissionning nuclear power stations and the disposal of waste or adds notional figures which understate the likely cost. (The maximum life of a reactor is around 30 years. It is as yet unknown how much it would cost to decommission a reactor but some estimates indicate the cost will be comparable to the original construction costs.)

The most thorough study so far of nuclear power costs in the U.S. by Charles Komanoff demonstrates that producing electricity from nuclear reactors is at least 25% more expensive than coal.

Nuclear power has never been subject to conventional economic tests. The development of nuclear power would not have been possible without huge amounts of government

money. Government grants and subsidies to the nuclear industry, both direct and indirect, have kept costs artificially low and guaranteed company profits. In other words, the taxpayer's money has ensured that the nuclear industry stay in business when by any normal reckonning it was an economic disaster.

INEFFICIENCY AND UNRELIABILITY

"Their unreliability is becoming one of their most dependable factors"—Wall Street Journal

Inspite of the huge financial and political backing for the nuclear industry, it has failed to produce the goods. More than a quarter of a century after the first power-producing nuclear plant was built, nuclear power production still accounts for less than 10% of electricity production in most countries that possess nuclear plants.

Nuclear power stations in the U.S. run at about 60% capacity. Given the huge capital outlay this is very poor performance. In 1979, the large Pressurised Water Reactors in the U.S. produced less than 50% of their designed output. The Harrisburg reactor was in full operation for a mere 5 weeks before the accident which put it totally out of action. The cost of those 5 weeks of electricity including current estimates of cleaning up could be as high as 2 billion dollars. In West Germany, up to half of all reactors have been out of order at any one time. In the U.K., the Advanced Gas-cooled Reactor was developed at a cost of between £8,700 and £11,100 million."The only return on this investment spread so far over 15 years has been the intermittent output of electricity from the two of the five stations which have worked,whose 4 reactors have averaged roughly 30% of their design capacity since 1976". (Duncan Burn quoted in "The costs of nuclear power".) In Switzerland a reactor core blew up after two years and the reactor had to be scrapped. In Sweden a reactor couldn't be made to work at all and was refitted to run on oil.

This poor operating record is due to the inability of the nuclear industry to deal with the technical problems inherent

in nuclear engineering and technology. In a nuclear reactor the repair of a mere pipe, a simple task under ordinary conditions, often requires the plant to be shut down. Some time ago, a pipe failed on a reactor north of New York City. As a result the plant was rendered inoperable for 6 months and 1700 certified welders were needed to repair the damage. It was necessary to hire that many because within a few minutes each worker would receive the dose of radiation deemed allowable for a 3 to 6 month period When dangerous faults are detected this can lead to all reactors of the same type being closed for inspection. The notion that nuclear is a superior technology simply does not correspond to the facts.

DO WE NEED NUCLEAR POWER ?

Another argument of the pro-nuclear lobby is that we need nuclear power. The mainstay of this argument is that we need more energy and that other sources of energy—coal and oil – are limited in supply.

In answer to this it should first be clear that nuclear power only produces electricity and electricity is but a part of our energy requirement. How big a part ? Electricity can, technically, be used for many purposes, but it is not always the best (i.e. most economical and socially relevant) form of energy : it depends on what the energy is used for. (In many cases electricity costs twice as much to deliver as to generate.) Electricity, if looked at economically even in industrialised countries, makes up only about one tenth of total energy needs (for example for lighting, electronics, public transport and certain mechanical processess). The other nine tenths are best taken care of by other forms of energy. Besides, even if we did disregard the economics and push ahead with more nuclear power stations :--

—nuclear power cannot abolish the need for oil : it has been demonstrated that even if all the oil-fired power stations were replaced immediately by nuclear, it would only reduce oil consumption in the Western industrialised countries by 12%.

—even with a full-scale nuclear programme including 1,000 Fsat-breeder Reactors in the world, nuclear power could not increase its contribution beyond 10% of the world's energy needs.

Why ?

Uranium reserves, unlike oil and coal, are very limited. (Barry Commoner in "The poverty of power", estimates that in 1974 the U.S. had sufficient reserves of petroleum to meet total U.S. needs at current levels of usage for 50 to 60 years. A report by the U.N. Economic Committee for Europe estimates proven measured reserves of coal could last another 215 years.) Naturally occurring nuclear fuel if simply used once will maintain a full-scale nuclear programme for only a few decades at the most. It is here that the **Fast-breeder Reactor** is meant to come in. They are not run on uranium but on plutonium (produced in other reactors). In theory they can produce more plutonium than they burn by "breeding" plutonium in a zone around the core. This plutonium can be extracted and used to fuel more Fast-breeder reactors.

Although the technology of Fast-breeders has been under development for over 30 years, there are as yet no commercial Fast-breeders in the world (with the possible exception of the U.S.S.R.).

A Fast-breeder requires a great deal of plutonium—at least 3 tons. The supply of this plutonium depends on production in conventional reactors (the only source), which in turn depends on the supply of uranium. Supposing enough plutonium can be made out of existing reserves of uranium to fuel 1,000 Fast-breeders in the world, even then nuclear power would only supply 10% of the world's energy needs by the year 2005. When these Fast-breeders are running, it takes a long time for a Fast-breeder to produce plutonium in the amounts required to fuel another Fast-breeder. It takes not years but decades (30 to 60 years.)

Fast-breeders are particularly hazardous. An expanded "plutonium economy" means that vast amounts of plutonium

will be produced and transported. A mere $\frac{1}{2}$ kg. of plutonium finely divided and inhaled could cause 21 billion cases of lung cancer. A lump half the size of a tennis ball can wreck a small city. Once out of control, a fission reaction in a Breeder could cause not only a meltdown but also a full fledged nuclear explosion. In addition, Breeders are cooled with liquid sodium (rather than water), a substance that ignites spontaneously when exposed to air and is therefore highly dangerous in its own right. It was probably this that caused a Breeder explosion at Shevenko, U.S S.R. in 1974.

WHY NUCLEAR POWER ?

"... in the last analysis there is no such thing as the civil atom or the military atom."—Sir John Hill, ex-chairman of A.E.A. in ATOM. 1979.

To most people the immensity of the problem of waste disposal alone would put the whole idea of nuclear power in question. Add to this all the other risks involved in all aspects of the nuclear fuel cycle, especially reprocessing plus the obvious economic disadvantages of nuclear power, then the reason why nuclear power has been developed at all requires to be further investigated.

There are some secondary, though nonetheless important reasons. In the West these include political considerations : the coal miners have been getting increasingly organised and militant ; uranium reserves are in "safe" places like the U.S., Canada, Australia and S. Africa.

The primary reason for the development of nuclear power is that it was in the interests of the military. The "first nuclear power station" at Calder Hall in the U.K., opened with great ceremony in 1956 was, in fact, not primarily built to produce electricity but was designed and built to produce weapons-grade plutonium. This was not just true of Calder Hall. All the first large reactors were operated exclusively to generate neutrons and turn uranium-238 into plutonium-239 for nuclear weapons. They generated electricity only as a by-product.

Nuclear power has never lost its associatian with nuclear weapons.

It is true that plutonium is better obtained directly from a reactor geared solely to the production of military grade plutonium (a "plutonium pile"). But, by changing the fuel in a "civilian reactor" more frequently, weapons-grade plutonium is made available. (Besides, in 1977, the Americans detonated a bomb made from reactor-grade plutonium showing that this is possible.) This may be a less efficient method of producing plutonium but it has some very distinct advantages :

It is *economically* advantageous. The "civilian reactor" is a preferable route for producing plutonium because it can also produce electricity which improves the economics.

It is *politically* advantageous. It is politically preferable because, whereas the building of a plutonium pile would signal to the world that the country concerned was intent on making nuclear weapons, the presence of nuclear reactors, (although they may be used for the purpose of obtaining plutonium for nuclear weapons), cannot be said to be such an obvious threat to other countries.

It is *technically* advantageous. "Civilian reactors" can be easily bought from abroad along with subsides and technical training and advice.

Statistics about plutonium are obscured in secrecy. But evidence available strongly suggests that plutonium, for example from Britain's "civilian reactors", is being diverted to the military. There are three arguments which support this :-

1. Calculations about the quantities of plutonium from purpose-built plutonium piles show that there has not been enough to fulfil military requirements.

2. At certain times. the Central Electricity Generating Board has been instructed by the government to modify nuclear reactor designs to make them more suitable as plutonium suppliers to the military.

3. There is an unexplained difference between the amount of plutonium produced in the U.K. and the amount in stock.

All that needs to be said about the so-called safe-guards

which are meant to deter civilian reactors being used for mili tary purposes, is that they are useless.

Thanks to its military birthright, nuclear power has never had to face the critical scrutiny accorded to other technological innovations. Secrecy was and is still a striking aspect not only of the military side of nuclear power, but also of the civilian side. There has been no open debate. Huge amounts of money (at least 200 billion dollars in U.S.) are now tied up in the nuclear industry which it is determined to protect. Yet, due to its own inherent problems and to public opposition, nuclear programmes in the West and in Japan are far less ambitious than they used to be. After the floodtide of advance between 1964 and 74, the nuclear industry in the U.S. has gone into severe decline. New plant orders were 41 in 1973, 20 in '74 and nil in '78. According to a report in the U.S. journal "Business Week" (25 12.78), " ..*within ten years, the U.S. nuclear industry is apt to contract dramatically and it may collapse altogether.*" (It is interesting that this decline preceded the increase in oil prices which should have given it a big advantage, and preceded the Harrisburg accident.)

How then is the nuclear industry to protect its investment ?

1. By supplying plutonium to the military. This as we have seen, has always been an important aspect of nuclear power. The nuclear power industry has a vested interest in an escalating arms race.

2. Through export and pushing sales abroad. Both U.S. and European reactor builders have tried to soften the economic blow by seeking reactor markets in the developing world. The hazards to health are often even greater when important changes and modifications made in domestic nuclear plants are not included in ones sold abroad, and, changes in design after purchase are not subject to safety checks.

Opposition to these sales is often presented by nuclear power advocates as condemning developing countries to continuing poverty. But, if these nuclear enthusiasts were seriously concerned about raising the standard of living in

these countries, the first step that they would advocate would be an end to the current system of economic relations between developed and developing countries which keeps the developing countries continually in debt. Nuclear power is no way out of this situation, on the contrary, it makes it worse. Those concerned to raise standards of living in developing countries should be interested in creating energy relevant to the needs of the people, to satisfy the basic human needs of heating, cooking, lighting and pumping. Nuclear power is particularly inappropriate for developing countries since it is highly capital intensive and requires large electrical grids suitable only for highly centaalised electrical supply systems. Alternate energy programmes using renewable sources of energy, for example solar and wind power, are more diverse and flexible, quicker to build, encourage local production, are safe and non-polluting, unlimite d .....It is a classic case of double-think among nuclear advocates to maintain that technology will find the answer to the disposal of nuclear waste but that it cannot develop alternative sources of energy for technical reasons. The reason why, up to now, renewable sources of energy have not been developed on a larger scale is due to the small amounts of funds allocated for their development. (In the U. K., for example, in 1981, £170 million was allocated for research and development of nuclear power and only £9 million on renew able sources.) This state of affairs is likely to continue until more people wake up to the perils and insanity of nuclear power.

Information compiled by Janet Ganguli from :-

1. "Nuclear Power for beginners" by S. Croall and K. Sempler.
2. "We all live on Three Mile Island" by Greg Adamson.
3. "Nuclear Power" by Walter C. Patterson.
4. "From Hiroshima to Harrisburg" by Jim Garrison.
5. "Atoms for War" by Howard Clark.

6. "The costs of nuclear power" by Colin Sweet.
7. "Nuclear Madness" by Helen Caldicott.
8. "The Big Risk" by Michael Flood.

Available :

Nuclear bulletin 1 : "The Worldwide Threat of Nuclear Technology." Rs. 0.75.

Nuclear bulletin 2 : "Radiation : the greatest public health threat of all time." Rs. 0.75.

Nuclear bulletin 3 : "The only way out of the nuclear nightmare" by George Kennan." Rs. 0.50.

In Preparation

Nuclear bulletin 5 : ' Karen Silkwood : victim of the nuclear police state."

Nuclear bulletin 6 : "A History of the anti-Nuclear Movement."

11-12

KAREN SILKWOOD:

Victim Of The Nuclear Police State

Health And Society Group

INTRODUCTION

Nuclear power is dangerous. Plutonium, which it produces, is deadly. Whereas nuclear weapons are kept under the guard of the military, nuclear power stations, though just as dangerous as nuclear weapons, are not kept under military surveillence. The threat of theft, loss and sabotage of nuclear materials is very real. The danger of nuclear power to the workers in the nuclear industry and to the public as a whole, has given rise to widespread opposition. The nuclear establishment is well aware of the threat to it from these two sources : potential terrorism and public opposition and it is taking counteractive measures. These measures amount to an erosion of civil liberties.

From the beginnings of nuclear power and its development with out any form of open debate and decision-making, the pursuit of nuclear power has run contrary to democratic freedoms. As nuclear power has progressed so too has its effects on democracy taken more concrete form. The workforce in the nuclear industry has been the first to suffer. The risks they face exist beyond their control and often beyond their awareness when they are kept deliberately in ignorance by the management. The right of labour to organise itself in its own defence is curtailled. In Australia industrial action in the nuclear industry is already outlawed. Under the Official Secerets Act in the U.K. the government and the nuclear industry is allowed to keep nuclear installations cloaked in secrecy and the employees are forbidden to communicate anything about their work. Apart from this, special atomic police forces exist today in several countries.

Britain has gone the farthest in officially curtailling civil liberties in the name of protecting the "plutonium economy", and has set up a nation-wide guard force of constables under the direct control of the atomic authorities and which is not

directly accountable to any government minister. This guard force has privileges in relation to carrying weapons not granted to any other police unit. The duty of this force is not only to guard plutonium, but to keep tabs on "dissenting political groups". According to the Sixth Report of the Royal Commission on Environmental Pollution, 1976 : "An effective security organisation could not be merely passive, simply reacting to events. It would need to have an active role···that is. to infiltrate potentially dangerous organisations, monitor the activities of nuclear employees and members of the public and, generally, carry out clandestine operations. It would also need to have powers of search and powers to clear whole areas in an emergency. Such operations might need to be conducted on a scale greatly exceeding what would otherwise be required on grounds of national security in democratic countries. The fear is expressed that adequate security against nuclear threats will be obtained only at the price of gradual but inexorable infringements of personal freedom."

The story of Karen Silkwood illustrates how nuclear power not only threatens our health and our future, but also our personal freedom.

The following extract about Karen Silkwood from Jim Garrison's book "From Hiroshima to Harrisburg" is reprinted with the kind permission of the SCM Press, London. We are publishing this bulletin to commemorate the anniversary of her death on 13th November*.

November 1982.

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Karen Silkwood :
Victim of the nuclear police state

In early 1972, Karen Silkwood, a 26-year-old mother of three children, went to work for the Kerr-McGee (KM) Nuclear Facility in a little Oklahoma town named Cimarron. Trained in physics and a firm believer in the benefits of nuclear power, she was hired as a laboratory technician to test the quality of the plutonium fuel being produced at the plant. KM had been awarded a multi-million dollar contract to produce the plutonium fuel rods for an experimental plutonium-fired Fast-Flux Breeder Reactor being built by the Westinghouse Corporation near Richmond, Washington.

Once working, Karen became quickly involved in the efforts of the Oil, Chemical and Atomic Workers International Union (OCAW) to organize the workers into a local branch of the OCAW. The main reason for organizing was worker complaints about the lack of regard for their health and safety. Many were put on the plutonium production lines without any training at all, the physical plant leaked highly radioactive materials out on to the floor, contaminating dozens of workers at a time ; and KM management, in order to meet production quotas, ordered workers to stand in contaminated areas and to continue working while clean-up crews attempted to decontaminate the area around them.

By the begining of 1973, the situation had deteriorated to the point where the OCAW, which had by then won union status, brought the workers out on strike. Non-union workers were brought in, however, and, completely untrained, were put to work on the plutonium production lines. KM was going to prove that no union could 'break' the tough oil-men of the KM Corporation.

KM proved too big to beat, and by the late spring of

1973 the union was forced to return to work under a weaker contract than the one they had before the strike. Seizing this initiative, during the summer of 1973 KM began a campaign to 'de-certify' the OCAW as the union authorized to represent the workers in the 1974 re-negotiation of their contract. As part of this decertification campaign, KM issued formal written orders forbidding the workers to discuss working conditions with anyone outside the plant, claiming that such discussions 'compromised the security' of the nuclear installation. Workers were also specifically forbidden to talk to anyone from the news media When some uranium pellets were found scattered around the plant, KM management seized upon the opportunity to force workers to undergo lie-detector tests. They were subjected to questions about their union support ; their contacts with union organizers ; their sex lives, their use of drugs, and whether or not they had ever made any 'anti-Kerr-McGee' remarks to anyone from the news media.

Those who refused to take these tests were either fired or transferred to the wet ceramic division of the plant, an area with an extremely high incidence of radioactive contamination and were reported to the Federal Bureau of Investigation (FBI) as 'suspects' in the uranium pellet scattering incident.

In July 1974, the Corporation forced the 'de-certification' election—and narrowly lost. OCAW thus was assured of the right to represent the workers in the new contract negotiations scheduled to begin on 13 November 1974. In August, Karen Silkwood (along with Jack Tice and Gerald Brewer) was elected to be a union negotiator. By December of 1974, Brewer had been fired, Tice had been transferred to the wet ceramic area, and Silkwood was dead.

The following is an account of the events leading up to her death.

When Silkwood was elected to be one of the union representatives, her area of responsibility was the issue of health and safety. The union had been crushed in its first strike over the health and safety issue back in 1972, and she was

determined not to have it happen again She interviewed all the workers who had ever reported KM violations of the health and safety rules ; she memorized the Atomic Energy Commission (AEC) regulations promulgated to safeguard the health of the workers, and she conducted her own health and safety inspections of the plant during her free time, compiling a long list of violations she herself noticed.

Knowing what the health and safety regulations were and seeing the violations of these rules by KM, Silkwood flew back to Washington, DC, in September 1974 and testified behind closed doors before the AEC, asserting that KM was guilty of violating some forty different health and safety regulations. The response of the AEC was to tell Silkwood and the OCAW that they would have to further 'document' these accusations before it would act in any way.

On 27 September 1974, during her stay in Washington, Silkwood first informed the OCAW that KM was not only guilty of gross violations of health and safety regulations but was seriously violating quality control standards as well. She told Tony Mozzochi, Vice President of the Union, and Steve Wodka, Mozzochi's assistant, that she could get documented proof that KM officials were knowingly 'doctoring', with *magic marker*, the safty inspection X-rays which, by AEC regulation, had to be taken of each plutonium fuel rod to insure that it was not leaking radiation through faulty welding. Tony Mozzochi was later to testify in federal court that these charges by Silkwood 'were the most serious charges I have heard in my trade union experience'. The AEC demanded perfectly welded fuel rods because, if defective, they could cause a disturbance in the flow of the liquid sodium used to cool the reactor core of the fast breeder. If the sodium is blocked from reaching the portion of the fuel it is meant to cool, the fuel rods can overheat, leading to accidental releases of radioactivity. Under worst-case conditions,faulty fuel rods can lead to a meltdown of the reactor itself.

Karen was instructed by Mozzochi and Wodka to return to her job in Oklahoma and secure copies of the 'doctored'

X-rays along with as much documentation as possible of the forty other charges she had made of KM health and safety violations

Karen returned to Oklahoma on 1 October 1974, and spent the entire month working at the plant by day and by night surreptitiously entering KM executive offices and laboratory facilities in order to photocopy internal KM documents proving her accusations made before the AEC. By the end of October, she had conclusive documentary proof of the validity of twenty-five of her forty charges. On 1 November, she finally secured copies of two, separate,'magic-marker-doctored' fuel rod safety inspection X-rays, doctored by one Scott Dotter, the special laboratory technician who the KM executives had specifically assigned to conduct the final safety inspection X-raying of the fuel rods. Silkwood discovered that not only was he doctoring up the X rays indicating faulty welds, but that the mere *number* of the fuel rods he 'cleared' each week was *itself* a direct violation of AEC regulation requiring that no one inspector be allowed to give the final clearance on over a certain percentage of the fuel rods leaving the plant.

On 2 November Karen telephoned Wodka in Washington and informed him that she had secured the documentary proof for twenty-five of the forty charges against KM and that she 'had gotten the goods on Kerr-McGee' : on the 'other matter' which they had discussed. Since the union negotiations were coming up on the 13th, Wodka advised Silkwood to 'lay low' until a few days before the negotiations were to start. At this time he would fly out to Oklahoma with Dave Burnham, an investigative reporter of the *New York Times*. Karen would then turn over to Wodka and Burnham all of her documentary evidence sustaining her charges, including her charge of wilful falsification of quality control reports. The plan was that Burnham would write up these charges and print them in the *New York Times* during the first week of the contract negotiations.

Unknown to Silkwood and Wodka, KM executive officials were aware of her every move. Nearly a month before, on

12 October, Oklahoma City Police Department Intelligence Unit Photographer Bill Byler and his friend and unofficial assistant, Steven Campbell, made contact with Silkwood while she and a friend, Drew Stevens, were at a restaurant. They 'd.scussed' with Silkwood her status as an employee of the KM Nuclear Facility ; her alleged 'anti-nuclear' attitudes expressed in the form of her voiced concerns concerning KM violations of worker health and safety regulations ; and her activites as one of the elected OCAW negotiators for the forthcoming contract negotiations. On 14 October, Byler discussed the information he had gained from Silkwood with the Oklahoma City Police Department Intelligence Unit Commander Bob Hicks. Hicks told Byler to gather as much additional information about Silkwood and her associates as he could and to report that information to the Intelligence Unit Commander as he obtained it. Hicks also gave to Byler the private unlisted number of the Director of Security for the KM Corporation, James Reading, instructing Byler to contact Reading and convey to him all the information he had gathered on Silkwood. On 15 October, Byler telephoned Reading and met with him on the same day. Both Reading and Hicks were kept informed of all subsequent information gathered on Silkwood.

The next move Byler and Campbell made with regard to Silkwood was to photograph pages of a confidential diary Drew Stevens was keeping in which he was cataloguing the activities of Karen and her efforts to stop the violations of health and safety standards at the plant where they both worked. Copies of the photographs made were given to both Hicks and Reading. Within this same time-frame Karen's phone was tapped and all her telephone conversations monitored. Moreover, Byler, Campbell, Hicks and Reading began to meet privately to discuss the possibility of finding some possible criminal charges against Silkwood and her associates —possibly relating to the paraphernalia Byler saw in Karen's apartment which he suspected was used to smoke marijuana.

After the 2 November telephone conversation with Wodka

in Washington, Karen took two days off from work. She returned to work on 5 November and performed her usual duties as a lab technician. This included working behind a glass shield, through glove-box openings and rubber gloves, to test various samples of fuel batches.

When she stopped to take her coffee break, she undertook the standard safety check of her person before leaving the glove-box area. She registered radioactive contamination. She immediately called for help and was taken to the decontamination area where she was undressed and scrubbed with wire brushes and treated with chemicals to remove the plutonium from her skin.

The safety inspection team then inspected her glove box but could find no radiation escaping from it ; nor was there any radioactive contamination in any part of the room she had been working in The KM Corporation was later to admit in depositions that the contamination on Silkwood did not come from that room. Nor did she receive the dosage from any other part of the plant

After the long scrubbing and decontamination process, Karen went home. She returned to work the next day and again when she began her check-out from the glove-box area she registered radioactive contamination. She was again rushed to the decontamination area and put through the process of attempting to remove the plutonium from her skin. This time however, she registered internal contamination of her nasal passages. She was ordered to go home and to return the first thing in the morning to undergo a 'sinus draining' procedure designed to lessen the continuing intake of plutonium into her lungs—the part of the body most sensitive to the carcinogenic effect to plutonium.

Once again the laboratory area in which she had been working was inspected ; again it was entirely free from radiation with the exception of a few places which she had touched with her contaminated hands.

On the morning of 7 November Karen reported directly to the decontamination ared of the plutonium facility for the

to conduct a criminal investigation against KM, Olsen agreed to work with Reading in the investigation During the following few days, Olsen interviewed several OCAW workers at the KM plant in a meeting set up by the Company and personally attended by Reading. At these meetings, the workers were asked whether they had any information they wanted to give concerning KM harrassment of the OCAW. When none of the workers came up with any incriminating evidence, Olsen closed his investigation of charges of KM harrassment of OCAW union workers.

Olsen then turned to investigating Silkwood's radioactive contamination. Instead of investigating the possibility of KM contaminating her, however, a confidential memorandum sent by KM Security Chief Reading directly to Dean A. McGee, Chairperson of the Board of Directors of the KM Corporation indicates that the 'thrust' of Olsen's investigation was to discover 'what were the means used *by Silkwood* to remove plutonium from the Cimarron Facility, or if in fact, the plutonium she was contaminated with came from some other source'.

In March 1975, Olsen met with an undercover FBI domestic surveillance operative Jacque Srouji who had been asked by the FBI to write a book on nuclear power in order to 'establish contacts in this area'. Olsen turned over his entire Silkwood investigative file to Srouji for copying. He also set up a secret meeting between srouji and Reading. Srouji was later to state to a Congressional investigator that at this meeting Reading informed her that he and his associates in the Security Divison of KM had wiretapped Silkwood's phone and had electronically 'bugged' her home prior to her contamination and death. Srouji states that Reading even showed her typed transcripts of the telephone calls monitored.

In the late Spring 1975, Olsen closed his investigation. stating that it was not possible to determine how the 400,000 disintegrations per minute of radioactive plutonium got on the food in Silkwood's apartment. In his report on her death, he accepted without question a report issued by the Oklahoma

State Highway Patrol stating that Karen had fallen asleep at the wheel. With regard to the question of documents, Olsen stated in his report that KM officials had said that there could not have been any documents since her charges against the company had not been true. This being the case, he never looked for any.

Within a few months of her death, therefore, the FBI investigarion of Karan Silkwood was closed. In response to official inquiries by her parents, the National Organization for Women, and theOCAW, FBI Inspector Al Connally responded that they 'watched too much television' if they expected every case to be solved completely. 'In ane event', Connally said, 'the FBI cannot discuss its investigations into the case, because it is a "closed" case. And the FBI offical policy is not to discuss "closed" cases'.

Unsatisfied with this explanation, the Nationals Organization for Women, the OCAW, the Environmental Policy Centre, Critical Mass, and various other interested organizations began to mobilize their constituencies to put pressure on the Senate Committee on Government Operations to hold. a public enquiry into what had really happenend. In November 1975. Senator Ribicoff, who chaired the Committee, agreed to hold hearings to find out not only what had happened but to determine how effectively the various federal agencies inclu ding the FBI, had performed their duties.

As foon as the Senate hearings were announced. the KM Nuclear Facility was completely closed down and all of its workers summarily fired. The plant was put into 'mothballs', to await the pending investigation. Suddenly, two weeks before the investigations were to begin, Dean McGee flew to Washington and met privately with Senator Metcalf, a high-ranking member of the Committee on Government Operations who with Ribicoff was heading the enquiry. The only other person present during this meeting was a Mr Bennet, the Washington representative of KM. No one knows what was discussed at meeting. The results, however were dramatic. The very next day, Senator Metcalf issued a press release anno-

The men jumped in their car and headed out of Oklahoma City along Route 74 towards Cresant.

Seven miles from Cresant, they came upon the red lights of police cars and a gathering of spectators. Karen was dead. Her body was gone. Her car had been taken away.

Telephone calls from David Burnham to the Oklahoma State Highway Patrol revealed that Karen's car had been towed away by some private wrecking service, *not* by the State Highway Patrol, as was the usual procedure An all-night search by Burnham, Wodka and Stevens failed to turn up where Karen's car and her documents had been taken

Before searching for the car, the men went to the coroner's, viewed Karen's mangled body, and telephoned her parents in Nederland, Texas, telling them of their daughter's death.

The car had in fact been taken away from the accident by a local wrecker service, Ted Seabring's Ford. At 12:05 midnight, he was called by the Oklahoma State Highway Patrol and directed to open up his garage in order for a group of KM officials to check Silkwood's car, 'to inspect it for radiation'. Four KM representatives came, dressed in radiation suits. complete with face masks. Both Ted Seabring and his assistant Kenneth Valiquet later asserted that these men took documents from the car and began reading them aloud to one another. Neither Seabring nor Valiquent recall whether these men actually took the documents they were reading.

Later that morning, police officials came to the garage and did take items from the car After this visit, Seabring took all the remaining items and packed them into a cardboard box, which he sealed.

It was not until that afternoon, 14 November, that Burnham, Wodka and Stovens finally located Karen's car. After a call to Karen's parents, Seabring released Karen's car and the sealed box of items he had taken from the car to them. Directly in the presence of Seabring, Burnham, Wodka and Stevens opened the sealed box and examined its contents. There was no manilla folder. There were no documents.

Wodka immediately telephoned Tony Mozzochi, OCAW

Vice President. The Union decided immediately to hire the best automobile crash reconstruction laboratory in the Oklahoma area to inspect the car and the crash scene in order to reconstruct what had happened. Contracted for the job was the Accident Reconstruction Laboratory in Dallas, Texas. One of their top experts, A. O. Pipkin, flew to Oklahoma, inspected and photographed Karen's car ; inspected and photographed the accident scene ; and reviewed both the police reports and the report of Seabring. On 19 November, the Accident Reconstruction Laboratory issued an official report concluding that the physical evidence Pipkin had been able to evaluate indicated that Silkwood had been struck in the left rear side by another automobile travelling up behind her at approximately 55 to 60 miles per hour. She had been knocked off the road and her car had driven directly into a concrete culvert. Karen had been killed instantly.

On 20 November, the OCAW filed a formal complaint with the Justice Department in Washington, DC, demanding that an investigation be conducted into Karen's mysterious death as well as into her mysterious contamination a week before her death. On 21 November, FBI Headquarters in Washington telexed the FBI office in Oklahoma City and ordered a full-scale investigation into the contamination and death of Karen Silkwood and into charges of union harrassment by KM. FBI agent Lawrence J. Olsen was assigned to the case.

Sworn depositions reveal that on the day he was assigned to the case, Olsen met privately with James Reading, informing him that the FBI had ordered him to investigate KM agents for possible criminal wrong-doing against Silkwood and other members of the OCAW at their Cimarron Nuclear Facility. At this meeting, Olsen explained to the chief of KM security what type of information might prove incriminating to KM and asked reading to set up an emergency meeting between Olsen and executive officials of KM as soon as possible.

This second secret meeting took place on 25 November. After explaining to the KM officials what the federal statutes were under which he had been ordered by FBI Washington

'sinus draining' procedure. Upon her first inspection, she was found to be heavily contaminated around her face, neck, shoulders, arms and hands. She had not been to the laboratory, she had not been in any other part of the plant ; in fact the only place she had been since she had been decontaminated the day before was her home.

KM ordered Silkwood to fly immediately to Los Alamos, New Mexico, to undergo a full week of special physical tests to determine the extent of her internal contamination. It was indeed unfortunate, they informed her, that she would have to miss the contract negotiations she had been preparing for but health and safety must come first.

On 8 November Karen was sent to Los Alamos, to a special US government radiation laboratory where she was to be put through a week-long battery of tests and examinations.

Once Silkwood was gone, a Special Inspection Team from the KM Nuclear Facility descended upon her home to begin what one of the team later described in sworn testimony as a full scale search' . Karen's personal mail was read and all tape recordings, personal diaries, notes, memoranda and other documents having anything to do with either her work at KM or her alleged use of marijuana were turned over to James Reading, the Chief of KM security, *not* to the decontamination team.

During the search, the KM Special Investigation team was joined by federal inspectors from the Region III office of the AEC. On 8 November, the AEC inspectors opened up Karen's kitchen refrigerator and found that the bologna and cheese she had been eating was radically contaminated with 400,000 disintegrations per minute of plutonium radiation. The appartment was immediately sealed off, and *all* of its contents taken, leaving only the bare concrete walls and floors. The contents were sealed up in 55 gallon drums of the type used by KM to dispose of its plutonium waste. These barrels and their contents have never been seen again by anyone other than KM and AEC officials.

On the night of 12 November, although Karen was sche-

duled for more tests, she gathered her belongings and flew from Los Alamos back of Oklahoma. She telephoned Wodka and told him that despite the loss of everything in her appartment she 'still had the documents' and that as far as she was concerned the plan to meet Wodka and Burnham the next evening was 'still on'.

Karen spent the night of 12 November in Oklahoma City, showing up at the KM facility, some 40 miles away, at 9 00 a.m. on the morning of 13 November for the contract negotiations. She negotiated with Tice and Brewer during the day, not mentioning the documentary evidence in health and safety and wilful violation of quality-control regulations.

After the negotiations broke off in the late afternoon, Karen went with other union members to the Hub cafe in Cresant for a de briefing session. She took one short break from this meeting to telephone Drew Stevens to make sure he was leaving his work early to go the Oklahoma City airport to meet the planes on which Brunham and Wodka were arriving, to make sure they got to the 8.00 p.m. meeting on time. After this call, Karen went back to the de-briefing and confirmed to a friend, Jean Jung, that she had documentation concerning health and safety and quality control violations that would 'get Kerr-McGee once and for all'. She also told Jean Jung about the meeting she was to shortly leave for with Wodka and Burnham.

At about 7:10 p.m., Karen left the cafe, got into her 1973 Honda Civic with an inch-thick manila folder full of documents, and drove off down Route 74 toward Oklahoma City.

In Oklahoma City, Burnham Wodka and Stephens sat waiting for Karen in Burnham's hotel room at the Holiday Inn Northwest. Eight o'clock came and went. No Karen.

Eight-thirty came and went. No Karen.

The men then began to become concerned and attempted to call the Hub cafe. They discovered. however. that Burnham's phone was 'out of order'. Leaving the room, they finally made contact at a pay phone and learned that Karen had left the cafe shortly after 7:00 p.m.

uncing that the previously scheduled hearings into the Silkwood matter were permanently closed.'

One of the Congressional investigators for the now-closen Senate hearings, Peter Stockton, took the case over to the House of Representatives and got the House Sub Committee on Energy and the Environment to agree to hold hearings into the Silkwood matter in April 1975.

When the FBI was contacted to provide copies of its Silkwood investigation file, it refused, citing its official policy not to discuss 'closed' cases. The Chairperson in charge of the enquiry, John Dingell, rejoindered by pointing to cases where Congress had been explicitly authorized to obtain copies of 'closed' FBI investigations, when such files were deemed necessary by the Congress for it to perform its responsibilities. Upon receipt of this information, the FBI immediately declared the Silkwood case 'open', refusing to give to Dingell access to its files on the grounds that the FBI had the right to refuse *anyone* the files on an 'on-going' FBI investigation. When questioned by Dingell how the status of the Silkwood case had suddenly switched from 'closed' to 'open' the Deputy Director of the FBI, James Adams, stated that the case had been re-opened 'due to all the inquiries being directed to the Bureau about it'.

Dingell held hearings anyway. One of the witnesses was Jacque Srouji who, according to FBI documents later obtained through subpoena power, was sent to testify in order to blast the OCAW and defame Karen Silkwoad. In her testimony, she accused Silkwood of being 'mentally unstable', of 'deserting her husband and three children', and of 'using marijuana'. She further stated that in her opinion both the contamination and the death of Silkwood had been deliberate and hinted darkly that perhaps the group responsible was the OCAW, which could have done it somehow to embarrass KM in contract negotiations. Under cross-examination, Srouji defended her conclusions by stating that they were based on FBI documents. This brought the proceedings to a halt, for if Srouji, introduced to the investigation as a journalist, had

seen FBI files, why had these files been refused to the Congress of the United States ?

Before the issue could be resolved, Dingell was ousted as the Chairperson of the Committee in a *coup d'etat* engineered by another member of Congress, Tom Steed, from the fifth District of Oklahoma, the home district of the KM Corporation's international headquarters.

With this, hearings ceased, and Karen's parents, until this time waiting patiently for American justice to deal fairly with the contamination and death of their daughter, contacted legal counsel to file a federal lawsuit designed to obtain justice through the federal courts.

In November 1976, a three count suit was filed charging first, that KM was legally liable for the plutonium contamination of Silkwood which occurred on 5,6, and 7 November 1974; secondly that James Reading, Dean McGee, Reading's assistants, and the other members of the KM Board of Directors participated in a wilful and intentional conspiracy to violate the civil rights of Karen Silkwood in her efforts to organize a lawful trade union at KM ; and that they then sought to cover up these violations. Four FBI agents, including Olsen and Srouji are named as co-conspirators in the cover-up. The third count charges these same people with an identical conspiracy of attempting to commit and then cover-up a deprivation of the equal protection of the laws and the right to the equal enjoyment of the privileges and immunities of all those persons, of whom Silkwood was one, who reported violations of the federal Atomic Energy Act the KM Corporation.

The first count finally came to trial in the Oklahoma Federal Court in the spring of 1979. Dr John Gofman, known to many as the 'Father of Plutoniun', because he was one of its codiscoverers, set the tone for the plaintiff's case by testifying that current government licences to operate nuclear plants conforming to existing standards are 'legalized permits to murder'. Evidence from the past ten years, he said, shows that federal standards for plutonium are at least 480 times too lenient and that Silkwood was 'married to lung cancer' as a

result of her contamination.

Dr Edward Martell, an environmental radiochemist, also testified that existing radiation exposure limits are 'misleading and inadequate and have not been reduced because of the government's vested interest' in nuclear power. Dr Martell called federal standards both in the US and abroad 'meaningless' because, contrary to official policy, there is no safe limit for exposure to low-level ionizing radiation.

Dr Karl Morgan, often referred to as the 'father of health physics' for his role in the setting of acceptable standards for radiation releases in nuclear facilities, testified that KM showed a 'callous' attitude towards the safety of its workers. He pointed out that the KM training manuals made no mention of the fact that one could contract cancer from radiation exposure, and that because of this refusal to recognize the dangers of radiation both KM management and the workers themselves were lax and in frequent violation of safety regulations.

Former plant workers stated under oath that their training had been so deficient that teenage workers often played at seeing who could get 'the hottest the fastest'. Workers said that plutonium spills were often painted over instead of cleaned up, workers left the plant contaminated, and plant supervisors were warned ahead of time of 'surprise' inspections by the AEC. There was also testimony stating that workers used uranium for paperweights, threw it around the rooms at each other, and even took uranium home to show their children.

One of the four plant supervisors, Jim Smith, branded the KM Nuclear Facility a 'pigpen', testifying that security was so lax, workers could have thrown plutonium over the fence or taken in past guards simply by telling them it was to be thrown out as waste. Smith also told of numerous incidents where workers were forced to stay in contaminated areas and continue working in order to meet production quotas, their only protection being inadequate face respirators.

The jury was convinced by the combined testimony of

expert witnesses and former workers, and on 18 May 1979 awarded $ 10.5 million in actual damages and $ 500,000 in personal injury damages to Silkwood's three children. In charging the jury Federal Judge Frank G. Theis directed them to define 'physical injury' with regard to plutonium as 'nonvisible or nondetectable injury ···to bone, tissue or cells'. The implications of this are profound, for it establishes *legally* that plutonium is in fact a 'dangerous material' and causes 'physical injury'. This means, on the one hand, that nuclear materials are so dangerous that nuclear facilities are under special restraint to prevent the escape of any of the material, whether intentionally or otherwise ; on the other hand, it means that workers and members of the public are now entitled to claim damages due to the operation of nuclear facilities if they can demonstrate that their sickness is attributable to radioactive releases coming from the plant involved. In charging the jury, therefore, Judge Theis stated that they did not have to find that KM deliberately contaminated Silkwood ; the mere fact that plutonium had been allowed to 'escape' the plant was sufficient to award damages.

In terms of the civil liberties violations of the case, the situation is somewhat more complex. Judge Theis refused to try these counts as he stated that as a union person, Silkwood was not protected against wiretapping and electronic surveillance under the Civil Rights Act. This ruling is under appeal.

What has emerged in the course of the investigation is the fact that the abridgment of Silkwood's civil liberties was not something unique with her. Intentional harassment and illegal electronic surveliance, illegal entry into the home in search of documents, and active co-operation of the FBI is not only the illegal acts themselves but in any cover-up required, are things that many anti-nuclear activities across the US have been forced to undergo. What singles out Karen Silkwood is the magnitude of what she uncovered about Kerr McGee malpractice in the areas of worker health and safety and the extra-ordinary measures Kerr McGee took to try to silence her. It seems clear that both her plutonium contami-

nation and her fatal accident were deliberate attacks on her.

What needs to be remembered in assessing this state of affairs is that plutonium, if it is to be used, must be protected by police state methods. You cannot have something that can be used for nuclear bombs and can damage and mutate human life with the lethalness of millions of cancer doses per pound in a free society. *A plutonium economy and a free democracy are a contradiction in terms.* This is a fact that has been recognized by leading legal experts and politicians alike. Writing in the *Harvard Law Review*, Russell Ayres stated flatly that 'plutonium provides the first rational justification for widespread intelligence gathering against the civilian population'. The reason for this is that the threat of nuclear terrorism justifies such encroachments on civil liberties for 'national security' reasons. It is inevitable, therefore, Ayres says, that 'plutonium use would create pressures for infiltration into civic, political, environmental and professional groups to a far greater extent than previously encountered and with a greater impact on speech and associated rights'. Sir Brian Flowers, in Britain, has come to similar conclusions. At the conclusion of his environmental impact statement for the plutonium economy in the United Kingdom, known as the Flowers Report, he made it quite clear that Britain could not have both plutonium and civil liberties. Rather, he said, to adopt the plutonium economy would make 'inevitable' the erosion of the freedoms that British people had fought for over the centuries and come to assume as inalienable.

What happened to Karen Silkwood, therefore, is something that should not be seen as an abnormal violation of her person and her freedom ; rather, it should be viewed as the *logical conclusion* of what the adoption of the plutonium economy in any country implies. Even as there are certain psychological implications inherent in the use and development of nuclear weapons, then, and even as there are direct physical results on both workers and public alike from the nuclear fuel cycle, so, to the plutonium economy makes inevitable the erosion of the human rights in the society adopting such an economy.

Again, it should be noted that these erosions are thus far largely subtle and unnoticed, largely because there has not yet been a large scale terrorist incident. But, as Robert Jungk reminds us,

> The question arises when the more severe restrictions on liberty that are expected from an increasing number of atomic institutions will exceed the limits of people's patience and capacity for adaptation. Safety analysts and risk assessors devote a great deal of attention to possible technical 'incidents' and 'blow-ups', but obviously underrate the social 'explosions' that seem to be almost inevitable as a side-effect of their efforts. Meanwhile the very numerous studies of MCA (maximum credible accidents) neglect the likelihood of MCSA (maximum credible societal accidents) which increase from day to day generated by the intolerable pressures of the 'nuclear state.'

What happened to Karen Silkwood was a maximum credible societal accident. If the plutonium economy is allowed to continue there will be others.

A Short History of the Anti-nuclear Movement

Health and Society Group

Introduction

The history of the anti-nuclear movement is the story of many ordinary people—and a few extraordinary people—involved in a struggle against an immensely powerful military-industrial-state complex in the name of sanity and survival. The strength of the movement is being increasingly felt on the political scene of the West.

As yet no equivalent movement has begun in India although her leaders seem intent on aping the West and following down its suicidal path. But we must not lose heart and give way to a feeling of impotence. Sometimes, it has been said, in pointing out the contrasting apathy in India, that in the West there is a huge groundswell of protest as if this has always been so. It should be remembered, however, that the massive rallies we have heard about recently in many Western capitals, have a long history behind them. They had small beginnings when their participants were often derided and labelled as cranks, and the growth of the movement has not always been steady. It didnot just happen but grew as the result of the combined efforts of many individuals who distributed leaflets, argued on doorsteps, gave talks, collected signatures for petitions, wrote to the press, took part in demonstrations or risked their freedom—and sometimes their lives—in order to spread the message. Those individuals who are aware of the dangers we face must stand together and make their voice heard. We shall overcome.

March 1983.

A SHORT HISTORY OF THE ANTI-NUCLEAR MOVEMENT

"Some day, the demand for disarmament by hundreds of millions will, I hope, become so universal and so insistent that no man, no nation, can withstand it."

—U. S. President Dwight Eisenhower.

"I have absolutely no confidence in our political leaders to do anything significant in the arms and disarmament field. Instead, the onus now lies upon public opinion to bring about a saner world."

—Dr. Frank Barnaby, Director of SIPRI (Stockholm International Peace Research Institute.) 1981.

Competition between armed states is as old as civilization. The great majority of people at any time has accepted without question that war and violence are at times justified. But there has always, too, been a far smaller but deeply convinced group for whom violence is not inevitable and who have longed for a world without war. The pacifist tradition goes back far. It has often been rooted in a religious outlook as for the Taoists in China, the early Christians, the Buddhists. Alongside opposition to war on moral and religious grounds, the idea has grown up of resistence to violence being in itself a powerful means of change. This idea was developed in particular by the American, Henry Thoreau, in his essay "Civil Disobedience" (1848), and it can be seen to "culminate in the life and work of Gandhi who, in turn, has been a major inspiration to such people as Martin Luther King in America and Albert Luthuli in South Africa.

The twentieth century pacifist's stand against war has not been easy. With the Fascism of the second world war and the attempted extermination of a race, the temptation to take part in warfare, evil as it is, in order to destroy a seemingly greater evil, was very strong. Many peace movements became reduced in numbers as members became convinced that even war itself might be necessary in the face of Fascism.

However, the development of nuclear weapons has totally changed the nature of war. With them man has acquired the capacity for the destruction not just of a single tribe or city, or even of an race, but of the whole earth. Nuclear weapons are so abhorrent and evil that it is not only the traditional pacifists who have come out against them but a whole cross-section of people of varying motivation and conviction. Bertrand Russell, for example, said he was not an absolute pacifist but advocated and supported the politics of peace because it was the only prudent politics in an age of potential total destruction.

The beginnings of protest.

When the atomic bombs were dropped on Hiroshima and Nagasaki in August 1945, there was public concern but no public outcry. For most people it seemed that the A. bombs had ended a very bloody war and saved lives. (This, in fact, is questionable as Japan, in all probability, was already preparing to surrender). The effects of radi. ation were not well-known until later.

The movement against nuclear weapons began in the early 1950's. It was at first directed against the testing of nuclear weapons in particular. There was small groups of concerned individuals, for the

most part pacifists (notably Quakers[1]) also pro-Soviet leftists as in the British Peace Committee. At this time the U.S. had a monopoly on nuclear weapons. In 1950 several peace and religious societies cooperated in a Hiroshima Day Commemoration in Trafalgar Square in London attended by about 3,000. Certain scientists were also among the first to voice their concern. In fact most of the leading scientists who worked on the first A. bombs later regretted their participation. In 1955 11 prominent scientists signed a manifesto calling upon scientists throughout the world to work for peace This was known as the Russell-Einstein manifesto and it provided an impetus for an international conference which is held every year and is known as the Pugwash conference.

Protest becomes organised.

Soon the U.S.S.R. was producing her own nuclear bombs and Britain started testing hers in 1957. The decision to "go nuclear"' had been taken by Prime Minister Attlee and his military advisors in the late 40s', without informing even the British government. A groupin Britain around the newspaper "Peace News" arranged for two Quakers, Sheila and Harold Steele to make a direct personal protest by trying to sail into the danger zone in the Pacific. Although they were stuck in Japan, the campaign was successful in creating widespread publicity and showed the potential of individual action. From it developed the "Committee for Direct Action against Nuclear War". Ideas of Gandhian non-violent action playedan influential part in their thinking. They were a group of

(1) "Quakers" is the term commonly used for members of the Religious Society of Friends, a Christian group who believe in the practical and social application of the Christian faith and many of whom condemn war in all circumstances.

radical pacifists aiming at disarmament through popular resistence, by mobilising local opposition focussed on where the bombs and missiles were made. They entered bases in order to obstruct work and to talk to the workers about the implications of their work.

In America the Committee for Non-Violent Action, (C.N.V.A.), began to organise a series of spectacular civil disobedience actions. One of these, a national demonstration was in Nevada during nuclear bomb testing. Other protests by regional C.N.V.A. groups included sit-ins at the Lawrence Radiation Laboratory in California, home of the H. bomb, and demonstrations at Port Chicago, the Navy's munitions port. On numerous occasions pacifists taking part in "Polaris Action" tried to enter the docks where the submarines were being constructed and to interfer with the launching by paddling boats carrying peace messages into restricted areas or actually trying to swim out to the submarines and board them. One of the most successful of C N.V.A.'s projects was the attempted sailing of the "Golden Rule" into the nuclear bomb testing area of the S. Pacific as the Steeles had attempted to do a little while before. Apart from this type of protest, there was a campaign of refusal to pay federal tax and a residential community was set up to serve as a place for non-violent training and a sanctuary for draft-card burners and deserters.

Also in America the committee for a Sane Nuclear Policy (S.A.N.E.) a membership organisation was formed in 1957. It had an educational and more moderate outlook.

In Britain the Campaign for Nuclear Disarmament (C.N.D.) was also formed in 1957 and was launched publically on 17 February 1958. Its

immediate precursor was the National Committee for the Abolition of Nuclear Weapons Tests (N.C.A.N.W.T.) which was, in turn, a coordination of numerous local groups which had come into being during the previous years. In contrast to the Direct Action Committee which was a small group of "nobodies", the C.N.D. leadership included a glittering array of Britain's progressive intellectuals. C.N.D. was originally intended as a high-level pressure group. However it quickly became a mass movement. Certain external events effecting the mood of the time help to explain how this came about. The brutal crushing of the Hungarian uprising in 1956 by the Soviet Union led to a mass exodus from the Communist Party and created much discussion amongst the Left and also created a climate favourable to the formation of a non-aligned peace movement. Previous campaigners had lacked a clear unifying policy. Now old and new campaigners rallied behind the clear slogan : "Ban the Bomb". For the next 4-5 years C.N.D. was to dominate the media. The Aldermaston marches (Aldermaston is a nuclear weapons research establishment) taking place over the 4 days of Easter became, at this time, a regular annual event and involved at their height at least 100,000 participants. Local demonstrations took place all over Britain throughout the year and received enormous media coverage.

The aim of unilateralism, that is the renunciation by Britain of nuclear weapons, was the most significant new factor that C.N.D. brought into the peace movement and it gave the campaign a dynamic appeal. For many C.N.D'ers, though by no means all, the main focus of the campaign was the Labour Party. For a while when in 1960 the Labour Party conference voted in favour of unilateralism, it seemed that success was in sight. But this decision was soon overturned. The question of

unilateral disarmament has remained a devisive one within the Labour Party.

The aim of disarmament through conventional parliamentary politics was not shared by the D.A.C. and there were soon those within C.N.D. also who were looking for more radical and aggressive methods of protest. In 1960 the Committee of 100 was formed by Bertrand Russell. It was committed to direct action though, unlike the D.A.C. which was always small in numbers, its aim was mass civil disobedience. In a way it amounted to a combination of the mass numbers of C.N.D. with the tactics of the D.A.C Its supporters, apart from radical pacifists, included anarchists and Marxists and some for whom obstruction to the state machinery was more important than strict adherence to non-violence. The activities of the C100 brought strong retaliatary measures from the government with many arrests and imprisonments (including Russell aged 89), raiding of offices by the police etc. During a demonstration in London on 17 September 1961, 1314 were arrested. The government used the Official Secrets Act against the protestors. After a demonstration at the Wethersfield base six protestors were found guilty of actions "prejudical to the interest and safety of the state" and were given 12 to 18 month sentences. One of the defendents wrote : "Our offices are raided, our homes searched, telephones tapped, our mail is read and police spies are sent to our meetings. This is the measure of our success. The government understands now that we are serious. We are not conducting a protest movement, but a resistence struggle against the State machine and its ability to exterminate millions of people."

The C100 gained wide media coverage. However they overestimated the popularity of their cause : increased militancy tended to lead to decreased

public support. It could be said they become more concerned with methods than the message and so failed to develop a coherent perspective and build a broad political movement. This failure and the divisions in their methods caused within the movement may have been a factor in the decline of the movement as a whole.

The decline of the movement in the late 1960's.

But there were other reasons for this also. One important one was the Cuba crisis of 1962. It seemed that the crisis had shocked government into an appreciation of the possibility of conflict escalating into nuclear war and, as a result, the Hotline agreement (by which the leaders of the superpowers could get into direct contact with each other) was reached. Atmospheric tests were banned in 1963 and therefore the risks of radioactive pollution decreased. The Non-poliferation Treaty appeared likely to restrict the number of countries that would acquire nuclear weapons. In a way the desperate urgency of the campaigners' message subsided. At the same time, the Vietnam war began to claim more attention from the peace campaigners both in America and Britain. The Labour Party in Britain, when elected to power, failed to keep its pledge to scrap the Polaris submarine and this meant that Britain now had a new system of missiles for the next 20 years. Many campaigners by this time were disillusioned and weary and looked for other outlets in issues. often relating to the environment and community relations, that they felt they could more directly effect. C.N.D. became an organisation rather than a campaign and the C100 finally wound up in 1968. They played. however a very important role in educating the public and the politicians about the dangers of nuclear war and in showing that the question of

nuclear weapons is not simply a political and strategic one but a moral one.

The experience of the anti-Vietnam war movement had a profound effect on American society and by the time the war ended radical activity in the U.S. had considerably broadened from opposition to war, racism and militarism to attempts and experiments to build an alternative society and search for positive values in building a peaceful society. When the war ended the natural focus for organising was lost and there was a possibility that the peace movement would fragment and lose its sense of direction. One of the early initiatives which sought to maintain the momentum and deepen the analysis of the peace makers was the B-1 bomber campaign which was a broad-based coalition bringing different organisations together. The B-1 bomber was a more sophisticated version of the B-52 bomber and involved an enormous amount of research and investment for its development and production. An important aspect of the campaign was to expose the danger of making whole areas dependent on the war machine for their employment and to investigate the question of conversion from military to peacetime industry.

The movement against nuclear power gains momentum.

It would probably be true to say that the majority of people during the early days of the disarmament campaign considered that nuclear power could be a useful application of nuclear technology. However, the campaign against nuclear weapons and weapons testing had heightened public awareness about the dangers of radiation and this new knowledge along with a growing understanding of ecology which exposed man's many harmful effects on the environment, led to increasing fears about the health aspects of nuclear power. Later

on, the inhernt problems eg. waste disposal and the inefficiency and economic absurdity of nuclear power became more and more starkly apparent. Whereas the issue of nuclear weapons faded somewhat in the public eye by the early 70's, the question of nuclear power presented a very real and present danger very near at home.

Early opposition to nuclear power in America and W. Europe took the form of legal interventions. Anti-nuclear lawyers took the Atomic Energy Commission (A.E.C.) to court in efforts to obstruct the granting of licences and the construction of nuclear power stations on particular sites. Others, in particular women, helped to organise the local community in support and to collect the necessary funds. Mainly middle class and professional people were involved in these activities and invaluable work was done in uncovering the blanket of secrecy and collecting and publishing information about the nuclear industry. By now the nuclear industry was producing opponents among the experts and scientists within the industry itself. Their outspokeness added greatly to the strength of the campaign.

These interventions were very expensive, complex and technical and difficult for the average citizen to understand. With hindsight it can be said to have been a mistake to make legal challenges the centre of the anti-nuclear strategy for it assumed that the government would be neutral and play fair. It has been shown time and time again that this is not the case. The goverment may be forced to reject an application to build a reactor on a geological fault, but it will side-step the issue when it relates to the future of the industry as a whole. Justice Parker, at the time of the British Windscale inquiry, simply ruled that the question

By 1962, C.N.D. was already beginning to wane. With the Test Ban Treaty the following year, the thaw in the Cold War already melting imperceptibly into the beginnings of "Detente". By the mid-sixties, when I went on to university, C.N.D. and its concerns had ceased to impinge greatly upon the average radical student conscience. Mine was no exception. Our eyes turned away from the tensions between the great power blocks towards national struggles against imperialism, especially, of course, the war in Vietnam. And then, with the events of 1968, we were preoccupied with the promise of socialism much closer at home. In the early seventies, I wrote for far left papers...within that milieu, we regarded C.N.D. with faint contempt, as something passe and irrelevant, a bit like a cross between the Fabians and the League Against Cruel Sports. We were concerned with the real issues.

All that was a long time ago. Times change, and so do one's values. Like most of those who lived through those days, I have been questionning our ideologies and trying to glimpse "beyond the fragments"...Today, I am convinced that the nuclear arms race issue is that upon which all other issues (and much else besides) depend. Nuclear arms menace not just the nature of the material conditions of our lives, but the continued existence of those conditions themselves.

—*Peter Fuller, writing in "Time Out", November 1980*

Some 24 years ago, in what we social geologists call the Pre-Aldermastonian Period, or the Age of the Angries, there existed a group of middle-aged softies called by the jaw breaking name of the National Campaign Against Nuclear Weapons Tests, inconveniently shortened to NCANWT. It was led by the admirable Quaker Arthur Goss, and it recruited quite a lot of distinguished sentimentalists and rebels and crusaders and Christians and heathens and the like.

At the beginning of 1958, it occurred to us that to campaign against the testing of the Bomb and not against possessing it was to say the least illogical ; so one evening the softies assembled in the house of John Collins Canon of St. Paul's, and out of it was born the Campaign for Nuclear Disarmament.

We were a tidy bunch, as I recall, Bertrand Russell, J. B. Priestly, Michael Foot, Kingsley Martin, A. J. P. Taylor, & so on & so on, with of course the incomparable Peggy Duff. Why I was included in this distinguished company is obscure ; perhaps because I was the only one there, or even in the country, who had personally seen three atom bombs go off, and had been greatly shocked thereby, at least to the extent that I didn't want to see any more.

For years thereafter, every Easter we did this Aldermaston march. We first made the idiotic mistake of marching to Aldermaston the Berkshire nuclear research establishment, arriving after three days to find. naturally nobody whatever there. Later we corrected that. We became a very big demo indeed, but never as big as last weekend's...

You have to be in your 40's even to remember a world before the atom bomb. Most of these demonstrators seemed to be in their 20's and 30's. It is true there was the immortal Fenner Brockway, who at 93 is marginally older than I and who in his early days was doubtless campaigning against the use of the dreaded crossbow. If there is an instinctive impulse that unites the immortal old Fenner Brockway and my grandchildren, and that brings 150,000 people from all over the country to see and be seen in Hyde Park on a dismal day, should not the world somehow pay heed ?

—James Cameron writing in "The Weekly Guardian" 8th November, 1981

of whether or not nuclear power should continue to developed was beyond the terms of the inquiry which would only consider what type of nuclear development was to be preferred. In this way the interventions can claim some local successes but could not bring a halt to the industry.

By around 1974 new tactics were being tried with the aim of taking the case directly to the people rather than relying on the courts. In the spring of that year Sam Lovejoy toppled a 500 foot utility weather tower in Montague, U.S. as an act of civil disobedience against proposed nuclear construction there.

In 1975 28,000 W. German, Swiss and French nuclear opponents overran a site on the Rhine in W. Germany. This action inspired nuclear opponents throughout the world. By 1978t the strength of the anti-nuclear power movement was being felt throughout Europe and America. In America a major struggle took place around the construction of the Seabrooke power station in New Hamsphire. It had previously been the cause of more than one hundred interventions. Now it was the scene of a series of demonstrations and occupations and arrests. This local struggle drew the attention of the whole of the U.S. The future of the plant remains in doubt. A major 4 year campaign also took place around the case of Karen Silkwood involving anti-nuclear, feminist and labour activists. On 18th May 1979 Karen Silkwood's family was awarded over 10 million dollars damages.[1] Opposition mushroomed following the Harrishburg accident in 1979 both in America and elsewhere.

1. Karen Silkwood was an employee of a nuclear power plant in Oklahoma and was murdered in an attempt to prevent her publicising gross safety violations and other irregularities at her place of work.

Local interventionists had already begun to coordinate their activities on a national scale. By now organisations like Friends of the Earth had become instrumental in developing a world-wide network of activists.

Revival.

By the mid-70's the movement against nuclear weapons was reviving. After several years of "detente", relations between the U.S. and U.S.S.R. began to deteriorate again. The U.S. pushed ahead with an increased defence budget and the development and production of still more lethal weapons : Cruise missiles, Trident, the MX missile, and the neutron bomb while the U.S S.R. installed SS-20 missiles targetted on Europe. The S.A.L.T. agreements have broken down. The newly elected right-wing governments in Britain and the U.S. are now talking less in terms of nuclear weapons as a deterrent but have begun to plan for the possibility of fighting and winning a "limited nuclear war" in the "theatre" of Europe. The new weapons being developed have a "first-strike" capability, that is, they may be used to start a nuclear war not simply to deter attack.

It is spine-chilling to realise how out of touch with reality the world's leaders can be. Many experts agree that it is inconceivable that a nuclear war could be limited and that anything like life as we know it could survive. Yet details are being worked out about, for example, how the postal service in the U.S. will be organised in response to a nuclear war :

"In the event of a nuclear holocaust, the United States postal service will suspend registered and express mail, will continue to accept personal letters, not exceeding 8ozs, and will ensure that correspondence destroyed to prevent it failing into

enemy hands 'will NOT be opened and examined'... change of address cards will be given to those fleeing the cities...As a concession in disaster areas post cards will be accepted without stamps."

(from the Guardian, August 13, 1982)

There is a new emphasis on civil defence which aims to instruct people how to survive a nuclear war. This and the imminent threat of war when Pentagon computers falsely detected Soviet missile attacks as occured more than once in 1980 have brought the reality of nuclear war starkly home to a lot of people.

The message of the anti-nuclear movement has become more meaningful and immediate to many people. People have a better idea of the cost of the arms race than before and the question of nuclear arms has become related to inflation and cuts in social services and starvation in the Third World. Nuclear weapons are killing NOW. This growing awareness is partly due to a conscious effort on the part of the anti-nuclear movement to relate to the concerns of ordinary people and the concern, in particular, for jobs. As Schumacher said : "call a thing immoral, soul-destroying, a peril to peace—so long as you have not shown it to be 'uneconomic', you have not really questioned its right to exist, grow and prosper." The need to build a case aginst nuclear power also on economic grounds as well as safety and moral ones has been widely recognised. In America Dr Gofman, a leading nuclear opponent, pointed out that issues relating to health and safety may be difficult for the public to understand. An increase in an electricity bill, however, is not difficult to understand.

The anti-nuclear movement was originally mainly a middle class and moral campaign, now

it is making a crucial breakthrough in the working class. By the end of 1980, over 300 trade union branches and regions and other bodies were affiliated to C.N.D. The participation of the unionists in the fight against nuclear power was becoming more apparent too, many pointing out how the workers stand in the front line of the economic, health and safety hazards of the nuclear industry. In the struggle to end uranium mining in Australia, the unions have played a leading role. Uranium mining and transportation has been severely disrupted by union bans. The vital role of the unions in the fight against nuclear power has been recognised by environmentalists, a group of whom have published information relating job opportunities and alternative forms of energy.

The movement today.

In Britain, in the light of the soaring support for C.N.D., it was decided to call the first national demonstration since 1974. This demonstration fulfilled all expectations and on 26th October 1980 70,000 people marched to Trafalgar Square for a 100 000—strong rally against Cruise missiles and Trident and for a cut in arms spending. In the course of 1981, there was almost a ten-fold increase in membership and local groups. By early '82 150 local councils in England, including the Greater London Council. Scotland and Wales had declared themselves "nuclear-free zones". Public opinion polls confirmed this growth with around 40% backing the principle of British unilateral disarmament. The Labour Party under the leadership of Michael Foot, a long-standing supporter of C.N.D., passed a resolution at their ånnual conference in 1982 in favour of unilateralism.

C.N.D. is still a non-aligned, independent peace campaign encorporating a wide coalition of many

shades of political and religious opinions. In view of Britain's decline as a world power and the proliferation of nuclear powers since the formation of C.N.D., its vision of a clear lead by Britain for nuclear disarmament has been modified by a recognition of the need to work simultaneously for multilateral agreements. C.N.D. is now more decentralised and its strength lies in hundreds of local groups and its links with specialist groups within the campaign and external links with other organisations working towards similar ends such as European Nuclear Disarmament World Disarmament Campaign, Friends of the Earth. There is now less conflict about different forms of protest than in the early days. Civil disobedience is seen as a tool to be used when the situation demands it. This could be for a major confrontation with the authorities when the new Cruise missiles are introduced into Britain in 1983. Preparations for this confrontation have begun already in the form of peoples' peace camps which have been set up outside the military bases selected for the missiles, for example, Greenham Common.

In W. Germany, the last few years have seen the phenomenal rise of the "Greens", a political party committed to an environmentalist policy of which their rejection of nuclear technology is a very important part. It is possible that within a short time they will be in the position of holding the balance of power in the government. It remains to be seen how they will be able to reconcile their contempt for the traditional parliamentary system, (they believe that parliament is irrelevant to the real needs of the people), and the attempt to implement their ideas – in an inevitably less "pure" form – through their position in parliament.

In the U.S., the "Freeze" campaign involving a coalition of different organisations has spread

very rapidly drawing support from both Republican and Democratic Congressmen. Launched at Georgetown University in the spring of 1981, its purpose is to create a mass movement to pressurise the U.S. and the U.S.S.R. to adopt a mutual freeze on the testing, production and deployment of nuclear weapons, and of missiles and new aircraft designed primarily to deliver nuclear weapons. It is seen as an essential and practical first step towards lessening the risk of nuclear war and reducing nuclear arsenals. A total freeze can be verified more easily than the complex SALT I and II and if it does not succeed the U.S. and U.S.S.R. will produce a new "generation" of nuclear weapons at tremendous expense and whose greater accuracy will make war more likely.

The international movement against nuclear weapons.

"We are cooperating with the powerful peace movements in W. Europe and America, East and West the non-aligned nations of the South. A great world peace movement is beginning to emerge..."

—Lord Fenner Brockway, 15 August, 1982.

The World Disalmament Campaign was launched by Lord Philip Noel-Baker and Lord Fenner Brockway and 3,000 delegates representing a comprehensive cross-section of voluntary peace organisations in London in April 1980. It had the aim of building up worldwide public pressure in support of disarmament and in particular the implementation of the Final Document of the First United Nations Special Session on Disarmament which took place in 1978. The W.D.C. was one of the organisations to present a petition sighed by millions all over the world at the Special Session in 1982.

Article 33 of the Final Document states the importance of establishing nuclear-free zones as an intermediate measure on the way to the ultimate aim of "general and complete disarmament." The aim of European Nuclear Disarmament (E.N.D.) is the creation of just such a nuclear-free zone in Europe.

"We fought World War I in Europe, we fought World War II in Europe and if you dummies let us, we'll fight World War III in Europe...."

—Rear. Admiral Gene La Rocque
Former Pentagon strategic palnner
(Source : Towards the Nuclear Holocaust by Sir Martin Ryle)

The appeal for E.N.D. was launched on 28th April 1980 largely in response to N.A.T.O.'s decision in December 1979 to deploy Cruise and Pershing II missiles in W. Europe. By the late '70's armory in W. Europe included a destructive power fifty times that of all the weapons used in World War II, the Korean war and the war in Vietnam combined. The new weapons are able to strike deep within the Soviet Union and will be under the control of the U.S.

The early draft of the appeal was written by E. P. Thompson, the Marxist historian who is one of the prime movers and powerful promoters of the campaign. The appeal calls upon the two great powers to withdraw all nuclear weapons from European territory and urges the U.S.S.R. to halt production of its SS20 missiles at the same time as calling on the U.S. not to implement its decision to develop and install Pershing II and Cruise missiles. It calls for the removal of all nuclear air and submarine bases, nuclear weapons research, development and manufacturing institutions and nuclear

warheads themselves. After circulation in Europe, a new draft was prepared encorporating the ideas of correspondents in many different countries. The response to the appeal has been extraordinary—it has received an astonishing range of support. Very quickly mass movements had grown up in Holland, Belgium and Norway. The Dutch and Belgians were able, in the swell of protest, to postpone the implementation of the N.A.T.O. agreement to install demonstrations in Cruise missiles in their country. The massive Europe during October and November 1981 were evidence of the grave anxieties about the continuing arms build-up in Europe. Support and publicity has spread rapidly in France, Italy, Germany, Spain, Greece, Portugal and elsewhere.

The movement for E.N.D. has made contacts and gained support in the Soviet Union also. This is not the first time the Western peace movement has penetrated into the U.S.S.R. Back in December 1960, eleven pacifists left San Francisco on a march that would take them across the U.S. and Europe to Moscow. After flying to London, the Americans were joined by peace marchers from 9 other countries. In each country their message was : oppose the militarism of your government, don't join the army, stop the arms race. After 10 months and 6,000 miles of walking, a combined group of Americans and Europeans reached Moscow and demonstrated in Red Square.

More than 20 years later, in 1982, a group of about 250 Scandinavian women gained the permission of the Soviet government and the cooperation of the official Soviet Peace Committee to march against nuclear weapons through Soviet cities. The Soviet Peace Committee has 450 members, for the most part citizens who have distinguished them-

selves in the field of space, exploration, acting. science. There are over 100 committees in various regions all of them led by prominent public figures but so far as is known, reflecting only standard anti-American views. It clearly faces a dilemma in relating to the W. European peace movement. On the one hand it sees in it the hope for an end to the economically crippling arms race and reducing the risk of war which, unlike the Americans, they have experienced at home at first hand in living memory. On the other hand they see in it the danger of encouraging dissension at home. The latter was borne out by the hostility aroused by the attempt on the part of the Scandinavian women to make contacts with the 16 leaders of the unofficial peace movement launched in the summer of 1982 in Moscow. These include two distinguished professors who were sent to a detention centre for alcoholics and hooligans for 15 days while the marchers were in town. They are obviously regarded as a threat and potential C.I.A. agents. It is also true that the N.A.T.O. countries regard the growing peace movements in their countries as a threat and are taking measures to counteract them. One traditional way is to present them as agents of the Russians. In Britain Mrs. Thatcher recently proposed spending £ 1 million of taxpayers money on discreditting C.N.D. This is one measure of the movement's success.

Nuclear weapons and nuclear power–the link.

It is now generally recognised among nuclear disarmers that nuclear power and nuclear weapons are two sides of the same coin, that nuclear power adds considerably to the possibility of nuclear weapons proliferation and therefore of their use. The two campaigns—against nuclear weapons and against nuclear power—have, in general, retained their separate identity although there is much over-

lap of supporters and policy. In America in 1977 an organisation called Mobilisation for survival was formed which calls for a halt both to nuclear power and nuclear weapons. They organised the first coordinated nationwide demonstrations against nuclear power and nuclear weapons. In Britain in November 1979 the Anti-Nuclear Campaign was set up as an umbrella organisation. The movements are establishing strong international links and are gaining greatly in political significance.

The movement against nuclear technology has broadened in the width of its support and deepened its perspective over the years. The anti-nuclear struggle implies, after all, not simply the substitution of one form of energy by another, or of one type of weapon by another, but it implies working for economic and political and social change in order to build a society where people do not seek to dominate or abuse either nature or each other. Within the movement there are wide varieties of opinion. In the width of the political and ideological spectrum lies the movement's strength but also its weakness. There is continuing debate : how can we create the widest possible platform of support without diluting our message ? How can we focus our attention on those areas of the world, for example the Middle East, where conflict is most likely to flare up into direct confrontation between the superpowers and lead to nuclear war, without exposing the divisions within the movement ? Do we try to proceed through the conventional electoral process or do we build up a movement from the bottom to by-pass our corrupt and undemocratic political system ? The way is not easy ; but we have to succeed for it is on the success of this movement that our survival depends.

Information compiled by Janet Ganguli from :

(1) "Overkill" by John Cox.

(2) "From Protest to Resistence", Peace News pamphlet No. 2.

(3) "The Power of the People". Ed. Robert Cooney and Helen Michalowski.

(4) "No Nukes" by A. Gyngy.

(5) "The Protest Makers" by R. Taylor and C. Pritchard.

(6) "Protest and Survive" by E.P. Thompson and others.

(7) "We All Live on Three Mile Island", by Greg Adamson.

Also available :

Nuclear Bulletin 1 : "The Worldwide Threat of Nuclear Technology.

Nuclear Bulletin 2 : "Radiation : the Greatest Public Health Threat of all Time."

Nuclear Bullentin 3 : "The only way out of the Nuclear Nightmare", by G Kennan.

Nuclear Bulletin 4 : "The Insanity of Nuclear Power".

Nuclear Bulletin 5 : "Karen Silkwood : Victim of the Nuclear Police State."

Tell the leaders of the nations,
Make the whole wide world take heed,
Poison from the radiation
Strikes at every race and creed.
Time is short, we must be speedy,
We can see the hungry filled,
House the homeless, help the needy,
Shall we blast or shall we build ?

Men and women, stand together.
Do not heed the men of war.
Make your mind up now or never,
Ban the bomb forever more.

—sung by the marchers on the Aldermaston marches.

11.14.

Documentation and Dissemination Centre for Disarmament Information

21, Railway Parallel Road, Nehru Nagar,
BANGALORE - 560 020
INDIA.

The Dissemination Centre was evolved in January 1984, out of a need to create an awareness to the Urgent task of Disarmament for Development to inform and educate the people of the Nuclear threat ; the destructive and ever growing Arms Trade; violation of human rights and related issues.

Secondly to make information & documents accessible for study, research or reference.

Thirdly, to support/link small action groups involved with these issues and to support each other.

We are a voluntary body of several resource persons and coordinated from Bangalore.

Our approach has been to effectively reach new audiences at the lowest cost. We make use of existing facilities of other organisations / institutions - basically coordinate joint programmes. We have made extensive use of United Nations films on Disarmament.

The results have been extremely encouraging. We have in the first twenty months been able to coordinate well over 160 programmes - all to a new audience We have initiated several institutions and NGOs to include Disarmament, Peace and related issues as one of their areas of concern.

We have had the State Governments department of Information & Publicity take an active interest in Disarmament efforts. Who have through us twice borrowed UN films for screenings through their district units.

In January 1985, we were invited by the University of Jammu to assist them to plan a course in Peace Education they planned to introduce.

To reach out to a rural audience, whose priorities are day to day living and issues like Disarmament are far removed, we are involved in evolving a slide programme to relate our concerns to them.

To link and support NGOs and activists in India, we are in the process of publishing a **Hand Book** - which will contain information about each other. Those of you who are not in touch with us are requested to contact us for our questionnaire

As part of our role during 1986 - the International Year of Peace, we will be part of an NGOs group, who will arrange public meetings, seminars and discussions on the different aspects of our concerns.

We have also planned to initiate a Non-formal series in Peace Education.

We have with us a set of slides, posters, UN and other publications for reference or study. At a future date we hope to publish an occasional Newsletter. We would welcome receiving NGO publications. If any of you are visiting or passing through Bangalore, we would be delighted to arrange a public meeting to share your experiences. However you should let us know at least two to three weeks in advance. We have in the past arranged meetings for several visiting Peace/Disarmament activists.

We have a panel of well informed speakers always ready to assist other NGOs and institutions.

We look forward to hearing from you.

Joint Convenors :
CITIZENS AGAINST NUCLEAR ENERGY (CANE)

1986
INTERNATIONAL YEAR OF PEACE

BANGALORE, April 17, 198

SUNDAY HERALD

AFTER THE BOMB: CAN LIFE GO ON?

CAN adequate life exist after nuclear war?

THIS feature investigates the unthinkable - the possibility of large-scale progressive survival after a worldwide nuclear holocaust.

THE writer details the current ability of nations to withstand such disaster; and of what is possible, given preparation and wider knowledge, if governments would act now and if ordinary people everywhere took the precautions widely available to them.

FOR many western countries the idea of nuclear war remains, officially, more or less "unthinkable." Yet in Britain, for example, 48% of those interviewed for a recent Marplan poll thought a nuclear conflict of some kind likely within their lifetime. 30% thought the danger greater than a year ago.

However they view the chances of such an event, millions of ordinary people in Europe and America consider surviving it to be impossible, unimaginable. But would it be?

Not to an increasing number of experts and serious, level-headed students of civil defence who argue that such views are based on mythology and misinformation.

The facts, they say, show that people can greatly improve their chances of survival and to ignore these facts at high levels of policy making is to forfeit what should be a vital part of western defence strategy.

Indeed, Britain's Nuclear Protection Advisory Group (NuPAG), an organisation formed to pool information from specialists worldwide in nuclear physics, medicine, electronics, engineering and disaster research, has been pointing out for two years that the West's ignorance and neglect of civil defence may be "*the biggest single military political blunder ever made.*"

"*We could be defeated by pessimism,*" *says Richard Burton,* eminent architect and NuPAG co-founder, "where we might well survive with planning and protection."

In a country further from the likely epicentre of an East-West nuclear exchange, the issue may seem less urgent. Yet the risk to people everywhere from some kind of nuclear disaster is greater now than it has been at any time since World War II. It seems likely to get worse.

DEVELOPMENTS in both conventional and tactical nuclear weaponry have multiplied the range of possible scenarios involvin- etc.

University's Centre for International Affairs, claimed that "the most stable situation in a crisis would be one in which neither side had a meaningful civil defence. The least stable situation.... is one in which there are marked asymmetries in civil defence capability....If the United States does not undertake an expanded civil defence programme the least stable situation will exist in a future crisis."

Figures sharpen this point. Since the late 1960s the Soviets have spent an estimated 50 billion dollars on a civil defence programme which by both their own and authoritative American estimates could enable between 92% and 95% of their entire population to survive a massive nuclear attack.

By comparison US funds - for

fuelled the growing awareness and concern about vulnerability to attack and the Government's previously well- hidden neglect of civil defence planning.

Coupled with the decision to allow deployment of Cruise-type missiles from British bases this has brought out the largest anti-nuclear demonstrations since the early Sixties.

In general, the campaigners for nuclear disarmament oppose discussion of protection with a vigour and rational grasp worthy of medieval Christians chasing heresies — on the grounds that civil defence is ineffectual, or warmongering and contrary to their own aims.

Exponents of civil defence do not share this dog-in-the-manger attitude, but they are [illegible]

mation. Without knowing what nuclear weapons are capable of, people cannot understand how to protect against them.

Within seconds of exploding, a nuclear bomb releases three of the four main forms of its awesome energies: heat - and - light, blast and initial radiation.

The almost instantaneous effect of an atomic burst is a brilliant flash of light. So bright is this that it can dazzle people up to 100 miles away. Anyone nearby looking directly at it can be temporarily blinded for minutes or even days and receive retinal burns. It is most dangerous at night, when the pupils are widely dilated.

With temperatures approaching those at the centre of the sun, the ensuing fireball will vapourise

jects or falling masonry. To protect themselves properly against blast effects people need a good, deep blast shelter.

It is important to note that more than 50 per cent of the people within the blast - areas of the atomic weapons used in Japan survived all of the effects described above - without advance warning or proper shelters.

Though grim when expressed in terms of a blast - area covering, say, four million people, these odds may be much better than we are often led to believe. And anyone's 50-50 chance of survival improves greatly with some information about what happens in a nuclear attack, even a minimum of advance warning and an awareness of what he can do to protect himself.

The fourth effect of a nuclear burst is fallout, representing 10 per cent to 15 per cent of the bomb's total energy.

Fallout is made when some of the radiation from the fireball attaches to dust and debris raised by the explosion. Swept up by the blast afterwinds, these particles form the famous mushroom cloud and are dispersed by prevailing winds.

Superstitions about fallout must give way to facts for people to survive its effects.

Fallout radiation does not poison the environment for years or penetrate every material. Like any dust, sooner or later it settles to the ground. If it falls on water, it will eventually settle to the bottom of that, too.

Fallout radiation decays rapidly in intensity. It is most dangerous for two or three days after an explosion. Shielding by heavy, radiation - absorbing material (brick, concrete, earth) will stop it and is vital during this period.

Within a week or two it will have reached levels which humans - dependent on their general health and careful monitoring of exposure - can tolerate for short periods.

Most of the effects of exposure to radiation are non - cumulative. Cells can repair damage that has not been too great. This is why a single, large dose of radiation is far more dangerous than small doses received over a period of time.

This is also why two items of equipment are so important for fallout shelters: a radiation - meter to measure levels of radiation inside and out, and a dose - meter to tell each person the dosage level he has received at any given time.

Apart from essential medical supplies a suitably equipped shelter will have food and water stored for safe consumption in sealed containers. Careful washing or removal of outer leaves will make even crops growing in the field safe to eat.

The foods to be avoided are milk and dairy products from cattle which have grazed on contaminated fields. Strontium - 90 from these imitates calcium in many ways and gets into the bones.

One other dramatic effect of a nuclear bomb deserves wider attention than it has received: the so - called electromagnetic pulse (EMP). In layman's terms EMP is a lightning - like surge of voltage capable of knocking out a wide range of power transmission, radio and telecommunications and solid - state computer equipment.

It has been estimated that a single weapon exploded high in the atmosphere over the North Sea could paralize most power and communications systems over the whole of Western Europe. Protection against this involves uses of special arrestors similar to, but quicker and more substantial than those used to absorb lightning effects.

Little work has been done on these in non - military areas. But electronic equipment — such as transistor radios — for use in shelters, can be protected by careful packing and earthing.

Discussing British fears of aerial bombardment before World War II, Tom Harrison, in his book **Living Through the Blitz** wrote, "The idea that attack from overhead would become the final...devastating stage in coming years grew....Thus the.....disciplined armed forces of traditional war would be threatened by collapse on the home front...."

The Western powers today will show little advance on those views of forty years ago — unless they realise that the real front is the home front and prepare accordingly. — GEMINI.

AFTER THE BOMB: CAN LIFE GO ON?

by Robert Gates

ed to pool information from ecialists worldwide in nuclear physics, medicine, electronics, engineering and disaster research, has been pointing out for two years that the West's ignorance and neglect of civil defence may be " the biggest single military political blunder ever made."

"We could be defeated by pessimism," says Richard Burton, eminent architect and NuPAG co-founder, "where we might well survive with planning and protection."

In a country further from the likely epicentre of an East-West nuclear exchange, the issue may seem less urgent. Yet the risk to people everywhere from some kind of nuclear disaster is greater now than it has been at any time since World War II. It seems likely to get worse.

DEVELOPMENTS in both conventional and tactical nuclear weaponry have multiplied the range of possible scenarios involving atomic weapons. Among strategists, the concepts of "flexible response" and "winnable" nuclear conflict have replaced the idea of a monolithic stalemate between the superpowers enforced by the doctrine of MAD, the Mutually Assured Destruction of hostage populations.

France, China and India have taken quite openly the superpower monopoly on nuclear weapons; it may well have been splintered even further in secrecy - by Argentina, Brazil, South Africa, Pakistan and Libya. Israel is now reckoned, on excellent authority, to have more than 20 nuclear bombs.

This nuclear diaspora increase the risk of a nuclear device falling into the hands of a terrorist group.

Meanwhile, more tension is spilling from industrialised countries into those areas where their dwindling, vital raw materials originate: the Middle East, Africa, South America.

This is not to mention the "peaceful" nuclear disaster, a possibility that came near to reality at Three Mile Island in America.

But the least known factor, outweighing all the others, is the current, stark imbalance between the superpowers in civil defence preparedness. The Soviet Union has taken elaborate steps to protect its people and industry from nuclear attack. The US and its NATO allies have not.

Putting the Russian view, Soviet Marshall V I Chuykov (in an article printed in the Moscow publication **Science and Life** as long ago as 1969) has said: "Although called mass weapons, with the knowledge and skilful use of modern defence methods, they will not injure masses, but only those who neglect the study, mastery and use of those methods."

In recent testimony before a Senate Committee Professor S. P. Huntingdon, Director of Harvard University's Centre for International Affairs, claimed that "the *most stable situation in a crisis would be one in which neither side had a meaningful* civil defence. The least stable situation.... is one in which there are marked asymmetries in civil defence capability....If the United States does not undertake an expanded civil defence programme the least stable situation will exist in a future crisis."

Figures sharpen this point. Since the late 1960s the Soviets have spent an estimated 50 billion dollars on a civil defence programme which by both their own and authoritative American estimates could enable between 92% and 95% of their entire population to survive a massive nuclear attack.

By comparison, US funding for civil defence has been less than 2% that of the Soviets. The likely mortality from nuclear war for Americans is normally given as 50% of the largely unprotected population (about equivalent to the local rate of mortality among the quite unprepared victims of Hiroshima and Nagasaki.)

In Britain, with its many targets and population centres tightly packed into a small landmass, a recent Home Office estimate suggested that "15 million Britons would survive an all-out nuclear strike."

Though well-documented, this disparity has been so little publicised that, as NuPAG points out, it "might as well be the Russians" ultimate secret weapon. No wonder they refused to have it on the agenda of the SALT treaty talks.

NATO Governments have been only too obliging. The balance of belief has become a more important element of the balance of power than ever before.

Even if the unwelcome event proved the Russians wrong in their belief that they can survive a nuclear war, the fact that they believe this and the West does not makes the situation dangerous indeed.

IRONICALLY, the most advanced civil defence programmes in Europe today are found in Switzerland, Sweden and Norway, none of them nuclear powers.

As the Swiss have stated in their manual on shelter construction, "for as long as wars have been waged, man has always devised an appropriate defence for every new weapon developed." To them, nuclear weapons are no exception.

Over the past year in Britain a series of media investigations has fuelled the growing awareness and concern about vulnerability to attack and the Government's previously well- hidden neglect of civil defence planning.

Coupled with the decision to allow deployment of Cruise-type missiles from British bases this has brought out the largest anti-nuclear demonstrations since the early Sixties.

In general, the campaigners for nuclear disarmament oppose discussion of protection with a vigour and rational grasp worthy of medieval Christians chasing heresies — on the grounds that civil defence is ineffectual, or warmongering and contrary to their own aims.

Exponents of civil defence do not share this dog-in-the-manger attitude; but they are interested in the practical realities of the situation, and are approaching them methodically. C Bruce Sibley, editor of a new British civil defence monthly called **Protect and Survive**, claims that the response to his magazine has been "overwhelming."

The quiet activities of NuPAG in Britain have helped bring about a Government reappraisal of its entire civil defence programme; its experts have also been invited by Government and industrial planners to advise on nuclear protection in several other countries, including West Germany, America, and certain States in the Middle East.

As NuPAG Information Officer Ivan Tyrell said to me. "Of course we see disarmament as the ultimate solution to this problem. But how can it be fair for us to risk the lives of other people, or our own children just because we have decided, against known facts, that protection is useless or warmongering. I wear a seatbelt in my car because it could save my life, not because I want to crash."

Good, accurate information about nuclear effects and protection from them has been accumulating for years. A number of countries have already put it to use. Whether the big Western democracies will begin to follow suit remains to be seen. — GEMINI.

IN old-fashioned wars, most of the victims were soldiers. Modern aerial warfare has shifted the risks to civilians. The 20 - to - 1 ratio of military to civilian victims in World War I was exactly reversed by the end of the Vietnam war. As Swiss military analysts have rightly noted, nuclear weapons have continued this trend - but on a completely new scale. Like it or not, we are all in the front line in a nuclear age.

For this reason, the Swiss and others like them believe that everyone has a role in civil defence and must be prepared for it. The first step in preparation is information. Without knowing what nuclear weapons are capable of, people cannot understand how to protect against them.

Within seconds of exploding, a nuclear bomb releases three of the four main forms of its awesome energies: heat - and - light, blast and initial radiation.

The almost instantaneous effect of an atomic burst is a brilliant flash of light. So bright is this that it can dazzle people up to 100 miles away. Anyone nearby looking directly at it can be temporarily blinded for minutes or even days and receive retinal burns. It is most dangerous at night, when the pupils are widely dilated.

With temperatures approaching those at the centre of the sun, the ensuing fireball will vapourise anything in its path. But people not too close to its centre can protect themselves from the heat by shielding immediately in the shadow of objects that will deflect it.

The heat - pulse lasts a few seconds, but burn victims who survived the atomic explosions in Japan were in many cases protected from fatal burns by their own clothing.

The initial radiation is usually so intense within a limited range of the burst that only a shelter covered by a suitable depth and type of material can save people from its lethal effects. But even here, sheltering behind a substantial object within a second of seeing the flash could save your life - dependent upon the size of the weapon.

THE bang - or blast - uses nearly half the bomb's total energy and is its most destructive effect.

Like the familiar "sonce boom" amplified many times, the blast - wave itself is a wall of highly compressed air travelling outwards from the fireball at about the speed of sound. Its rate of travel gives a person two miles from the explosion - centre about 10 seconds to seek shelter from it; again, the possible difference between life and death.

Blast is so destructive because its forces are multidirectional. The first blast - wave is echoed by a reverse "negative" effect as the partial vacuum created by the rising fireball rapidly draws air back towards the centre of the explosion.

Both these waves are accompanied by blast - winds reaching several times hurricane - speed. In an air - burst weapon, these forces are further tangled by the shock wave bouncing off the earth and back into itself.

Near its source, blast will put intolerable pressure on bodies exposed to it. The more common danger is from being hurled through the air, from flying objects or falling masonry. To protect themselves properly against blast effects people need a good, deep blast shelter.

It is important to note that more than 50 per cent of the people within the blast - areas of the atomic weapons used in Japan survived all of the effects described above - without advance warning or proper shelters.

Though grim when expressed in terms of a blast - area covering, say, four million people, these odds may be much better than we are often led to believe. And anyone's 50-50 chance of survival improves greatly with some information about what happens in a nuclear attack, even a minimum of advance warning and an awareness of what he can do to protect himself.

The fourth effect of a nuclear burst is fallout, representing 10 per cent to 15 per cent of the bomb's total energy.

Fallout is made when some of the radiation from the fireball attaches to dust and debris raised by the explosion. Swept up by the blast afterwinds, these particles form the famous mushroom cloud and are dispersed by prevailing winds.

Superstitions about fallout must give way to facts for people to survive its effects.

Fallout radiation does not poison the environment for years or penetrate every material. Like any dust, sooner or later it settles to the ground. If it falls on water, it will eventually settle to the bottom of that, too.

Fallout radiation decays rapidly in intensity. It is most dangerous for two or three days after an explosion. Shielding by heavy, radiation - absorbing material (brick, concrete, earth) will stop it and is vital during this period.

Within a week or two it will have reached levels which humans - dependent on their general health and careful monitoring of exposure - can tolerate for short periods.

Most of the effects of exposure to radiation are non - cumulative. Cells can repair damage that has not been too great. This is why a single, large dose of radiation is far more dangerous than small doses received over a period of time.

This is also why two items of equipment are so important for the whole of western Europe. Protection against this involves uses of special arrestors similar to, but quicker and more substantial than those used to absorb lightning effects.

Little work has been done on these in non - military areas. But electronic equipment — such as transistor radios — for use in shelters, can be protected by careful packing and earthing.

Discussing British fears of aerial bombardment before World War II, Tom Harrison, in his book **Living Through the Blitz** wrote, "The idea that attack from overhead would become the final...devastating stage in coming wars grew....Thus the.....disciplined armed forces of traditional war would be threatened by collapse on the home front...."

The Western powers today will show little advance on those views of forty years ago — unless they realise that the real front is the home front and prepare accordingly. — GEMINI.

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The Nuclear Threat

FALLOUT

The Medical Effects

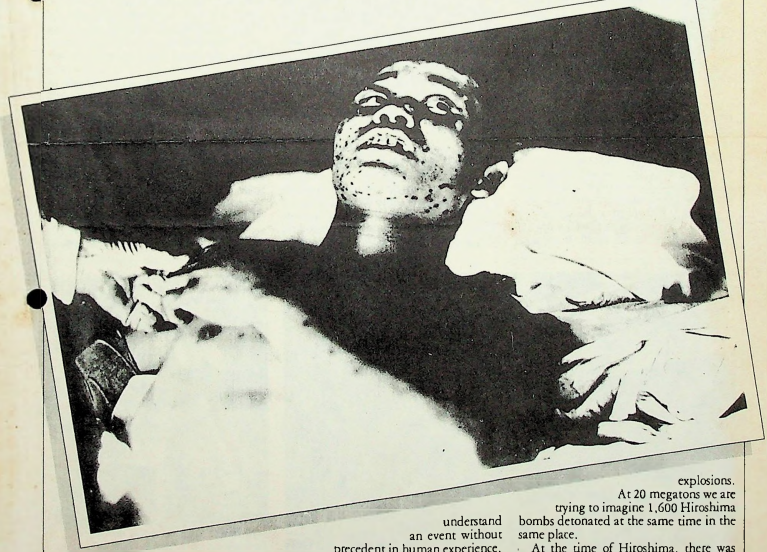


PHOTO: THE MEDICAL EFFECTS OF THE ATOMIC BOMB IN JAPAN.

By H. Jack Geiger

To calculate the consequences of a thermonuclear attack on an American city is to try to describe and understand an event without precedent in human experience.

Hiroshima and Nagasaki do not serve. The weapons used on those cities approximated 13 kilotons of explosive force. At one megaton—a small weapon by contemporary standards—we are trying to imagine 80 simultaneous Hiroshima explosions.

At 20 megatons we are trying to imagine 1,600 Hiroshima bombs detonated at the same time in the same place.

At the time of Hiroshima, there was one nuclear power and the world's total arsenal comprised two or three weapons. Today there are at least six nuclear powers and the total arsenal—conservatively estimated—exceeds 50,000 warheads.

But most important, Hiroshima and

In New York, the burn cases alone would exceed by a factor of 1,000 the capacity of all the burn-care centers in the United States.

Nagasaki were isolated, limited disasters. They could, in time, be saved and reconstructed with help from the outside. In any full-scale nuclear exchange today there would be no "outside" that we could rely on for aid. In a population-targeted attack, every community in the United States with a population of 25,000 or more might be destroyed. The same is true, of course, of all the communities in the Soviet Union, Great Britain and Europe. There are so many warheads that there is a shortage of targets.

During the last 20 years, the consequences of nuclear attack have been calculated in exquisite detail in hundreds of scientific journals, books and government publications.

It is relatively easy, in scientific and medical terms, to predict the effects of overwhelming blast forces, searing heat and intense radiation on human beings and their environments. It is the imagination that fails, because we are so unfamiliar with the scale and magnitude of these forces. For example: a large conventional bomb explosion creates a heat of about 9,000 degrees Fahrenheit; a thermonuclear explosion creates a heat of 27 *million* degrees. Or again: If we were able to divide the combined American and Soviet arsenals into Hiroshima-size bombs, and we were to explode one such bomb every minute—60 Hiroshima bombs an hour, 1,440 a day—we would have to do that for two years and three months before we exhausted the arsenals.

Since we cannot imagine a full-scale nuclear war, in order to comprehend the consequences of thermonuclear weapons we must consider the case of a single weapon and a single city—a one-megaton warhead, let us say, the equivalent of one million tons of TNT. That's enough TNT to fill a freight train more than 200 miles long; the actual bomb is about the size of a suitcase.

To calculate the effects, we need to know only the size of the weapon, the nature of the attack (air burst or ground burst, single or multiple strike), the nature of the terrain, the time of year, the day of the week and the time of day, and the prevailing weather conditions, especially the wind direction and velocity. A single one-megaton air burst over the New York City metropolitan area, for example, would—according to the calculations of the U.S. Arms Control and Disarmament Agency—kill 1,667,000 people and profoundly injure 2,838,000.

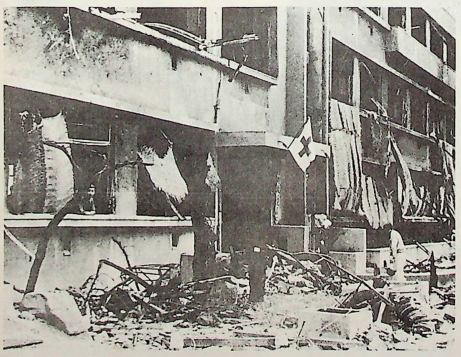
A single 20-megaton air burst would kill 7,698,000 and seriously injure 3,874,000.

These numbers, so large as to be almost beyond comprehension, are serious *understatements*, however. Assuming something quite probable—that the attack would occur on a weekday when more people would be working in the central city, near ground zero—and something quite certain—that the nuclear explosion would create a Hiroshima-type firestorm burning for days at 1,800 degrees Fahrenheit, turning every bomb shelter into a crematorium—the casualty count would increase 25 percent.

Taking these factors into account, a one-megaton air burst would kill 2,000,400 and severely injure 3,405,600 for a total of 5,406,000, or 33 percent of the New York City metropolitan area.

Again, taking the same factors into account, a 20-megaton air burst would kill 9.2 million and severely injure 4.6 million for a total of 13.8 million, or 85 percent of all the people in the New York City metropolitan area.

There is no identifiable event in human history in which two million to



Left, Fukuromachi School, not far from the center of the explosion in Hiroshima, was one of the few buildings left standing. It was immediately used as an aid station. Above, thousands of Hiroshima survivors suffered severe burns.

PHOTO CREDITS: BOTTOM LEFT—THE MEDICAL EFFECTS OF THE ATOMIC BOMB IN JAPAN; UPPER RIGHT—THE MEDICAL EFFECTS OF THE ATOMIC BOMB IN JAPAN;CENTER—BROWN UNIVERSITY; FAR RIGHT—HIROSHIMA MEMORIAL MUSEUM.

There is no defense; civil defense is at best an illusion, at worst a fraud.

nine million people have been killed in one place in one moment. There is no previous situation in which there were three to four million seriously injured human beings in one place.

And what would these injured "survivors" be suffering? Tens of thousands—in some circumstances, more than 100,000—people would have extensive third-degree burns. The number of New York City metropolitan area burn cases alone would exceed by a factor of 1,000 the capacity of all the burn-care centers in the entire United States.

Hundreds of thousands of "survivors" would suffer crushing injuries of the chest, abdomen and limbs; skull fractures; spinal cord injuries; and multiple lacerations, hemorrhage and shock. Many would have these injuries in conjunction with burns and acute radiation sickness. A moderate number would have ruptured lungs and eardrums from blast pressures, in addition to their other injuries. Many would be blind, because as far as 35 miles from ground zero, a reflex glance at the nuclear fireball would produce severe retinal burns.

These would be the *short-range* problems to which a medical response would have to be addressed. Long-range problems would, of course, include the epidemic disease potential of millions of decomposing human corpses, lack of safe water, a burgeoning growth of insect carriers of infection, and rapidly decreasing stocks of food. But who would be left to respond?

Assuming a one-megaton air burst, one physician would survive for every 1,000 severely injured persons in New York City. Working 20 hours a day, it would take eight days for every critically injured "survivor" to be seen once by a physician—for about 10 minutes. Another factor is that there would be no hospitals, no ambulances, no lab equipment, X-rays, blood, plasma or drugs. In short, there would be no medical care at all, as we commonly understand it. What would be left of the buildings would be lying in what would be left of the streets; bridges would be down; subways and tunnels would be crushed.

But these are the consequences of just one weapon—a single one-megaton or 20-megaton device used in one strike. In the real event, as many as 30 or 40 megatons could hit the New York metropolitan area, with strikes occurring over days or weeks. In the real event, there could be 7,000 or 10,000 megatons dropped on the United States—and a similar or even larger number on the Soviet Union. Deaths would occur everywhere, not just in the target areas, as radioactive contamination spread and as epidemic disease and starvation followed. There *is* no defense; civil defense is at best an illusion, at worst a fraud.

The only true meaning of "survival" is social, not biological. Simply to tally those who are still alive, or alive and uninjured, is to make a biological body count that has little social meaning. The biological "survivors," in all probability, merely have postponed their deaths. Life in the interim would bear no resemblance to life before a nuclear attack.

From a medical standpoint, the danger of nuclear war is a public health problem of unprecedented magnitude. There is no coherent response, no cure. Only one medical (and social) strategy remains: prevention. •

H. Jack Geiger, M.D., is Arthur C. Logan professor of community medicine, City College, City University of New York, and is a member of the board of directors of Physicians for Social Responsibility, of which he was a founding member.

Above, as part of the 1950s civil defense plans, school children were put through duck and cover drills. Right, injured people gather at Hiroshima's Miyuki Bridge about three hours after the bomb hit.

PHOTO CREDITS: BOTTOM LEFT—FEDERAL EMERGENCY MANAGEMENT AGENCY;BOTTOM RIGHT—THE MEDICAL EFFECTS OF THE ATOMIC BOMB IN JAPAN.

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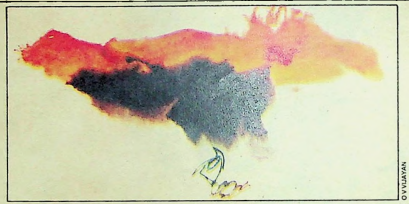
OUTSIDER/O V VIJAYAN

THE UNDERDOG'S DENSEPACK

The Third World has become a pawn in the nuclear war game, upholding pacification and at the same time acquiring more and more weapons of destruction, says O V Vijayan.



VENKATA G

For long we contemplated nuclear war with an obscene sense of victory, because we had counted on our outliving the imperial races which would annihilate themselves with their weapons, giving us the opportunity to translate our moral pretence into reality. Spread at our feet would be the rubble that once had been Europe and America! This cheerful prospect has since been upset by scientists who have predicted an interminable nuclear winter following the holocaust. They say the soot and dust of the explosions would be carried to the non-combatant continents as well, and this would blot out the sun, and in the long night all living things would freeze to death.

India's nuclear establishment does not seem to be overly bothered. Small may not be beautiful, but it could hope to escape detection. It is thus that we buy cluster bombs talking of Gandhi, import computerised torture devices for the secret police and yet condemn military juntas for suppressing human rights, and occasionally dismember a nation and yet feel outraged by Ronald Reagan. Our nuclear innocence seems to be on much the same lines, because it in some way presupposes that we will never have to ask ourselves what we intend doing with our plutonium, whether we could hold that perilous substance in our hands without eventually turning it into weaponry.

Raja Ramanna who spoke the other day at Delhi's India International Centre, was telling us about peaceful atomic energy all over again. He had told us in 1974 that by '76 the reactors would be ready. They weren't, and from '76 to '83 were the years of silence. He spoke again in '83 giving us an '84 deadline, and now he tells us that it is '85, by when we will start our fast breeder reactors which will enable us to have a commercial reactor by the end of the century.

These dates have ceased to interest me for many reasons. For one thing, I am convinced that even if the reactors produced the kind of plenty claimed by their partisans, all that plenty will merely deepen our Poverty Divide. I am reminded of the observation a commentator made recently on the Jamshedpur tribals whose land the Tatas bought to build their steel mills on; the steel hasn't made the tribals one bit more prosperous. But even more compelling is the reason that so far I have found no one who could say with honest conviction that the containers holding nuclear waste will survive the uncertainties of the future centuries. The waste is toxic for 20,000 years.

The immediate post-War years were the years of nuclear penitence; the unleashed atom had to be harnessed for peace. Science had not yet begun to reveal the terrible chasms in its logic; no one was prepared to accept that perhaps here was one path science ought not to have taken, and that there is nothing like *safe* or *peaceful* nuclear energy. It was thus that Nehru postulated the nuclear credo for us; so was the government committed to producing 10,000 MW by 2000 AD, as cheap energy for the people. To produce this much energy by nuclear means, we need 44 atomic power stations of 230 MW capacity each. Each of these will need 200 tonnes of heavy water as initial input and another 20 tonnes by way of annual replenishment. The power stations have a life span of 30 years, though they seldom last that long. Granting they do, it is 30 x 20 tonnes plus 200 tonnes, or 800 tonnes of heavy water per unit, or a total of 35,200 tonnes for the entire works. The production cost of one kilogram of heavy water is Rs 5,000, at which rate a tonne of the substance would cost around Rs 50 lakhs. The aggregate cost of heavy water alone will be a staggering Rs 17,600,00,00,000 (seventeen thousand six hundred crores). Then at 60 tonnes per unit per year we need 79,200 tonnes of uranium. We are assured that plentiful deposits exist in the country. Again, the processing involves astronomical sums of money. Perhaps, if we can take a patriotic view, the costs are not all that forbidding; new year advertisements after all put the cost of a dance-dinner at Rs 1,500 a couple!

I do not wish to examine the interminable tangles we have got into (Tarapur, for instance, is over-radiated, Kota is shut down due to a leak, and Kalpakkam is non-operational), but all I should like to know is whether this pursuit of energy, so patently questionable on account of its hazards as well as its economics, hides a drive for weaponry.

The satellites, it is rumoured, picked up evidence of increased activity on the Pokhran site. The Americans made this their excuse for refusing spares for Tarapur, proof, no doubt, of Reagan's racism. The government has told us the Pokhran blast was a peaceful blast, and a pity the New Information Order is not here, for it would have told us of the hundred peaceful things the blast would accomplish, like building instant alchemic apartment blocks or curing cooped up broilers of their neurosis. I have never ceased wondering, and it is ten years, a long enough time for wondering. We can wonder on, but the last thing we'll have is a debate, because the Atomic Energy Act of 1962 arms the government with powers to declare any information classified. The prime minister is the chairperson of the nuclear works, and successive incumbents, despite their varying commitments to liberal values, have hugely enjoyed this terror and vodoo. It is on record that the then minister of defence had heard about the Pokhran blast over the radio and not from the prime minister.

Often a piece of nuclear junk is sold by Western salesmen to an impoverished Third World country, machinery faulted and outlawed in its own place of manufacture, much the same way as multinationals dump dangerous drugs on us. This junk then becomes for the oligarch and the dictator a totem of national glory and personal perpetuation. And if it spews forth massive contamination, blighting our genetic susbstance, the masses, muddled by degraded populism, would never know.

Once we have the nuclear facility, and once a hostile neighbour makes the bomb, populist pressures could be manipulated for a nuclear arsenal. We can still do without the bomb, or nuclear energy, but that is the path of creative politics and a compassionate lifestyle, and of throwing the minds of our people open. A Pakistani or an Indian bomb will have little combat relevance other than satisfying the fundamentalist and vegetarian hawks in the respective countries. But it most certainly will serve to impose depravity and fatalism on the subcontinent. More than all this, the greatest nuclear hazard we have to contend with is the amorality of our own scientist, hopelessly compounded with the rhetoric of the decolonised opportunist. He matches the politician's contempt of human rights with his own affront to the eternal protoplasm.

At any given moment nearly 300 of our nuclear scientists are junketing abroad. It is to this diners' club that our unborn generations are entrusted. Perhaps they might never need that care, the end coming sooner. And when it does, we can always go with the satisfaction that not all of it was imported, that we too had our little bombs, the underdog's densepack.

"IN A NUCLEAR WAR, IT IS BETTER TO BE VICTIMS THAN CRIMINALS."

THE WEEKLY INTERVIEW/GERT BASTIAN

The nuclear drama being played out in Europe is a source of increasing concern. With both the US and USSR involved in a frenetic missiles race that might end in a catastrophic holocaust.

Gert Bastian, a West German general who resigned to protest against the NATO deployment of missiles in Western Europe, talks to Ivan Fera about the chilling prospects of the Third World War and eventual devastation.

The NATO decision in 1979 to deploy the new Pershing-2 and Cruise missiles in western Europe provoked the resignation of a senior NATO commander from the West German army, Gert Bastian. As a two-star general and a tank division commander in southern Germany, Bastian knew the deployment for what it was, and decided to expose it. From the platforms of the European peace movement, Bastian disclosed that the Pershings and Cruises were not deployed in answer to the Soviet Union's new SS-20 missiles, but represented the first step in a new NATO mobilisation designed to wage and win a nuclear Third World War. The Pershings and Cruises are designed to destroy in six minutes the Soviet Union's nerve centre of command, and to paralyse its military responses. The nuclear missiles on the Trident-2 submarines and the laser missiles mounted on platforms in space, proposed to be developed, will complete the configuration.

Bastian pointed out that with the Pershings and Cruises, the balance of terror—the precarious, but the only sanity that the arms race was capable of—was now a thing of the past. It stemmed from the clear perception that no one could win a nuclear war, which assured only mutual destruction. This did not stop the arms race but served to strike a rough balance. NATO, led by Reagan and the Pentagon, now believes that a nuclear war can be won.

NATO, however, shies away from publicly announcing its new programme as a cold-blooded and fully intended strategy. Preferring to project it instead as a continuation of the arms race, as a build-up in self-defence against USSR's initiatives. On the other hand, Bastian says, the Soviets who actually have neither the resources nor the know-how to match NATO's mobilisation prefers to pretend that it does, in the hope of projecting a deterrent. Nothing could suit NATO's real interests better, since Soviet postures serve to justify its preparation for a nuclear victory. Bastian is convinced that only a unilateral disarmament can break out of this dangerous vortex.

Bastian's resignation and his disclosures caused a furore and provided both the European and American peace movements with vital information and clear insights with which to effectively question their governments' military objectives. It was precisely to prevent this that, pressures were brought to bear on him and Bastian was not allowed to resign, in the wake of a letter which he wrote to the West German defence minister arguing that to defend Europe, the new missiles were both completely unnecessary and totally dangerous.

For two months he was stripped of his com-

mand and allowed to keep only his rank while the West German government weighed the consequences before he was finally allowed to leave the army in 1980.

Bastian was recently in India to address the members of the newly constituted Movement in India for Nuclear Disarmament (MIND), a movement that has sprung up in the wake of the growing militarisation and the arms race on the subcontinent. This interview, recorded during his visit, is particularly relevant in this context. Bastian, who was elected to the German parliament as a member of the Greens Party, is internationally, one of the best-known leaders of the European peace movement.

☐ *You were saying that the NATO forces are undoubtedly superior in all important respects to those of the Soviet Union and the Warsaw Pact in terms of both air, sea and land systems. Could you elaborate on this with some figures and also point out the qualitative differences between the two mobilisations?*

To begin with, it is very clear that the navies of the United States, the United Kingdom and France are superior as far as all the decisive units are concerned. Big aircraft carriers for combined air and sea operations are only available in the West, on this scale. Besides, in the last World War it was only the United States and the United Kingdom that conducted and acquired experience in air and sea operations, not the Soviet Union. They are traditional sea powers, and together they have, I think, 18 very modern aircraft carriers, while the Soviet Union has none comparable. The Soviet Union has 2 aircraft carriers, carrying helicopters, for anti-submarine warfare, but they do not carry combat aircraft on board the carriers of the British and the US navies. As far as the big ships are concerned, the Soviets are only superior in the number of submarines, both conventional and nuclear. But submarines are not guaranteed to rule the waves in a war. The Germans know this better than any other nation. We have tried in two World Wars to break the naval superiority of the United Kingdom and the United States with submarines. We were not successful, and I don't think the Soviet Union can be, either. This is so because anti-submarine warfare is highly developed in western countries, much more than in the Soviet Union.

According to experts, the anti-submarine systems of the United States can wipe out most of the Soviet subs in the first days of the war. Already in peace time, the United States can locate any Soviet subs in the sea, can follow and pinpoint them within the first hour of their leaving the harbour. Therefore, the submarines of the Soviet Union are not such a danger as they are made out to be.

The USSR has no intention to build a comparable navy, nor does it have any plans to build a comparable number of aircraft carriers. This indicates that it is not the intention of the USSR to become a superior power, much less to become an equivalent power. Therefore the USSR does not want to fight a Third World War. Without the capability to be equivalent on the oceans, a world war cannot be won.

☐ *You have said that the USSR has no intention to build a superior navy. Do they have the intention to build an equivalent naval capability?*

USSR intends to build a navy capable of being present on all oceans in peace time and to support the movements and smaller struggles in countries all over the world. But in a worldwide struggle, the USSR cannot be present off foreign coasts and in other oceans all over the world.

NATO has always been saying that the USSR is far superior as far as land forces are concerned, and that, therefore, we need nuclear weapons in Europe to defend ourselves from a possible USSR attack. It is correct that the USSR has more troops available, but only in central Europe. But it is equally true that worldwide, NATO has more troops available than the Warsaw Pact countries. Both sides have nearly 5 million soldiers. But NATO has some hundred thousand soldiers more. The difference is not very important, but the point is that it is incorrect to say that NATO is weaker as far as the number of land forces are concerned.

The superiority of the land forces of the USSR in central Europe must be set against certain other important factors. First of all, the USSR's superiority is not such that an attack against well equipped defence forces can be successful. The experience of all the last great wars shows that the defender in a good defence position and with well equipped troops can only be defeated if the attacker has a 6 to 1 superiority. This was the

I don't think the United States government in a time of peace would be so criminal as to kill a 100 million Russians in cold blood and to make a nuclear disaster for the whole world.

experience of the German troops in the USSR in World War II. As long as the Germans had a superiority of less than 6 to 1, the USSR positions remained unshaken. It was only when the ratio was greater, that the Germans broke through the Soviet defences.

This holds true even now, largely because modern weapons technology favours the defender rather than the attacker. You see the attacker is always forced to move in an open situation in any given terrain. He must leave his cover and move towards the defence position of the other side. In other words, the attacker is vulnerable. The defender can wait for the attacker to make the first move. Today, the defender is equipped with sophisticated and highly accurate anti-tank missiles. The second generation of anti-tank missiles have a range of 4,000 metres, more than that of the tank cannon, so that the defence positions are out of the tanks' reach. The defender now has anti-tank missiles mounted on helicopters. All the NATO armies have a large number of these anti-tank helicopters which guarantee high effectiveness. We also have new ammunition for the conventional artillery with anti-tank guidance systems built into every grenade. All this put together gives a greater superiority to the defender, not to the attacker.

In addition to this, more than half of all divisions of the Warsaw Pact countries are not Soviet troops but are drawn from Poland, Czechoslovakia, Hungary, Rumania, etc. It cannot be assumed that these troops can be relied upon for a Soviet attack on West Europe. The Warsaw Pact is not a fixed and solid alliance. The whole process of erosion within the alliance is already evident. Poland is a very good example of this. Nobody can assume that a Polish or a Czechoslovakian soldier is willing to die in Germany or Hungary just to be able to raise the Red Flag in Europe. I think the Soviets have to deploy a large number of their own troops in these countries to be able to control them and their troops on a war front. As against the superiority of 6 to 1 that the Soviet Union needs to overwhelm NATO, now we only have 1 on NATO's side to 1.8 or 2 on the Soviet side. If the Soviet Union is able to reinforce these troops by transporting divisions from Siberia to the western military districts opposite western Europe, NATO will also be able to reinforce its troops. The United States is prepared to air lift at least 4 divisions to West Germany; besides, they have Spanish troops also available for such reinforcements against the Warsaw Pact.

☐ *How do the airforces compare?*

The Soviet Union in peace time has an airforce slightly larger than NATO's in central Europe. But NATO is capable of a much higher reinforcement of its airforces. In 24 hours the United States can mobilise three times more aircraft across the ocean to aid western Europe, according to a concretely worked out NATO project. On the other hand, the Soviets can also transfer aircraft from the eastern front to reinforce its own airforces in the West. But the quality of the training of NATO's pilots as also the management of sophisticated modern warplanes is far superior in the West. For example, one standard of comparison is the number of sorties that an aircraft is capable of flying in 24 hours. The number of sorties that the NATO aircraft are capable of is far higher. This has been established in the conflict between Israel and other Arabian countries, equipped with Soviet aircraft and Soviet management. The Israelites flew 2 to 3 times more sorties than the MiG's could on the other side. I think that the equation between NATO and the Warsaw Pact airforces is the same.

On the other hand, NATO has a very effective anti-aircraft system. We have anti-aircraft missiles of a very sophisticated kind. For instance the Roland missiles developed in cooperation between France and West Germany which all our armies are equipped with. I think the chances of a successful air attack operation for the other side are extremely limited. Therefore I cannot see how the Soviets can ever be militarily superior to NATO forces. They are weaker in the most decisive areas.

☐ *Given the range and the scope of modern war technology, would it be relevant to compare the two blocks in geostrategic terms?*

Yes. The military comparison is in any case, only one parameter, and not the most important. The most crucial consideration is the geostrategic configuration. If you look at the map it is clear that the Warsaw Pact countries are in a worse situation than the NATO countries. They are a close block of countries in the centre surrounded by NATO countries and their military installations, in addition to the NATO alliances in the Far East. Japan is for all practical purposes, today, a member of NATO. After the settlement at Williamsburg, it is clear that Japan is very much part of the encirclement of the Soviet Union, an agreement that the Japanese politicians have put their signatures to. Australia, it is equally clear, is friendly towards NATO and not towards the Soviet Union. In the case of a war, you must count Australian forces as well along with NATO's, as one alliance against the Soviet Union. Probably this will include China as well, one cannot say. In other words, the Soviet Union cannot, as it did in World War II, concentrate all of its troops from Siberia and the Far East on to the western front. In World War II the Soviet Union came to an agreement with Japan and was able to concentrate all of its troops from the Far East against Germany in the West. In the next war I don't think this will be possible.

☐ *Have any of the Warsaw Pact countries protested against the siting of the SS-20 missiles?*

Yes. Rumania has demanded that the SS-20s be removed from their soil and the number of missiles directed to western Europe be reduced

and was against the deployment of the new short-range missiles, the SS-21s and I think that the government in Czechoslovakia is not happy with the new missiles either. The conditions within this alliance are not such that small countries can refuse what the Soviet Union wants to impose upon them, but there is no doubt that the population and the government are unhappy.

☐ *Cannot the Soviet nuclear subs you mentioned earlier be seen as mobile missile bases?*

Sure. Also the Soviets have a larger number of missile-carrying subs. I think there are 900 on the Soviet side, as against 600 on the United States side, but the number of warheads on the American subs are much higher than those of the Soviet subs. They have nearly 6,000 on their submarines whereas the Soviet Union has only about 2,000.

☐ *Even though the Soviet Union has only 2,000 warheads on their subs, cannot these be used to launch a first strike?*

I think not. A first strike is only useful and can guarantee victory in a war if it destroys the second strike capability of the other side. But the United States has only 25 to 30 per cent of its intercontinental ballistic missiles (ICBMs) deployed in the country itself. More than 50 per cent have been deployed on the submarines, which cannot be destroyed in a first strike, and 20 per cent are deployed on strategic bombers which most probably cannot be destroyed in a first strike either. Most of them will be in air before the missiles find their target.

The Soviet Union has not a chance of avoiding a second strike of the United States made by submarines and strategic bombers. Even if they can destroy all the land-based ICBMs, the United States has a better chance to avoid a second strike by the Soviet Union. The Soviet Union has 20 per cent of its intercontinental warheads based in the country itself.

☐ *And those cannot reach the United States?*

They can, but they can also be reached by the other side in the same way. The Soviets have only 20 per cent of these warheads on submarines, and no strategic bombers. And if the United States is able to produce intercontinental missiles like the MX, and submarine missiles like Trident-2 which are highly accurate, like the Pershing-2 and the Cruise missiles, they can try a first strike, and if 80 per cent of the Soviet, ICBMs are destroyed, only 20 per cent remain on the subs for the second strike. Then the other side has three times more against the Soviet Union's 2,000 warheads. The situation clearly is not in favour of the Soviet Union.

☐ *What about the Soviet Union's anti-submarine capability?*

They have some, but technologically their's is nowhere equivalent to that of NATO's.

☐ *What is the current direction of the Soviet Union's research in weapons technology? Are they trying to develop a first strike capability?*

Yes. They are developing intercontinental missiles with greater accuracy and a large number of warheads, but the point is that the new Soviet intercontinental missiles will not be capable of destroying the great number of warheads on the other side, which are on submarines and on strategic bombers. The basic situation is that the United States is capable of a second strike even if all its land-based ICBMs are destroyed. The Soviet Union cannot avoid a second strike from submarines and from the aircraft.

☐ *To ask the other question. Does the United States at present have a credible first strike capability?*

At the moment, no, because its later programmes particularly the Trident-2 project is not yet ready. However, in two or three years when these programmes are complete and available, then the situation may change. The United States can conceive of and calculate a possible first strike. This is even more so given the new American anti-missile programme which aims to destroy the second strike missiles of the Soviets in flight. That is the objective of President Reagan's 'star wars' programme; that the United States must be in a position not to fear a second strike from the other side. This would create a very dangerous situation.

At the moment we are in a situation of a mutual assured destruction—MAD—not in Europe, but—that is the balance of terror—between the United States and the Soviet Union. Mutual assured destruction however, does not prevail any longer in the European theatre. The deployment of the Pershing-2 and the Cruise missiles in Europe makes the situation in the European theatre very unstable.

☐ *What role do these missiles play in the context of America developing a first strike capability?*

NATO and my government also, are saying that the Pershing-2 and the Cruise missiles are only an answer to the Soviet deployment on the other side. But this is a lie. The Pershing-2 and the Cruise missile are the instruments of a new strategy of *decapitation*, developed by the United States for the European theatre. In the event of a war, the United States can destroy the most important political and military nerve centres of the Warsaw Pact organisation, and of the Soviet Union. The command posts of the Warsaw Pact troops and the guidance installations of the

Nobody can assume that a Polish or a Czechoslovakian soldier is willing to die in Germany or Hungary just to be able to raise the Red Flag in Europe.

airforce are not only situated in Soviet Russia but in countries like Poland and Czechoslovakia, and only some are deeper within the Soviet Union. The range of the Cruise and the Pershing-2 missiles, 1,800 kms and 2,500 kms suffices to hit most of these crucial targets very quickly and accurately. This is the real reason why the Pershing-2 and the Cruise missiles have been placed in Europe, not in answer to anything that the Soviet Union has deployed.

☐ *In the event of such an attack, will the Soviet Union have no nerve centres left?*

The most important command centres will be decapitated. We have 108 Pershing and 440 Cruise missiles, that is, nearly 500 new missiles of one warhead each, and if 500 important targets are destroyed, it will lead to a total paralysis of the Soviet Union's ability to wage war.

☐ *Would these missiles be able to destroy the Soviet Union's second strike capabilities?*

No. That is not the objective. The Soviet Union has always said that in such an eventuality, they will direct a second strike at the United States, but that is highly problematic, and I can't see why they would actually do it. I think that is more in the nature of propaganda, to make the deterrents credible. After an attack with the Eurostrategic missiles by NATO, it would be suicidal for the Soviet Union to escalate the conflict to an intercontinental level. Therefore, the Soviet Union I think, would come to the conclusion that it would be better to fire the SS-20 missiles against NATO targets in Europe, than fire missiles against the United States, because the other escalation gives no advantage. Therefore the assumption that the war in the first stage would be limited only to the European theatre would not be incorrect, I think..It is in the common interest of both superpowers to avoid the final conflict.

After an attack by Pershing and Cruise missiles, the possibility of a second strike by the Soviet Union is considerably weaker, once the nerve centres of the command installations are destroyed. However, even if it were somehow possible for the Soviet Union to give the ICBMs the firing order in time, what would be the advantage against the ICBMs of the United States on submarines and in the air which are in full readiness to strike? These missiles can answer in the first ten seconds.

☐ *As a senior NATO commander who is convinced that the Americans are moving in the direction of developing a first strike capability, do you consider such a capability can be successfully realised?*

This depends on two conditions. If the United States have enough accurate weapon systems available, and if their anti-missile systems can guarantee that a second strike of the Soviet Union can be avoided, it can be put into effect. Under these two conditions, I have no doubt that in the event of a crisis the temptation for the Pentagon to fire a first strike will be very great.

☐ *But do you think that it would require a crisis, or that they would do it any way?*

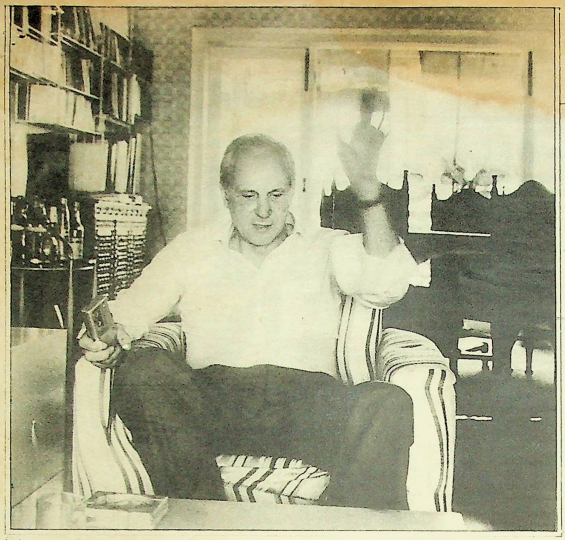
I think that the government would come to such a conclusion only in a state of very great tension, in a crisis, not in a time of peace. I don't think the United States government in a time of peace would be so criminal as to kill a 100 million Russians in cold blood and to make a nuclear disaster for the whole world.

☐ *But crises can be created?*

Yes. And they can arise from any situation, for example in Latin America or in Cuba, in Korea or in Afghanistan, in any part of the world, and in a situation in which it seems to be that the best option is to be able to fire these weapons first. If it is possible to strike first, without the risk of being killed 10 minutes later, then I cannot guarantee that a government will not be free of the temptation to do it. In Cuba if it had been possible for the United States to have fired missiles against the Soviet Union without the risk of a nuclear answer, I think that President Kennedy would not have given an ultimatum. If Kruschev could have fired missiles on the United States without risking a nuclear answer, he would not have drawn back the ships. If one of the superpowers is in a position not to fear a second strike by the other, the situation for the whole world is much more dangerous. Technologically speaking, the United States is so advanced that it is closer to arriving at such a position.

☐ *The whole threat of nuclear annihilation seems much more concrete and real a possibility than the hope of nuclear disarmament. In such a situation can we concretely imagine a series of practical steps leading to disarmament as a realisable objective?*

The first step must be for NATO to make a declaration, like the Warsaw Pact nations, renouncing the first use option of nuclear weapons in case of a conflict. The second step is for NATO and the Warsaw Pact countries to come to an agreement, perhaps based on a proposal by the Soviet Union, to establish a nuclear free zone in Europe. The third step must be for the smaller European countries on both sides to demand that all mass-destruction means of the superpowers must be withdrawn from their countries. All nuclear weapons and chemical warfare systems as well as superpower troops. They must estab-



lish a troop free zone in central Europe, without alien troops, that is Soviet troops in Czechoslovakia, Hungary, Poland and on the other side without the US, British and French troops in west European countries.

Later on it should be possible to dissolve both blocs, NATO and the Warsaw Pact, to return to a normal situation in Europe. 30 years after the end of World War II it is time, I think to overcome the divisions of that conflict and to stop deepening the trench that divides Germany into two parts with more and more armaments. These are practical steps which can be taken without risk to European security, and it means that my country for example must be willing to go out of NATO at a suitable time, and smaller European countries also must make a beginning towards dissolving the blocs.

☐ *What if you were facing a Hitler on the other side? What if you had somebody who was insane enough to use a first strike against you without caring whether you were capable of a second strike? Would your stand still be the same?*

That's a very important question. First of all I don't think that it is probable that such a criminal concentration of forces which was present during Hitler's time will repeat itself again in this century. But what we have seen of the Kremlin's policy and of their actions show that they are very careful even in a situation like Afghanistan. They are not adventurous. Hitler was a gambler, they are not. They have a very rational leadership which is very careful in choosing its options and in executing them. But even in such a case if the Kremlin were to exhibit such tendencies, given the nuclear weapons we think that it is better to be victims than to be criminals.

☐ *Given your stand and that of your party, would you clearly and coldly face one possibility; that if you were to remove the Pershing and the Cruise missiles, and if you were to go in for unilateral disarmament, would you be prepared to leave your country open to a nuclear attack from the Soviet Union without being able to defend yourself against such an attack?*

Yes. I personally would be prepared to accept such a situation. And I think that if the Germans in the wake of the history of this century were to take such a step it would initiate the beginning of a new age. But the population of my country is not willing to accept this and I'm realistic enough to see it. It is only a small group which is in the peace movement which has this attitude and is prepared for such an offer. The greater part of the population is still thinking in the traditional way, that we must be protected and unattackable. To them it is necessary to point out that we must be able to defend ourselves but not with means of mass destruction which cannot defend anything.

☐ *You had said earlier that it is impossible to defend West Germany because of its nuclear power plants. Could you elaborate on this?*

I think that in a modern conflict, a country, particularly a small country, overcrowded and with nuclear power plants working, cannot fight a war. It can only capitulate or come to a peaceful settlement. Therefore it is a contradiction in the policy of our government to build more and more nuclear power plants and install nuclear missiles and tell our people that we are protected adequately under America's nuclear umbrella. It is curious to say that the Soviet Union can blackmail us with the SS-20 missiles when they can much more easily blackmail us by threatening to destroy our nuclear power plants with conventional weapons. Its a much easier option to use and one that does not entrench Russia in a nuclear war. You can always say it was a mistake and no one can fix the responsibility for such an attack. Recent studies have established that if one reactor were to be destroyed, it would render one third of West Germany uninhabitable.

☐ *After the Pokhran blast, there are now reports that Pakistan is thinking of attempting an underground explosion. There are also rumours that India is considering developing a hydrogen bomb. What stand would your party and the European peace movement take towards an arms race on the subcontinent? What stand would you advise the peace movements in India and Pakistan to adopt?*

The peace movement in our country would suggest that you renounce the development of nuclear weapons even in the case that Pakistan would develop such weapons. That cannot be a reason to do the same. It is better to make a declaration openly to this effect renouncing the making of nuclear weapons unilaterally, and also to make an appeal to international solidarity, which is in any case a better protection

☐ *What is the basic foreign policy approach that your party, The Greens, adopts towards the Third World?*

The Greens have the basic provision that human rights are inalienable, in every part of the world. And that they must be maintained at all costs. They cannot be renounced. The basic rights of every human being must be defended against all suppression, in Afghanistan as well as in El Salvador, in South Korea as well as in Pakistan, in Turkey as well as in Iraq and under Ayatollah Khomeini in Iran. We support all movements which are fighting with non-violent means for human rights. We are supporting the movement of the Sadinistas, in defence of the revolution against the CIA and intervention by the United States. The Greens would like to see a world in which the relations between the rich nations in the southern hemisphere are more just, than what they are now. The Greens will also fight against the exploitation of the South by the North.

☐ *A coalition between the Greens and the Social Democrats is absolutely essential in the next elections in order to create a majority in the German parliament (Bundestag) to ask for the removal of the Pershing -2 and the Cruise missiles. Do you think it is possible given the differences between the Greens and the Social Democrats, to build an alliance on this single principle of agreement? Because the coalition once formed has to be sustained since if it falls apart it could lead to a defeat of peace movement itself?*

You are right. It is difficult to build a coalition on the basis of agreement on the missiles issue alone. We have differences with the Social Democrats on other questions, for instance, on the nuclear power plant or on the issue of German's membership in the NATO alliance, and I think that the Greens cannot compromise on these issues, but these differences must not be allowed to come in the way of the coalition. The most important objective is to get the missiles out of Germany.

☐ *Do you still have any faith in negotiations as a means to disarmament, or do you feel that these talks can only become fruitful after some unilateral steps towards disarmament have been made. For instance after you have an anti-missile majority government in Germany and the Pershing and Cruise missiles are removed?*

I don't think that arms reduction talks can begin again very soon; the last proposal of the Soviet Union is still on the table, which was refused by the United States but was supported by my government. The proposal was to reduce the SS-20s number to the level of the British and the French missiles. The United States said that the British and the French missiles could not be included. This was a fair and reasonable proposal and the peace movement protested strongly against the American refusal. Unless the Americans change their minds talks cannot begin again.

The experience of the last 40 years has shown that talks are not successful. We have had SALT 1 and SALT 2 which was not ratified in concrete by the United States. It is a paper document, nothing more, and the United States now have more missiles and Trident-2 submarines than this settlement allowed. Nor have other talks in Geneva and Vienna been any more successful and to look forward to talks, I think, is to be hopelessly optimistic. Therefore, other methods must be developed to come to better results. This other method can only be a unilateral disarmament with calculated steps on one side.

11-18

SAVE THE WESTERN GHATS MOVEMENT

AND

CITIZENS FOR ALTERNATIVES TO NUCLEAR ENERGY

We present below a summary of facts (with sources) to show why nuclear energy must not be proliferated any further in India.

I. Do we need to generate more energy or do we need to use available energy most efficiently ?

TABLE 1 ENERGY - GDP RELATIONSHIPS

Country	Energy (in tonnes of oil equivalent) / $ 1m GDP	Index
U.S.A.	1400	186
France	795	100
Italy	915	115
Japan	849	106
Karnataka	7292 (1974-75)	917
	8092 (1979-80)	1,017

Source: Prof. D.K. Subramaniam, Karnataka State of Environment Report 1984-85, Ed. C.J. Saldhana.

II. Why is India so inefficient in using the available energy?

There is a tendency to equate energy with electricity. Electricity is a secondary form of energy. It is inefficient to produce and it's use must be restricted only for lighting.

TABLE 2 ELECTRICITY AS A PERCENTAGE OF ENERGY CONSUMED IN INDUSTRIAL SECTOR

Country	%
U.S.A.	17.3
France	15.1
Italy	17.1
Japan	20.0
Karnataka	69.0 !

Source: Prof. D.K. Subramaniam, Karnataka State of Environment Report 1984-85, Ed. C.J. Saldhana.

III. Is nuclear power cheap ?

TABLE 3 COMPARISON OF COST OF ELECTRICITY OBTAINED FROM DIFFERENT SOURCES

Source	Life Cycle Cost Rs/KW	Paise/KWH
Nuclear	44,000	103.13 (AEC+WD)122.06 (ACTUAL)
Thermal (Coal)	42,000	92.45
Hydel 25%	25,000	62.73
Prod. Gas	19,000	41.03
Bio Gas	12,000	28.18
Small Hydel	8,000	17.70

Source: Prof. A.K.N. Reddy, National Workshop on Nuclear Power Plants with Specific Reference to Kaiga, Dec. 10-11, 1988, Bangalore.

P.T.O. 2 ..

IV. Are nuclear plants safe ?

India is currently installing the Canadian designed CANDU REACTORS. The performance of these reactors in Canada vis-a-vis their accident proneness is given below :

TABLE 4 CALCULATED PROBABILITIES OF ACCIDENTS IN CANDU REACTORS

Type of Accident	20 Reactors (Annual)	20 Reactors (Life Time)
Loss of coolant (Three Mile Island)	1/5	99.7%
Core Meltdown (Chernobyl)	1/500	7%

Source: Atomic Energy of Canada Ltd., Safety Report for Lepreau-I, 1979. Presented by Dr. Vishnu Kamath, National Workshop on Nuclear Power Plants with Specific Reference to Kaiga, Dec. 10 and 11, 1988, Bangalore.

V. Accidents and Consequences :

Chernobyl - Estimated Cost $ 17000 m

1,35,000 people evacuated. Immediate deaths 33.

Cancer related mortality 1500-500000.

Estimated death toll in a populated site such as in India - 500000 to 1000000.

Can we afford this economic and social cost?

Source: Christopher Flavin, World Watch Institute, Science Age, September 1987.

VI. Unanswered Questions :

1. How do you treat nuclear waste? There is no known method. Nuclear waste can only be contained (disposed). Containment does not mitigate it's harmful nature.
2. How long does nuclear waste need to be contained? While high level wastes have to be contained for eternity, an optimistic estimate is atleast 6,000 years.
3. Do we have containers that last 6,000 years? NO !
4. The life of a nuclear reactor is only 30 years. What happens to the reactor at the end of its life ?

   It is left as such and buried under a sarcophagus and will need to be guarded for 6,000 years against vandals, terrorists, earthquakes and other acts of God.

VII. CRISIS MANAGEMENT

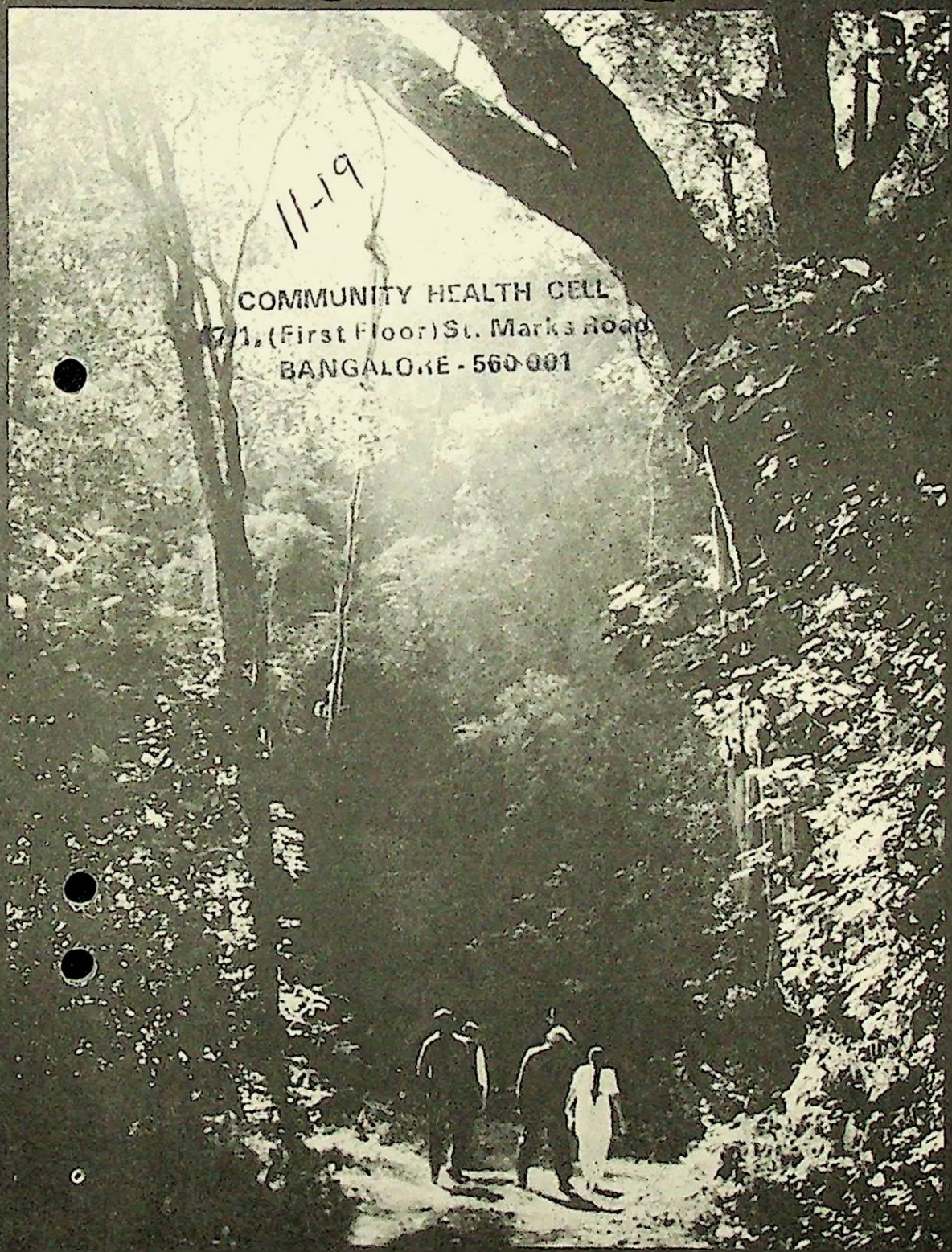
We cannot even fight fires in a high rise building (Hotel Siddhartha Fire, New Delhi). We cannot handle gas leaks (Union Carbide, Bhopal). Can we deal with nuclear accidents?

To know how Soviet Union dealt with Chernobyl, read National Geographic, May 1987; Christian Science Monitor, May 1, 1989.

If you want more details of the original literature, please write to :

DR. VISHNU KAMATH, 456, VIVEK NAGAR, BANGALORE - 560 047.

Why Kaiga ?

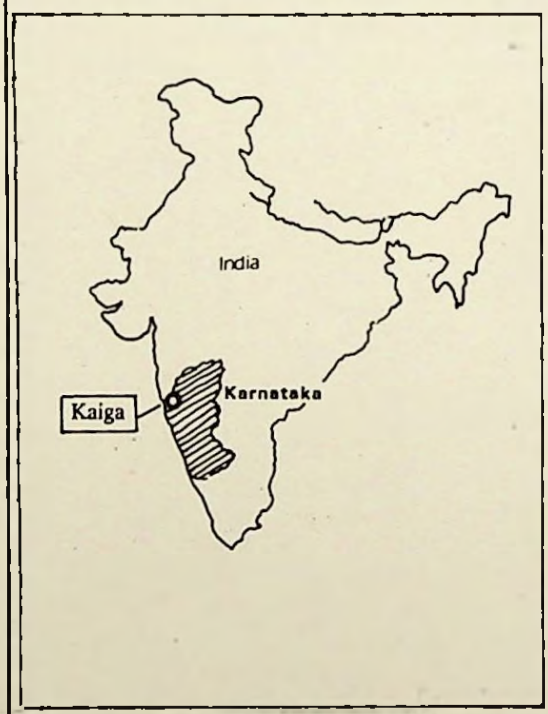


CITIZEN'S ARGUMENTS AGAINST THE NUCLEAR POWER PROJECT IN KAIGA

The State of Karnataka is coming on the nuclear map of India in a big way. This land of beauty and plenty has been chosen to house the entire nuclear fuel cycle: uranium mining, processing and enrichment of radioactive materials; burning it in nuclear reactors, stockpiling and ultimate burial of its deadly wastes.

This vicious cycle has its spikes rooted in the choicest spots of this State:

- Uranium mining in the serene and evergreen hills of the Western Ghats;
- Uranium processing and enrichment at Ratnahalli, adjacent to Brindavan Gardens, the most popular tourist spot in Karnataka;
- Construction of a reactor complex on the bank of River Kali, again in the midst of a virgin evergreen forest and game sanctuary;
- Burial plans for the hazardous wastes in the Kolar Gold Fields, the pride of Karnataka and India.



No other State in India has been gifted with such a Pandora's box that promises enormous clout to the well-to-do and death, disease and suffering to the common people. All this is being planned and executed in a short span of three years - exactly during the period in which the world has witnessed the worst nuclear accident, stern opposition to nuclear power and landmark decision to bid good bye to nuclear power in many countries.

Of the four major nuclear projects that are unleashed in Karnataka, two were mooted with the connivance of a small clique, two were undertaken without informing even the State Assembly and not one was initiated with the consent of the local inhabitants.

But the Kaiga scenario has turned out to be different. The people here have mounted a formidable opposition - the first of its kind in India. This project, as well as the resistence have far-reaching implications for Karnataka and the Third World.

It is high time we inform ourselves on nuclear energy and all that is happening around it and ask the authorities some questions.

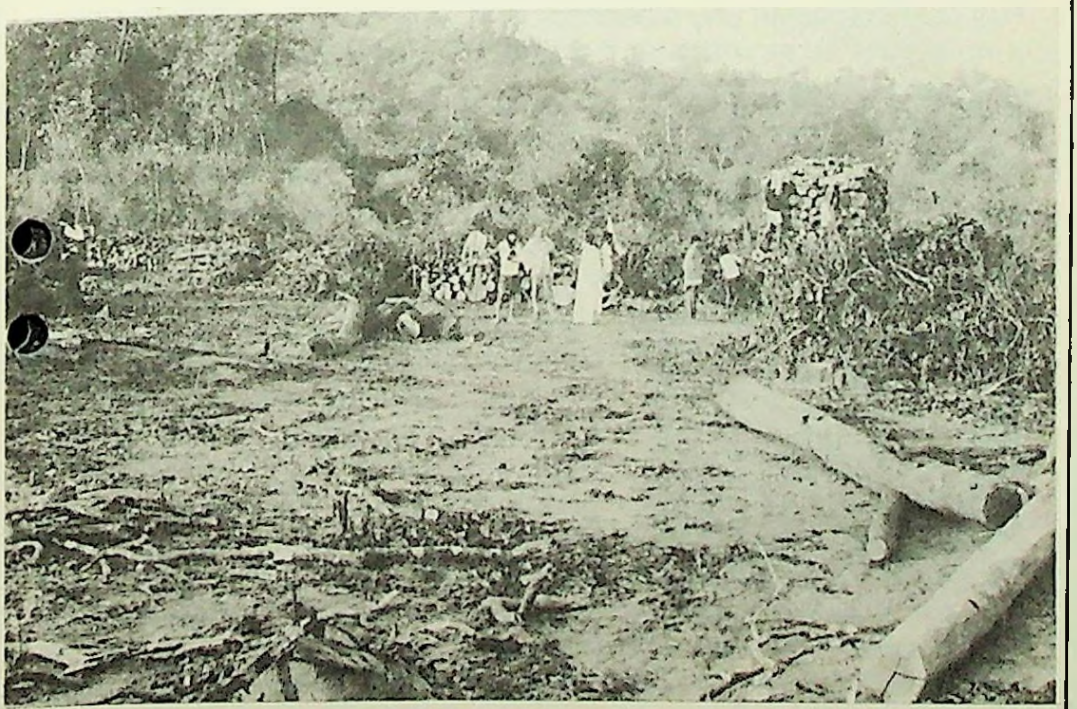
Where is Kaiga? What is happening there?

Twenty kilometers from the Goa border there is a little-known, sleepy village called Kaiga, on the left bank of River Kali, surrounded by steep hills and thick forests of the Western Ghats. Massive preparations are going on to set up a nuclear reactor complex there. A large chunk of virgin evergreen rainforest is being bulldozed to pave way for heavy machineries and even more gigantic earthmovers.

This serene wilderness will soon become a human beehive, busy in erecting concrete domes and dams, screaming steam engines, radioactive cesspits, waste yards and criss-crossing of high-tension cables and pylons.

Countless biological species, evolved over millions of years in this forest ecosystem, will be wiped out without a trace. Native people will be driven out and in their place a new set of life forms consisting of construction labourers, technicians, plumbers and accountants will invade the Kali valley. The birth pangs of the monster have already begun.

The bountiful nature of the North Kanara District, which once had 80 per cent of its land under forest cover, has been reaped and raped many times over: under the pretext of growing teak and eucalyptus for the government coffers; mining manganese, iron ore and quartzite for the benefit of the private industries; plundering bamboo and softwoods for the paper mills; clear- felling to build reservoirs, dams, lay cable lines and new townships for the benefit of large industries.



Plunder of a pristine forest

In a short span of three decades, the natural forest cover of the district was reduced to less than 30 per cent. Not satisfied with this rate of destruction, now enter the nuclear mandarins.

State of our Environment

Two major issues of global concern are involved in the Kaiga project. One is the assault on the rainforest. Tropical rainforests are humanity's greatest treasure-house of genetic diversity, a unique biological reservoir. Embracing the earth like an equatorial girdle, they directly influence the global weather pattern. Covering just about six percent of the global land mass, they harbour more than half of the world's plant and animal species.

According to the FAO, atleast 7.5 million hectares of rainforests are destroyed annually. Unofficially, this figure has been put at 20 million hectares. This amounts to 100 acres cleared every minute. Atleast one wild species of animal or plant is being wiped out from the face of the earth everyday. Twelve years from now, that is by the end of the century, we would have extinguished over one quarter of all life forms.

Forests Are More Than Woodlots

We have already destroyed more than half of all the rainforests. Whatever is left is, in fact global heritage. Attempts to prevent further loss cannot be left solely to any one group or nation. Hence, a World Rainforest Network formed in 1987, with non- governmental organisations from 23 countries, including India, is striving to protect this heritage. It may also be noted here that FAO has pointed out India's state of forests as being alarmingly critical. The Brundtland Report (the World Commission on Environment & Development 1987) has said that when any biosphere is fragmented into small fractions, it no longer ssupports and nurtures the life-system it had. Human tree-planting activities can only be to serve the fuel and other needs of people. It does not create forests which are life systems evolved over millions of years.

Kaiga is in the midst of a virgin rainforest. The picture shown alongside has been taken at a spot just 3kms from the Kaiga Nuclear site. The site is surrounded by 250 sq.kms. of Anshi Bioreserve and 834 sq.kms of Dandeli Widlife Sanctuary. The nuclear project is being pushed through in such haste that not even a pretense of an attempt has been made to estimate its impact on the rich ecosystem. No biologist or ecologist was commissioned even to catalogue the biological species that are destined to be wiped out.

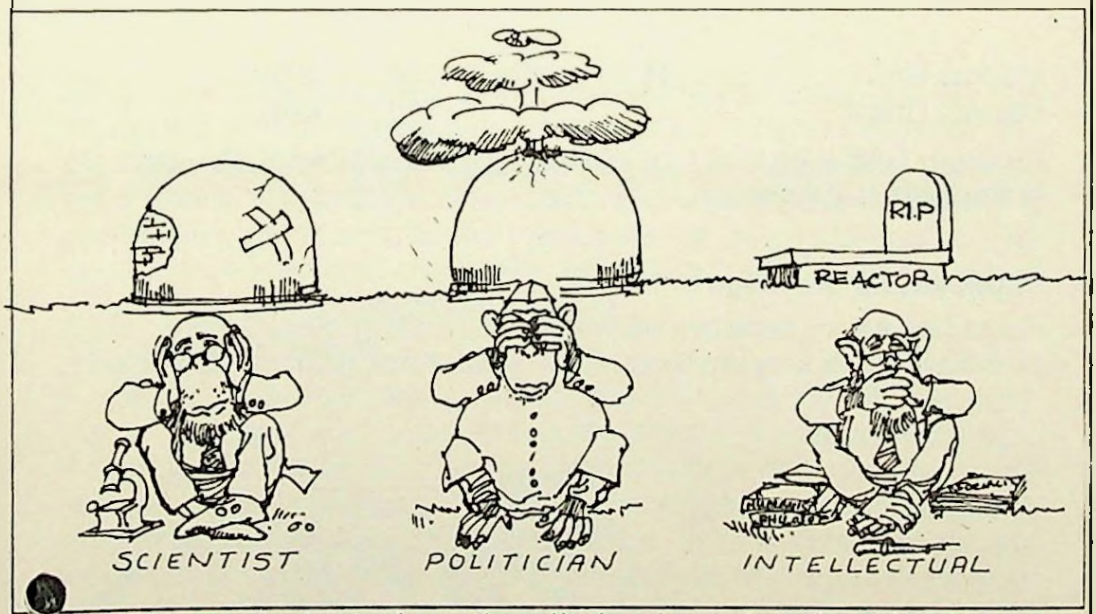
The entire project was cleared by a three-member committee reportedly consisting of one civil engineer, one nuclear physicist and one economist after a cursory survey from a helicopter joyride. The 18-page Environment Appraisal Report prepared by the Nuclear Power Corporation does not even contain the names of the authors.

An Incomplete Technology

The other issue of global concern is the nuclear technology itself. It is an incomplete technology as well as a provenly unsafe one. It demands utmost rigorous discipline and unerring human behaviour. Of late, it has also proven to be economically unviable, constantsly demanding huge subsidies from governments, as in the case of France. In fact, it is because of this that many countries have abandoned the nuclear option.

Indian Nuclear Scene

The Indian nuclear history is replete with instances of radioactive spillouts, accidental leakages and frequent malfunctions of the reactor as well as auxilliary systems.



The Tarapur plant has the distinction of being the 'most contaminated atomic power station in the world'. During its first ten years it had 344 accidents or "unusual occurrences" as the DAE calls them.

This record was beaten by the Rajasthan plants which had 251 forced closures in its first decade. The number of days these remained closed far exceed the number of days they have worked. Leak of radioactive heavy water worth Rs.4 lakhs everyday and cracks and breaks led to closure of Unit 1 for three years.

The Kalpakkam plants became operational amidst claims by DAE that it had 'perfected' the technology through repeated repairs of the Rajasthan plant. But this too is beset with problems. Vibrations have led to breakages of turbine blades and these plants have been

liberally drawing the parts meant for the Narora and Kakrapara plants. There was a long delay in starting of these due to non-availability of heavy water. While the structures were waiting so,severe corrosion has occurred resulting In heavy maintenance work. Here too, heavy water leakages are common. Increasingly these Units are having longer and longer closures. In one instance fuel pins got stuck and Rs.9 crore worth of heavy water gushed out into the cooling water drains.

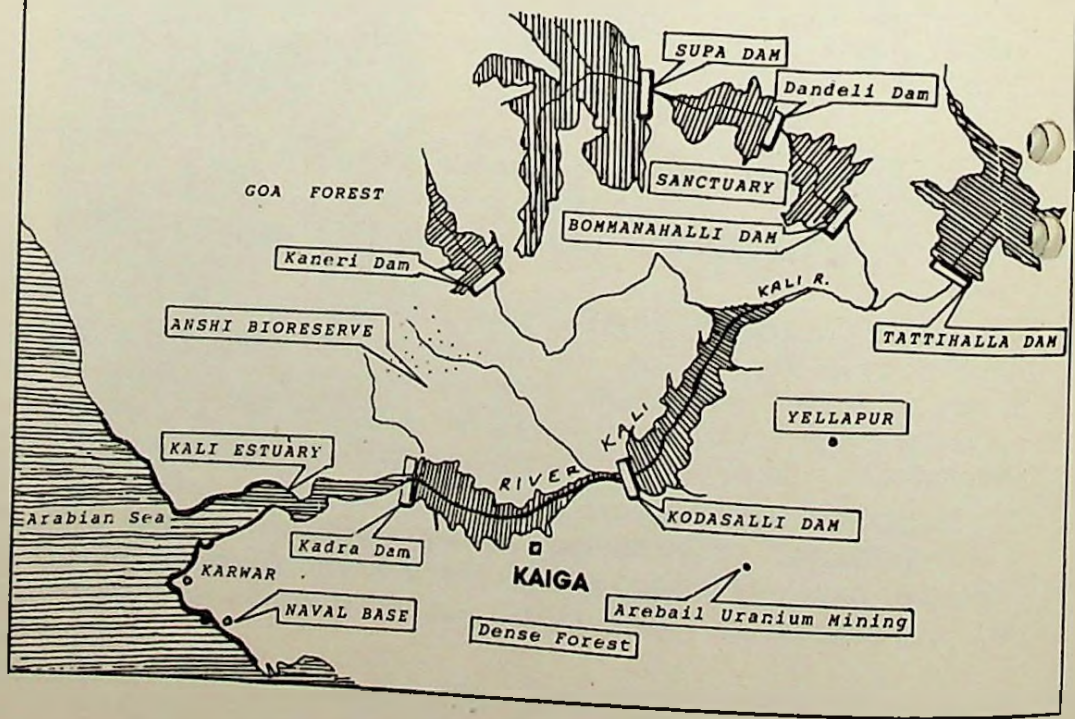
The following table shows the number of days for which our reactors have remained non-operational, but continue to consume power.

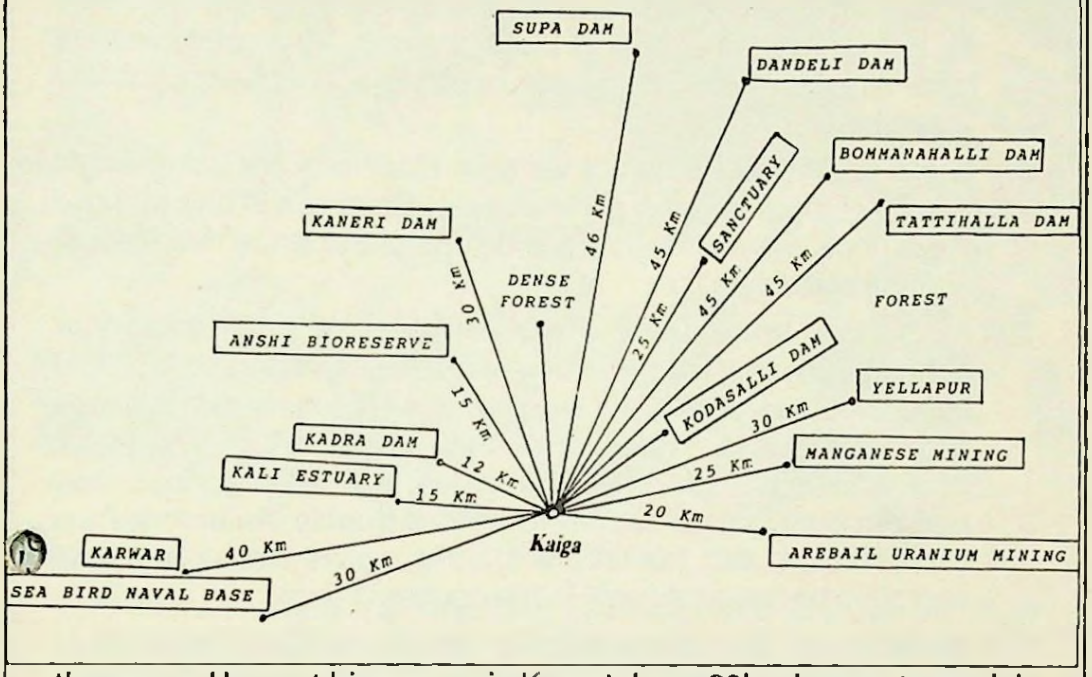
Name of the Reactor	1984	1985	1986	Capacity Factor (1986) %
Tarapur Unit I	46	107	27	86%
Tarapur Unit II	132	29	131	52%
Rajasthan Unit I	366*	285	365	-
Rajasthan Unit II	121	106	54	68%
Madras Unit I	84	164	154	40%
Madras Unit II			113	42%

(Source: DAE's 'Nuclear India' No.2 and 3 1986 Note: The error (*) in the table is original)

Implications on Kaiga

Kaiga has a very sensitive environmental setting. Seven major dams around in the vicinity in a tectonically weak zone; (see the map below).





the second largest bioreserve in Karnataka; a 20km long estuary rich in aquatic life that supports more than 5000 fisherfolk families; the country's largest naval base at Karwar with sensitive defence installations. Any leakage of radioactivity here will have far- reaching implications. In no time all the marine life will be contaminated. The livelihood of protected tribals like the Halakkis, Siddis, Kunabis and Gowlies will be very adversely affected.

Criteria Contravened

Kaiga receives very heavy rainfall, more than 3000mm per year, spread over five months. Wind velocity goes well beyond 100 kmph. According to the Atomic Energy Commission's own criteria for site selection,such a high rainfall area is not suitable. In fact, 5 out of 7 criteria for site selection are against Kaiga. Solar ponds to evaporate low-level nuclear waste are not feasible in the area. During an emergency the area gets isolated rendering evacuation in time impossible. Mandatory requirements for emergency preparedness will mean greater destruction of the forest and belies the claim that an atomic power station requires 'only a small amount of land'.

Assuming the unlikeliest event of no emergency arising, Kaiga still remains a highly unsuitable location for these reasons:

- There is no major industrial centre within 200Kms which can consume the base load electrical output from Kaiga. With a transmission loss of more than 25% it is uneconomical to carry this energy to far-flung areas.
- During wartime the entire region becomes a prime target for enemy attack because of the concentration of so many sensitive installations-the naval base, atomic reactors and a chain of large

dams. As a precautionary measure, series of defence installations in the forests, along the coastline and on the hill slopes will come up before the completion of these projects. So a once- verdant land of peace and plenty will become a beehive of military activities.

- Large-scale impounding of water in reservoirs are increasingly recorded to be causing earth tremors. Breaches in any of these 7 dams will mean a radioactive deluge of the entire riverine belt and the coastal region.
- As nuclear installations attract terrorists or other anti-social activities, security will be beefed up. Normal civilian activities and freedom of movement and expression will be curtailed. Pilferage and unintentional recycling of innocent- looking radioactive objects like metal pieces, rubber tubes, fishing nets, shoes, may result in putting rural citizens to serious trouble. An atmosphere of suspicion and hostility will build up as house-to-house searches become frequent in the course of time.
- In the event of a major disaster like those that happened at Chernobyl,. Three Mile Island, or Windscale, it becomes impossible to even inform local residents, let alone evacuate them, because of the difficult terrain.

A Nuclear Complex

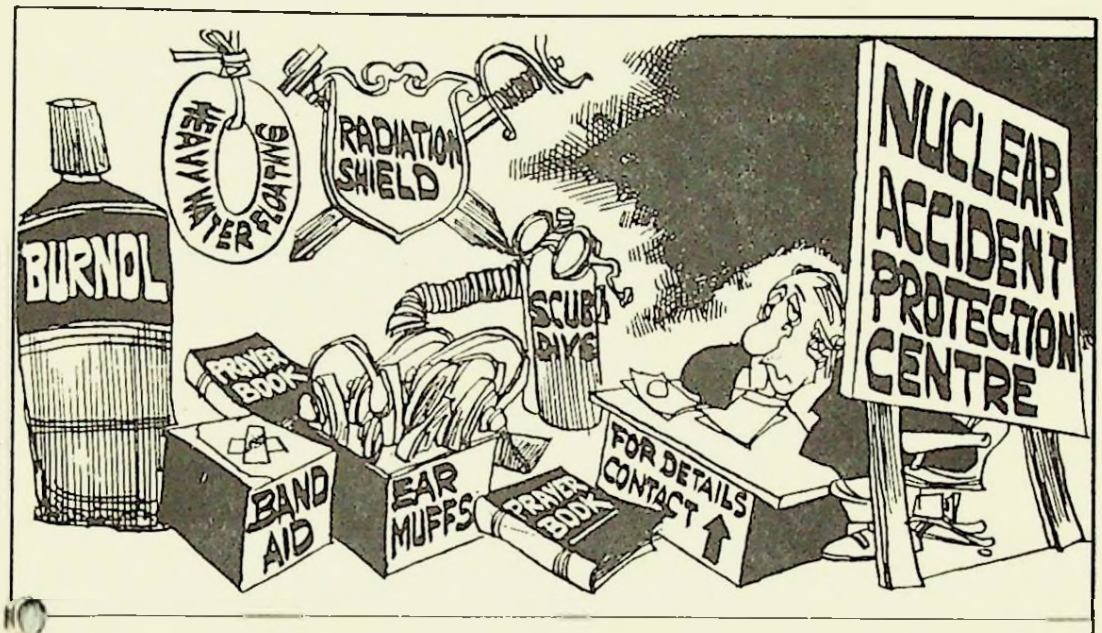
The greatest threat of all is in the long-term future of the West Coast. Once installed, the reactors become a permanent blot. When they are dead and useless, one cannot just wish them away. The current trend all over the world is to build more reactors in the same complex. The advantage is that the dead reactors can also be guarded while making use of the available infrastructure for the 3rd,4th,5th and nth reactors. This is what is happening at Tarapur, Kota and Kalpakkam, and planned at Kaiga, too.

Are We Missing A Technological Future By Not Going Nuclear ?

One often finds statements by the nuclear establishment's Chiefs that India will miss out on a technological future if nuclear energy is rejected. But it is not true. Nuclear power does not lead us to a technological future but only up a technological blind alley. With all its hazards, nuclear power's costs far outweigh its benefits, which are only short-lived.

Among the countries which have rejected a nuclear future are USA, Sweden, Switzerland, Finland, Denmark, Austria and Yugolsavia. In USSR, UK, and France, it Is facing stiff public opposition after Chernobyl, which also caused several other nuclear mishaps being disclosed in their own countries.

The newer, safer and renewable sources such as solar, wind, tidal and biomass are available in plenty to us. Conservation, efficient use and proper maintenance and upgrading of our machineries are the solutions to our energy problems.



Courtesy: Bulletin of Sciences

Everytime an additional reactor is erected, more land will be taken and more people displaced. And again casual labour living and working in the area means destruction of more forests. Needless to reiterate, the burden on the future generations becomes heavier with every added reactor.

Dead But Never Gone

There is no satisfactory technique known till today for dismantling a dead reactor. Even if a technique were to be discovered in the future, by all indications, it would be so prohibitively expensive that the future generation might prefer to simply guard them instead. This would be more true in a capital-scarce country such as ours. But the dead reactors continue to remain dangerous for hundreds of thousands of years. According to one study, the radioactivity contained in a big dead atomic power station will be equivalent to a Hiroshima bomb.

Nuclear regulatory agencies all over the world are now formulating strict regulations. They make it mandatory for the nuclear industry to safely dismantle its reactors and return the land to " GREENFIELD STATUS". That is, the place should be suitable for unrestricted public use. Will Kaiga ever be returned to greenfield status? The answer is an emphatic NO.

When the future generations opt for environmentally sound, renewable and cheap energy sources such as solar, wind, biomass or tidal, they would still have to be spending enormous amount of money and resources to safeguard these dead reactors. Do we have the moral right to impose such a curse on the generations to come?

When we are facing an acute crisis due to wanton destruction of our natural resource base, can we afford to sacrifice what little is left only to line the pockets of the industrial tycoons? Will the future ever forgive us?

An appeal submitted to the Prime Minister of India on 22.7.88 by CITIZENS FOR ALTERNATIVES TO NUCLEAR ENERGY, Bangalore.

Dear Sir,

We fervently appeal to you to declare an immediate moratorium on the construction of the Kaiga Nuclear Power Plant for the following 10 reasons:

1. Kaiga is located in the midst of a tropical evergreen forest. The serene and complex ecosystem will be disrupted due to construction of concrete domes, dams, townships, radioactive cess-pits, roads, pipelines, high-tension transmission powerlines and pylons. No one has so far studied the impact of a nuclear complex in a tropical forest.

2. Kaiga is located in close proximity to 5 major dams, 1 naval base, a wildlife sanctury, a bioreserve and a very sensitive estuary. Nowhere else in the world a nuclear reactor is sited in such a complex system.

3. A very thorough Environmental Impact study was called for. But a study was conducted in a casual manner after the site is chosen , just to justify the choice.

4. Most of the site- selection criteria set by the AEC run counter to Kaiga. The site is very inappropriate.

5. Kaiga is surrounded by rugged geographic terrain. Emergency evacuation, movement of sensitive nuclear materials, safeguarding the reactor etc are very difficult. Moreover,there is no major electricity consuming centre within 200 kilometres.

6. Many international organizations have already sent their appeals to you to reconsider Kaiga. Eminent radiation experts, environmentalists and doctors have questioned the Kaiga choice in the context of " Global Development and Environment Crisis ", in an international Conference held in Malaysia in April 1987. Delegates from 32 nations sent "Stop Kaiga" appeal to you. This year in June, the delegates of another 12-Nation Conference for Nuclear-Free Asia-Pacific have appealed to you to abandon the Kaiga Project.

7. Sixty prominent citizens of Karnataka, comprising of doctors, lawyers, artists, journalists, professors and literateurs like the Jnanapeeth

Award Winner, Dr. Shivaram Karanth, have appealed to you to stop Kaiga Project.

8. Nuclear Power Projects are abandoned in many countries responding to public opnion. Yugoslavia has shelved 4 such projects. The USA,The Philippines and even the USSR has shelved the

   Nuclear Projects located in sensitive areas. In the international arena today, it is more prestigious to abandon a nuclear project than start a new one. India could be the first country to reconsider a nuclear site for ecological reasons, in the Third World.

9. You have approved our Chief Minister's plan to hold a National Debate on nuclear energy in Bangalore. It is quite natural that there should at least be a brief halt to the construction activities at Kaiga, till such a debate is held.

10. Your mother earned international accolades for stopping the Silent Valley Hydel Project. It was her keen interest in preserving the sanctity of a thick forest that prompted the technocrats to rethink on the project. The Kaiga valley is equally rich. If your intervention could save it from the high-tech onslaught, the forest-lovers all over the globe, not to speak of the people of Karnataka, would indeed be indebted to you. You would earn the singular distinction of having saved the Kaiga valley which would otherwise become dead and silent by the end of 21st century. Please stop Kaiga, save Kaiga.

Yours Sincerely

Citizens for Alternetives to Nuclear Energy

Documents enclosed for the Prime Minister's perusal :
The Penang Declaration, The Hong Kong Appeal, "The Statement of Shared Concern" signed by 60 prominent citizens of Karnataka.

P.S: As a response to this appeal, CANE received a terse one- sentence note from an Under secretary of The Prime Minister's Secretariat informing that the letter is directed to the Department of Atomic Energy for its attention.
P.p.S: Within months 4 more reactors have been sanctioned at Kaiga.

CANE CAMPAIGN SUMMARY

4 years of Peaceful Resistence

1985

An intensive grass-root level campaign was launched in the North Kanara District as soon as Kaiga was chosen as a site for India's 6th nuclear complex. A series of lecture-cum -slide shows were arranged in all the major townships of the district by a group of environmentalists. This group, initially known as Citizens Against Nuclear Energy (CANE) had a better acronym in the local Kannada language 'AVINASHA', which means "indestructible", standing for ANUSHAKTI VIRODHI NAGARIKA SHAKTI. Local people sent telegrams and postcards in thousands to the government. The response was quick.

For the first time in India's nuclear history top level nuclear scientists descended on the remote village near Kaiga to convince the rural citizens about the safety of nuclear technology. But the villagers' barrage of awkward questions made the scientists beat a hasty retreat to their ivory towers in Bombay.

The then Chief Minister arranged a hurried meeting between the people and the nuclear establishment's top brass. A four-hour marathon meeting proved futile as the nuclear scientists failed to convince the people about the real motive behind the Kaiga project.

As the movement gained momentum in rural areas, CANE was invited to participate in a debate on nuclear safety organised by the Max Mueller Bhavan, Bombay. But the seminar was stalled by the nuclear authorities at the 11th hour, thus displaying their phobia for public discussion on what goes on behind the nuclear facade in the country.

1986

Opposition to the Kaiga project became widespread. Campaign through small newspapers was taken to the neighbouring districts of Shimoga and Dharwar. A seminar was conducted in a small village Vajralli where safer, cleaner and people oriented development alternatives were presented by scientists from Bangalore, Kerala and Gujarat. Nuclear authorities declined to participate in the seminar but at the same time put up an exhibition stall just 13 kms away to detract the villagers! People who took out processions against

A roadshow in Bangalore on atomic hazards

A human chain on Chernobyl Day near Vidhan Soudha

the high-handed behaviour of the nuclear authorities were beaten up by the police at Yellapur. Meanwhile the other surreptitious nuclear projects like the Rare Earth Materials plant at Ratnahalli, the uranium mining project at Arebail and the high-level waste burial plan at Kolar Gold Field also came to light. Protests spawned in all these places as the people realised the implications of a full-scale nuclear fuel cycle in Karnataka.

The Chief Minister was gheraoed by the Rural people at Sonda where he promised to hold a National Debate and reiterated his earlier promise to send a teams of local leaders to various nuclear installations in the country. Villagers undertook a long foot-march and a campaign . After four days of relay trekking they congregated at Kaiga and held a rally at Karwar under the leadership of Jnanpeeth Award winner, Dr. Shivaram Karant. Despite all these protests tenders for civil works at Kaiga was published in Bombay newspapers.

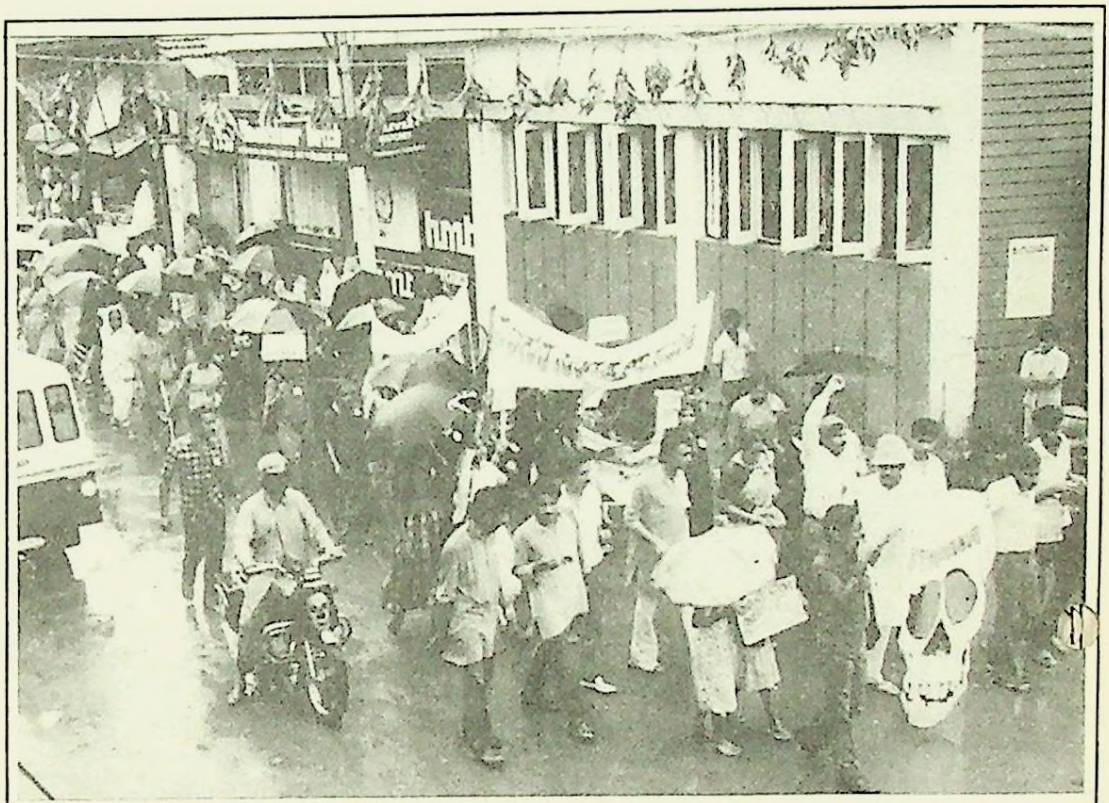
Internationally known nuclear critics Helen Caldicott and Bob Caldicott were invited to address a series of public meetings in Bangalore.The Chernobyl accident resulted in further mobilization of people against the nuclear projects in Karnataka.

1987

University students took out a jatha to all the major educational institutions of North Kanara district. Another rural seminar 'Chernobyl to Arebail' was arranged at the uranium drilling site at Arebail.A signature campaign was launched. More than - In 100 an eminent people from all walks of life appealed to the Prime Minister to halt the Kaiga project. National workshop held in Hyderabad it was declared that the site selection criteria had been violated in respect of Kaiga. At the Global Conference on Environment at Pinang (Malaysia), delegates from more than 30 countries appealed to the Indian Prime Minister not to proceed with the Kaiga project.

In Bangalore hundreds of anti-nuclear activists donning skull masks marched from Gandhibhavan to Rajbhavan with a unique roadshow and submitted a memorandum to the Governor.

All along the winding route of the 100 - day march by environmental activists - the 'Save Western Ghats March' the Kaiga project was decried as a major threat to the stability of the ecology of the Western Ghats.



Anti-nuclear demonstrations at Karwar, near Kaiga

1988

A team of anti - nuclear experts including Dr.Rosalie Bertell, Dr.Paul Johns of CND, UK and Prof. Erickson from Sweden visited Bangalore and addressed the public about the hazards of ' peaceful' nuclear projects.

The Karnataka Government at last arranged to send 4 teams of visitors, each comprising of an MLA, a journalist and two local citizens to Rajasthan (RAPS), Tarapur (TAPS), Madras (MAPS) and to the uranium mining site at Jaduguda, Bihar. Majority opinion of each team was against setting up of similar projects in North Kanara District.

A colourful Chernobyl day was observed with a day-long sit-in at MinskSquare in Bangalore. 100 volunteers observed a day's fast. It ended with a big human chain formation followed by a public meeting addressed by activists and scientists.

CANE was represented in the Asia-Pacific Nuclear Free conference at Hong Kong where a special resolution was adopted appealing to the Prime Minister of India to halt the Kaiga project. A massive rally was held on 2nd October at Karwar where nearly 3000 people (mostly women) congregated despite heavy rain, urging the Nuclear Power Corporation (NPC) to close down the office. More than 300 people including a religious leader, Swami Vishweshwar Teertha of Pejavar courted arrest which created a furore in the State Assembly.

But this also caused the NPC to unleash a major offensive, by announcing its plan to build four more reactor units at Kaiga. The forest area claimed to be occupied by the NPC was instantly brought down from 1750 ha to 250 ha and ultimately to just 25 hectares! People of North Kanara intensified their agitation by blocking all the major roads and highways. The Karnataka government agreed to hold the much promised National Debate which was ultimately reduced to a 'workshop' with no representation from the Central Cabinet.

Can We Do Without Nuclear Power ?

Easily. Even in countries where 30-60 per cent of the electricity comes from the nuclear source, studies have established that they can do without nuclear power. The share of nuclear power in our country's total energy consumption is too negligible to be even calculated. And we have other vast resources.

- We have plenty of oil and natural gas.
- The efficiency of our thermal power plants can be increased atleast two-fold and we have coal reserves to last us more than 200 years to come.
- Less than 20 per cent of our hydro electric potential has been tapped. Ecologically sound, small hydel stations can be put up and power supplied through decentralised transmission systems. But instead, generally, huge dams and reservoirs are build which result in heavy silting-up problems. Understandably, all such dams are performing poorly making people mistrust the hydel potential and possibilities.
- We have enviably long coastline and large land mass which hold immense potential of tidal, wind and bio-mass energy.
- Our proximity to the equator provides us with ample solar energy. All these non-conventional sources have been developed, tested and proved both in our own country and in other countries as well.
- Most important of all, we need to become energy conscious. There is gross abuse of energy in our country. Not only most inappropriate forms of energy are used for various activities, it is also used very inefficiently. Being hardly an industrial economy, our industries gobble up 50-70 per cent of our electricity and for most inefficient end-uses. In western industrialised countries, the industries take less than 20 per cent of the power produced in those countries. In addition, using badly maintained and out-dated machineries, we consume 12- 16 times more energy for the same value in output, compare to the advanced countries.
- Studies have shown that atleast 25 per cent energy saving is possible in our country by adopting some measures.
- Above all, the kind of changes mentioned above create more jobs, more assets and a better environment for all of us.

CITIZENS FOR ALTERNATIVES TO NUCLEAR ENERGY

Who are we?

WE ARE a group of people concerned about our environment and future of humanity - not only the immediate future of the present generation but also of life itself on earth.

WE ARE for science and progress along scientific lines and application of technology for the benefit of the large majority of common people.

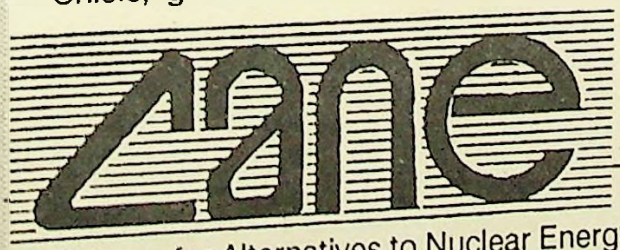
WE ARE concerned that the natural and other resources in the country should be wisely used for the development of the common people as well as preserved to nurture the future life on earth.

WE THINK that a trade-off of the existing resources for a paltry gain in the immediate future, without long-term planning, will mean destruction of the life-sustaining resource base.

WE ARE STUDYING the energy and development issues in the country today at depth and are doing extensive documentation on them. Based on these we write articles, papers as well as letters in the papers.

OUR FUNDS ARE very meagre. No big money is involved in our campaign and all our funds are raised locally. We collect information from newspapers and scientific periodicals. We give slides shows and lectures in cities and villages . We seek small contributions from friends and the public to meet specific expenses like replacement of a fused projector -bulb or printing small booklets.

BUT BY FAR the main sustenance for our activities comes from a meltdown at Three Mile Island, an explosion at Chernobyl, leaks at Tarapur Atomic Plants, cracks at Rajasthan Atomic Power Plants, closures of Madras Atomic Plants, arrogant statements of nuclear Chiefs, ignorant remarks by politicians.... and the like.



Citizens for Alternatives to Nuclear Energy
809, 17th E Main, 5th Block,
Rajajinagar, Bangalore - 560 010
INDIA

This booklet has been brought out on the eve of a National Debate on nuclear energy (December 10-11, 1988) sponsored by the Government of Karnataka in Bangalore. We are thankful to the Government of Karnataka for financing the printing of this booklet.

Nuclear Fiasco FACT SHEET

"Nuclear Technology demands 100 per cent perfection but man is not 100 per cent perfect"
- Ralph Nadar

- A sign on the University of Florida's research reactor building reads "please don't flush the toilet while the reactor is running". The problem? The reactor's secondary cooling system is supplied by the same water main that feeds the toilet. When the toilet is flushed, the water needed to cool the reactor drops, and it must be shut down to prevent over heating.

- A nuclear reactor without a fastening screw and a washer at a Japanese atomic power plant has been allowed to resume operation. The fastening screw on the fuel assembly and the washer underneath were found missing, during a regular check in August 1988. The screw has since been located and recovere, but the washer is still missing, perhaps inside the pressure container beyond the focus of the underwater camera. How the screw became loose has not been investigated. Nuclear safety authoritles however believe that the reactor can resume work.

- A system to protect against the release of radioactivity in an accident at a nuclear power plant at Hope Creek, New Jersey (USA) was installed backward. The error was discovered while the plant was operating at 20% testing power.

- On march 31, 1987 the US Nuclear Regulatory Commission (NRC) directed Philadelphia Electric Co to close its Peach Bottom nuclear reactor in Pennsylvania, because the control room operators were regularly falling asleep at their posts. In 1986 the same plant was fined $200,000 for safety violations.

Records obtained from NRC suggest that workers sleeping on the job is a regular occurrence at nuclear plants in the USA. The commission has recommended that in the reactor control rooms, high backed cosy chairs should be replaced by low-back, plain models.

- Among other safety violations in USA that the Nuclear Regulatory Commission has found out are "the workers were found playing video games on the computers and engaged in reading "non -technical literature...."

- The 1000 MWe reactor at Brown's Ferry in Alabama was brought to the brink of a meltdown - by a candle. Two workers were checking air leakages in the foam rubber packing of reactor control cables. When a technician brought his candle very close to the packing, immediately it burst into flames. The entire cabling caught fire which raged for nearly seven hours. With all the electrical connections snapped, both the normal cooling as well as the much touted Emergency Core Cooling System became inoperative. There was a real emergency as the core began to heat up on the way to a meltdown. Disaster was averted as the operators succeeded in diverting water from an auxilliary pump through a makeshift connection - just in time.

- In October 1988, hidden under a heavy fog, nine activists from France and Germany climbed over the fences surrounding the French nuclear reactor at Cattenom and climbed to the top of the 165 meter high cooling tower. Later in the morning, as the fog lifted, their banners appeared down the side of the tower "No to Nuclear" (in French) "Energy Yes, but not like this" (in German).

Police tried to dislodge the activists by spraying them with water from a helicopter five times during the afternoon, but the nine on the tower only felt a few drops of water. The group had earlier been given free access to a German nuclear reactor at Brockdorf and had been granted DM 1750 to conduct an accademic research making a 'survey of risks and benefits of this kind of energy'.

11.20

WHY WE DONT NEED NUCLEAR ENERGY

Forty years ago nuclear energy was hailed as a clean, cheap and perpetual source of energy. Now, after billions of dollars have been spent on nuclear installations and research in several countries, many lessons have been learnt. It has been proved that it is neither cheap nor safe or clean and what is perpetual about it is really the waste and the burden of having to guard the same. Indeed, even the most ardent supporters of nuclear energy would admit, waste management is the Achilles heel of nuclear technology.

The countries which have come to depend on the nuclear source have insurmountable problems and will sooner or later have to take the wisdom of those which have given it up. Here is the story of those countries.

U.S.A. has the largest number of reactors and maximum learning about the technology's failures as well. Possessing the largest mass of nuclear waste (15,000 tons), is desperately looking for suitable dumpsites. (Some African governments have agreed to burying of most dangerous wastes in their countries for a price.) It has cancelled all licences for nuclear plants since 1979.

U.K. is struggling with a number of reactors of outdated designs. Many accidents and leaks which had been hushed up are coming to light in recent times. Following Chernobyl accident, is facing mounting pressure from the public, resisting both installations and waste dumping wherever sites for the same are being proposed.

SWEDEN despite having the best safety record in the world has decided to close down all its 12 reactors by 1995 and wind up all nuclear installations by 2010.

AUSTRIA has decided to dismantle its first nuclear reactor which was never switched on, following the verdict in a public referendum on the issue.

YUGOSLAVIA accepting a proposal tabled by the youth organisation-Socialist Association of Yugoslav Youth, the Parliament decided to halt its nuclear programme. It is considering a moratorium at the end of this century.

FINLAND has dropped plans for a fifth nuclear plant.

NETHERLANDS has decided to stop with its two reactors.

DENMARK After intensive public education by anti-nuclear groups, the people voted against the party that was interested in going nuclear.

SWITZERLAND With the cantons refusing to allow reactors to be put up, the Central Government has not been able to find for more reactors.

FRANCE The Electricite de France, is staggering under multi- billion dollar debt and cannot survive without the generous subsidies from the France Government.

U.S.S.R responding to public pressure, abandoned its latest Krasnodar power plant although 41 million dollars had been spent on the project. Residents around the 20 reactors, in different places are bitterly opposing the reactors despite being promised " more jobs, good housing facilities and other valuable social amenities ".

Coming to the Indian nuclear programme, the installed capacity is to produce 2.5 % of the electricity in the country. But the actual production has been far less than half of this, at any point of time. The small reactor models which we are installing are both obsolete and uneconomical. The world over reactors are of standardised 1000-1300 MW capacity. In addition, our reactors are shut most of the time and when they do operate, they are running on less than half of the installed capacity. There have been innumerable leaks and accidents all of which are hushed up under the cover of the Atomic Energy Act which gives powers of such secrecy. If nuclear reactors are for power production, one fails to understand why everything to do with them is covered up under the excuse of defence and security.

The Tarapur plants which have the best performance record in the country have the reputation of being the world's most contaminated reactors and the highest potential for a major nuclear disaster. The Rajastan Station has been a tale of woe from the beginning. With innumerable cracks and breakages, it has been a source of constant headache to the Atomic Energy Department. In addition, it has been spilling radioactive heavywater worth several lakhs of rupees with no accountability. They are shut most of the time.

The Madras Power Station which was started under the great euphoria of being indigenous technology, has had its share of problems. Having had several long closures forced by technical problems, it is also drawing from the parts meant for the future plants constantly. It has now been derated to half its capacity.

The recent decision of the Government to resort to wholesale import of reactors from USSR is a clear indication of the end of the " indigenisation " honeymoon.

Facing opposition for their installation in their own countries, the other countries will only be too happy to dump them on us.

DECOMMISSIONING - A TECHNOLOGICAL RIDDLE

COMMUNITY HEALTH CELL
47/1, (First Floor) St. Marks Road
BANGALORE - 560 001

Decommissioning is probably the least publicised hazard of a nuclear power programme. It is also one of the major 'hidden costs' of atomic energy.

After about 20 years of operational life, nuclear reactors show signs of ageing. Embrittlement, corrosion, activation and contamination caused by accumulation of radioactivity begin to degrade its performance. The reactor literally begins to crumble. After about 30 years of operational life the reactor is shutdown permanently. The last batch of fuel assembly is taken out, all the circulating liquids in the moderator and coolant circuits are removed. Highly corrosive acids are passed through the piping, flushing out the radioactive crud. The reactor is now ready for dismantling.

No commercial reactor has been completely dismantled in the world so far, though 43 of them have been shutdown for various reasons. Only a few low-power prototypes and research reactors have been decommissioned. Some examples are Elk River, and Shipping port in the USA, Gundremmingen in West Germany, Chinon - A1 in France etc. In the UK an AGR at Windscale is being decommissioned as an experiment. The damaged reactor at Three Mile Island is also being decommissioned and forms a special case. The experience in all these units indicates that, technically and financially, dismantling nuclear reactors is far more burdensome than previously anticipated.

On the technological front, decommissioning is a formidable task. Reactors are built to last, not to be dismantled. The longer they work, more is the accumulated radioactivity. The pressure vessel and the containment remain intensely radioactive even after the core has been removed. At Shipping Port,USA, the entire pressure vessel made of 20 centimeter thick steel and weighing 770 tons was lifted in one piece, proposed to be transported 8000 km through the Panama Canal and along the American Coastline and finally buried at Hanford. However, larger reactor vessels weigh thousands of tons and have to be chopped into transportable pieces. All piping of the primary circulation system, running into hundreds of kilometers will have to be cut up and buried as waste.

EXOTIC HAZARDS

Extensive use of remotely controlled equipment, robots, lasers and other exotic technologies have been proposed to overcome the difficulties. Extreme care must be taken that the dust arising in drilling and cutting operation does not escape to the environment. It has been suggested that the pressure vessel be cut up under water by powerful lasers to control the dust. Electric torches, drills, saws etc., used in the cutting operations, chemicals used in the decontamination of other components themselves get contaminated and should be disposed of. As most of the work has to be done in a contaminated atmosphere, only skilled workers wearing protective gear have to be used.

Decommissioning is also inexorably linked with waste management problems. At present nuclear power plants store their most toxic wastes at the site itself, in specially created ponds. There are dozens of reactors which are defunct and ready for dismantling but the work cannot be taken up until the in-situ waste is transferred and stored elsewhere. Dismantling a large nuclear power plant generates its own medium and low level wastes. Estimates vary with plant'sslze and design but it is expected that the former will be in thousands of tons and the latter in tens of thousands of tons, per reactor. Transport and safe storage of wastes in such quantities will only compound the already out of control waste management problems.

COST ESTIMATION - AN ELUSIVE EXERCISE

The cost of dismantling is still an unknown factor, with estimates varying in the ratio of 1:60. In 1978 the US Nuclear Regulatory Commission (NRC) sponsored a study of decommissioning costs which worked out to about Rs.10 lakhs per megawatt of installed capacity. The actual costs incurred during proto decommissioning projects so far are nowhere near this optimistic figure. The 72 MW Shipping Port reactor is being dismantled at a cost of $100 million or Rs 2 crores per megawatt. Economist Duane Chapman of Cornell University puts the final figure even higher at Rs.6 crore per

megawatt of installed capacity for large commercial reactors. NRC is now imposing several conditions on private utilities to ensure that funds are available at the appropriate time for decommissioning.

Dismantling a reactor immediately after it ceases operation is considered too costly in Europe. Deferred decommissioning strategies are being advocated as "safe and cost-effective". A decay period of 30 to 50 years is being proposed during which the defunct reactor is sealed, guarded and continuously monitored for leaks. Even then the dismantling operation, as and when it is taken up, may go on for a decade or more.

Nuclear regulatory agencies all over the world are formulating strict regulation which make it mandatory for the nuclear industry to safely dismantle its reactors and return the land to "greenfiedid status" - i.e.for unrestircted public use. Will Kaiga ever be returned to a greenfield status? The answer is an emphatic NO. The Indian nuclear establishment has worked out two strategies for decommissioning. One is the resent apparent policy - pretend that there is no suchthing as decommissioning problem. The actual policy is to evade, postpone, shift the responsibility and make the future generations pay for decommissioning.

Nuclear plants are being establlshed not singly but in clusters. The last of the proposed six reactors at Kaiga will become due for decommissioning probably by the end of 21st Century. But until then no action need be taken on any of the earlier reactors either. They can be just shutdown and kept mothballed.

Dozens of defunct, crumbling and radioactive monoliths of steel and concrete - that indeed would be the accursed legacy bestowed by our "Vision", our "Energy" Planning" on the generations of the 22nd century.

"According to the Worldwatch Report of 1986, a total of 1363 truckloads of radioactive materials will have to be dismantled from a 1000 MW reactor and buried in the final resting ground. This is almost equivalent to the proposed Kaiga reactor. A total of 17,887 cubic metres of metal and concrete should be plucked out from the reactor for the final and safe burial. Where? When? At what cost? At whose cost?"

MELTDOWN OF A DIFFERENT KIND!

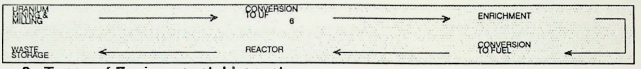
Engineers at the Hanford Reactor Complex near Washington are planning to melt a landfill contaminated with low level waste such as metal scrap, clothes, paper, and plastic wastes. The idea is to convert entire mass along with soil and vegetation into a huge lump of glass. The soil would be heated by electric current flowing between electrodes placed ground. Paper, wood and plastic in the molten landfill would escape as gas. Using 3000 Kw of power for a period of nine months, section after section of the landfill will be subjected to a temperature of 2500`F, in order to ensure complete meltdown of the landmass.

ENVIRONMENTAL IMPACTS OF NUCLEAR ENERGY

11.23

1. The Fuel Cycle Approach:

The usual method of analysing and documenting the environmental impacts of energy generation is based on the fuel cycle approach, in which a fuel cycle is the whole sequence of processes. It includes transporting from the energy source to the actual energy form(e.g. electricity) which is transmitted/ transported, and beyond the latter,to the disposal/ recycling of wastes and by- products. There are several possible nuclear fuel cycles, but one of the common ones is shown below. viz., the non-reversible fuel cycle for light - water reactors which account for about 90% of the world's reactors:



2. Types of Environmental Impacts:

The principal environmental impacts arise through (a) radiation and (b) thermal particle pollution. The radiation, which includes (i) alpha-particle, (ii) beta-particle and (iii) gamma-rays, can have an effect, viz., cancer, on those who are exposed to it, and can also affect, through genetic damage,the future generations.

Only a part (about 33%) of the heat generated in the nuclear chain reaction can be converted into electricity. The rest has to be dissipated, and this waste heat disposal can cause thermal pollution.

Thus, the nuclear energy system, based on a fuel cycle, produces, in addition to electricity, also radiation and waste heat. These radiation and thermal outputs at the various stages of the fuel cycle must now be elaborated.

3. Uranium mining and milling:

Uranium is mined as uranium ore, contalning U3 O8 In concentrations greater than 0. 1% by weight. The high-grade ores containing up to 4% U3 O8 have been largely worked out. About 0.04 tonnes of 0.1% ore are required per MWHe of electrical energy produced by a reactor.

Uranium ores are generally mined by underground or surface mining, depending upon the geological context. Today, the two modes of mining are resorted to in roughly equal proportions.

Uranium- 238 is radioactive and decays to give radon - 222 (a chemically Inert but radioactive gas). Thus, every uranium ore deposit contains radon -222 produced by spontaneous radioactivity. When a geological deposit containing uranium is disturbed - as in mining - the escape of radon is facilitated. But, radon-222 is itself radioactive producing " radon daughters ". One of these is polonium-218 which, because it is charged, adheres to any dust particles. Thus, the dust generated in uranium mlning contains particles laden with highly radioactive radon daughters. Inhalation of such dusty air is well known to increase the incidence of lung cancer. Radiation exposure produces about 3.4 x10 -3 to 1.1 x 10-2 deaths per million Mwhe.

Even after mining has been completed, radon will continue to be released from an open-pit mine unless special remedial action is taken, e.g., by covering the pit and waste rock with soil.

The crude ore from mining is then milled, i.e., crushed and ground to the consistency of fine sand, and leached with either sulphuric acid or sodium carbonate to produce a mixture of uranium oxides (with a stoichiometry given by U3 O8) called "yellow cake". For every tonne of yellow cake (60-90% U3 O8), about 100 tonnes of residual sand, called " tailings" are produced as well as toxic and radioactive liquid waste (3700 litres /tonne ore.)

Uranium milling operations thus lead to releases of radioactive material (airborne particles and gases) as well as to radioactive liquid wastes and "tailings". The "tailings" are radiological hazards in several ways - (1) they contaln radium - 226 which concentrates in bones and is far worse than strontium- 90, (2) they produce the inhalable radon daughters which cling to dust. Since the yield of yellow cake is very small, almost all the ore ends up as tailings - in south-western USA about 90 million tonnes have been piled up. They are washed into rivers, and in Grand Junction (Colorado) , they have been used for filling beneath foundations.

4. Uranium Enrichment:

Enrichment from about 0.7% U-235 in natural uranium to about 2-4% is a difficult process because the chemistry of U-235 and U-238 are virtually identical - the small mass difference of 3 in 235 can be the only basis of separation. Two methods are current: (a) gaseous diffusion, and (b) gaseous centrifuging. Both these require a gaseous uranium compound. Hence yellow cake has to be converted into UF6. Apart from the fact that UF6 is a viciously corrosive gas, the other impacts of uranium enrichment are non- radiological and arise from the enormous water and electrical requirements, particularly for gaseous diffusion (centrifuging requires only one-tenth the electrical energy.).

5. Fuel Fabrication:

The UF_6 enriched to about 3% in U-235 is converted, with the aid of ammonium hydroxide, to UO_2 which is formed into pellets and sintered to achieve the desired density. Finished pellets are loaded into zircaloy or stainless steel tubes, fitted with end caps and welded to form a fuel pin. The completed fuel pins are assembled in fixed arrays to be handled as fuel elements.

The real enviromental hazard of the fuel fabrication process is the possibility of the material becoming critical. This is particularly the case with plutonium whose oxide, when mixed with UO_2 in suitable proportions, yields a promising fuel material.

Because fuel fabrication plants may not be near reactors, fuel elements have to be transported, and the loss/theft of fuel elements can be a danger. A fuel fabrication company reported that over six years of activity it had missed 60 kg. of enriched uranium - enough weapon-grade material for several fission bombs.

6. Reactor

Though there are many types of reactors, attention will be confined here primarily to light- water reactors.

1). Air borne Radiation: The main radiological impacts involving air-borne radiation arise through krypton- 85, xenon-133, tritium and carbon-14 released through the stack.

2) Thermal Pollution: The thermal efficiency of light - water reactors is only about 33% . Hence almost two - thirds of the heat generated in reactor core has to be rejected into the environment, i.e., about 2000 MWt for every 1000 MWe which is produced. The cooling water that is pumped back to the source at the rate of about 50 m3/sec. (0.66 million gallons / minute) is about $10^{o}C$ higher than the source temperature. *It can heat up an entire river to about $35^{o}C$ for several miles.* Since oxygen solubility goes down with temperature, there can be considerable damage to water-based eco-systems. In addition, microclimatic changes can be produced.

3) Spent fuel: The irradiated fuel elements are both valuable (because they contain plutonium and uranium) and also dangerous (because of their high-level and low-level radioactivity.) Whether or not they undergo reprocessing (for recovery of plutonium and/or uranium), the large quantities of high-level waste (the nitric acid treatment of fuel elements yields about 5 m3 /tonne of spent fuel) must be managed. A 1000 MWe nuclear plant produces at least 25 tonnes of spent fuel per year, and the high level waste per tonne includes about 100,000 curies each of strontium- 90 and caesium - 137. After evaporation to reduce volume, it is stored in tanks - carbon steel tanks have a life- time of about 25 years, and stainless steel ones, slightly longer.

The Hanford facilty in Washington State has over 150 tanks for over 250,000 m3 of high-level waste. The life-times of tanks and the volumes of waste to be handled must be seen in relation to the half-lives of some of the constituents of the high-level waste, e.g, strontium-90 has a half life of 28 years, caesium-137, 30 years, plutonium, 24400 years. (Ten half-lives- 1/2 10 = 1/1024 - are required to reduce radioactivity by a factor of 1000) Hence, tank storage is only an interim measure.

Thus far, no satisfactory acceptable long-term solution to the high-level waste disposal problem has been developed. All that is clear is that high-level waste must preferably be in solid, rather than liquid form to immobilize the waste and reduce the possibility of it spreading via leaks or vaporization.

7. Reactor Accidents:

The most serious environmental impact of a nuclear reactor that has very nearly - but thus far not actually - taken place is a loss of coolant accident (LOCA), in which, for a number of possible reasons, the flow of coolant water is interrupted. In such an event, the central rods are programmed to fall back into the core automatically and curtail the chain reaction. Despite this, the heat from the radioactive core materials can cause a precipitous rise in temperature. It can initiate a " meltdown " in which the fuel melts through the floor of the containment building into the ground boring deeper and deeper (the " China Syndrome ") until it reaches the groundwater whereupon it can erupt into a geyser of steam and debris releasing a deadly radioactive cloud into the air.

To prevent such events, reactors have an Emergency Core Cooling System (ECCS) . Though the ECCS is meant to be a fail-safe system, it has been the subject of controversy. The most detailed assessment of the risk of meltdown was officially made by the 1974, $3 million, Rasmassen Report. But not only was the report disputed by non-official assessments, but its endorsement was formally withdrawn by the Nuclear Regulatory Commission in January 1979. In any case, the Report did not even imagine the formation in the Three Mile Island reactor of a hydrogen- containing bubble which could block off the coolant and / or explode.

Other ways in which reactor accidents can occur are through earthquakes (Bedaga Head, Belg), human errors (Browns Ferry, Al.), etc.

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THE CHRONICLE OF ATOMIC ACCIDENTS

1987

Many nuclear accidents were reported around the world: Germany, the U.K., Japan, the US. Defective valves resulted in leakages of volatile uranium hexafluoride first during the night of April 11/12, at the Comurex nuclear plant at the Tricastin site and later at the Pierrelate Plant in the Drome. Seven workers were injured. France's prestigious Superphenix fast- breeder reactor at Creys-Malville released liquid sodium for more than ten days at Tricastin.

1986

BRITAIN, Sellafield --fourfold leakage of radioactive fuel from the nuclear plant's reactors, five workers being subjected to radiation. Upwards of 300 serious and disasterous incidents have been registered since the inauguration of this nuclear plant. In some cases the radius of radioactive terrain contamination reached 25 miles (46.5).

1986

USSR, Chernobyl -- (26 April) the worst man- made nuclear disaster took place in the cluster of 4 reactors of High-Power- Boiling- Reactor (RBMK) 1,000 MEe capacity each. The Chernobyl- 4, exploded when due to human error, its fuel- core experienced melt-down. According to the official admission 31 persons died, 231 suffered irreparable damage, and 135,000 Soviet citizens have been evacuated and permanently placed under medical supervision. Radioactivity affected 20 countries, far and wide. Industrial and agricultural loss is estimated to be more than $10 billion.

1986

USA, Webbers Falls -- an explosion in the reservoir with radioactive gas at a uranium - enrichment plant, killing one person and wounding eight.

1985

INDIA -- Small explosion and damage was reported at its newly commissioned Madras Atomic Power Plant at Kalpakkam. Also its first fast breeder test reactor when commissioned hurriedly for political reasons, experienced damage and shutdown. The Dhruva research reactor also commissioned this year (Without proper synchronisation) went out of control and had to be shut down.

1983

USSR, Atommash -- a serious accident occured in a Soviet Atomic machinery plant "atommash" where new generation of nuclear power stations were being built. Details are not available.

1981

INDIA -- Besides many explosions and accidents at heavy water plants in preceding 5 years, a major accident occured at Rajasthan Atomic Power Station unit - I. More than 3,000 workers were exposed to radiation. The plant has since been closed down. No details have been made public.

1981

JAPAN, Tsuruga -- leakage of radioactive water, causing tenfold increase in the concentration of radioactive substance in the Urazoko Gulf. As a result of negligence on the part of maintenance personnel, the reservoir of radioactive liquid waste was not tightly sealed. Over three hours 40 tons of highly radioactive substances leaked from it and mixed with the communal refuse of the city. Two hundred and seventy persons subjected to radioactive radiation. Fishing was prohibited for a long time in the gulf.

FRANCE, La Hague -- fire at a plutonium- enrichment plant. A radioactive cloud was formed, exposing a considerable number of people to radiation.

1979

USA, Three Mile Island -- leakage of radioactive water from the reactor as a result of a breakdown in the valves of the cooling pump. Accumulation of radioactive gases in the upper part of the reactor. One person died, about a hundred were hospitalised and 14000 evacuated from the contaminated area. The accident was similar to those which occured in 1974 at the Beznau nuclear plant in Switzerland and were repeated at the Ringhals-2 nuclear plant in Sweden and the Kori-1 reactor in South Korea. In all these cases the fault was with the equipment supplied by the American corporation Westinghouse.

1979

INDIA -- In a massive "pinhole" leak of radioactive water at Tarapur 300 workers were exposed to more than permissible limits of radiation.

1978

BELGIUM, Antwerp -- cracks were found in the body of a steam generator during the annual loading with nuclear fuel at the Doel atomic power station. Several male technicians and one female, who took part in replacing the spent fuel elements were subjected to radiation.

1977

USA, Cliton -- an accident at the construction of an atomic power station, many workers receiving a critical dose of radiation.

FRG, Brunsbuttel -- an accident in the main pumps, exhaust of radioactive steam into the engine compartment of the reactor and partially into the atmosphere.

1975

USA, Browns Ferry -- a fire of the electrical equipment of the reactor, with a large part of protective and control devices going out of commission.

1974 (?)

INDIA -- A major accident took place inside Tarapur Atomic Power Plant (Bombay) killing instantly 2 engineers. The Chief engineer died after three years of injuries sustained in the accident.

1972-1973

USA -- 850 cases were registered of deviation from the norm in the performance of all American nuclear reactors in operation at the time. Seventy percent of the investigated reactors had major faults in the safety systems. Two persons died and 15 were seriously injured in the accidents of that period.

1972

CANADA, Chalk River -- Leakage of radioactive liquid from the research reactor due to an error of the maintenance personnel, explosion of the hydrogen oxygen mixture inside the reactor.

FRG, Obrigheim and Wurgassen -- An accident of the reactor protecting devices and an accident during a trial launch of another reactor an explosion was prevented owing to an instantaneous stoppage.

1969

SWITZERLAND, Lucens -- leakage of the coolant in a reactor working for scientific purposes. Owing to the precise functioning of the protective devices, the consequences of the accident were localized.

FRG, Lingen -- excess of the permissible limit of radioactive substance leaked out as a result of technical malfunctions. The reactor design was changed to guarantee against a repetition of a similar accident.

1966

USA, Detroit -- an accident in the experimental accelerator, a considerable rise in the temperature of the coolant and the intensity of radiation. The reactor was put out of commission and reopened only in 1970.

1961

USA, Idaho Falls -- exhaust of radioactive substances from a reactor working for military purposes. The accident arose as a result of safety violation by the servicing personnel. Three persons died.

1958

CANADA, Chalk River -- Leakage of "heavy water' contaminated with radioactive particles from the fuel rod of the reactor, fire at the uranium rod, exhaust of toxic gases, radiological contamiantion of the technical personnel delegated to combat the accident.

1958

USSR, Kyshtym, The Urals -- A big explosion in a plutonium dump turned vast areas of the southern Urals into wasteland, 30 small towns were wiped out of the map of Urals. The accident came to light only when 1979 Dr.Zhores Medvedev wrote about it in the British Press. Death toll remains unknown.

1957

BRITAIN, Windscale -- ignition of the graphite rods of an industrial reactor, exhaust of radioactive iodine. The reactor was temporarily put out of commission. At this nuclear centre, later renamed Sellafield, 13 persons died, upwards of 260 were doomed to radiation sickness and 12 workers many years after, revealed symptoms of an enhanced content of plutonium in their bodies exceeding permitted levels of international standards.

1951

USA, Detroit -- an accident at a research reactor overheating of fissionable material due to exceeding the permissible temperature and air polluted with radioactive gases.

Compiled by Dr. Dhirendra Sharma.

11.25

ENERGY AND EQUITY

The question of energy is not usually looked at in its entirety, although it is a crucial ingredient in development. The so-called experts narrow their vision to an area or discipline that they are familiar with. They seldom, if ever, take a look at the whole energy scene to see where they could contribute most effectively. Instead, their perception of the problem and the answers they want to find are determined by what their jobs or professions demand and not by what the situation demands.

For example, an official of an electricity Board will talk about having "to meet the demand for electricity" rather than think whether electricity would be the most appropriate form of energy to be used in the situation, for those activities. Same thing happens whether it is coal production, hydro-electricity or nuclear energy. Unfortunately, the general public as well as their representatives and administrators also put themselves in similar straightjackets.

Inaddition, there are other political and oblique considerations that block resolution of the energy issue in an equitable manner. With the result,

a)resources are diverted to cater to the needs of a small elite;

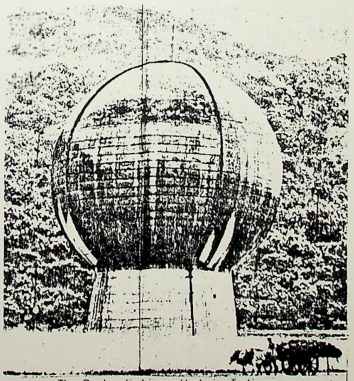
b)energy is (ab) used or used very inefficiently whether it is commercial form or non-commercial form; and most important of all,

c)our natural resource base has been indiscriminately destroyed rendering destitute masses of common people at whose expense these 'development' schemes are taken up.

ENERGY CONSUMPTION AND STANDARD OF LIVING

Energy consumption is no doubt one of the indicators of the standard of living of the people. But energy is NOT electricity alone. Even in a highly industrialised country, like the USA for example, the demand for energy in the form of electricity is only about 11%. In India it is about 20%. Electricity is a high quality and expensive form of energy. It has specific areas of use where it is most efficient. But not being costed properly in our country, industries have tended to use it for purposes where it is neither necessary nor efficient.

When we look at the wealthy countries whose per capita energy consumption we compare ours with, three things strike us. In those countries tasks involving heavy manual drudgery such as cutting or laying of roads and lifting of heavy loads are all done with machines. But in our country we still use largely human and animal energy for such work.



The Contradictions that is India-
Atomic Power Station & Bullock Cart

Secondly in our country a big chunk of the electricity produced is taken by the industrial sector-55-58 per cent in India, 70 per cent in Karnataka. And we can be hardly called an industrial economy. In contrast, in the heavily industrialised countries including the Federal Republic of Germany, France and USA, the industries take about 15-17 per cent of the electricity produced there. The third point is about the efficiency with which we use energy. We use 10-16 times more energy for the same value of output compared with USA, France or Japan. Recent studies show that this inefficiency is increasing rather than decreasing in heavy industries.

INCREASE IN ENERGY DEMAND

The projected higher demand for energy or electricity calculated by the Governments or Administration is done keeping the prosont inefficiency and anomalies intact. Besides, in reality, the increase in demand is not a simple multiplication as depicted by our officials. This is shown clearly by the experience of other countries. Following the Oil Crisis in the 1970's, conservational measures taken in the UK, West Germany and Netherlands resulted in a 6-7% decrease in energy consumption. In the USA, in 15 years, the increase was only 5%.

A recent survey of 21 western industrialised countries by the International Energy Agency in Paris revealed that at 32 percent growth between 1973-85, their energy consumption grew only by 5%. Often there is a 'saturation point' beyond which demand does not grow. In this context, there seems to be no basis for the projection by our planners that energy demand in the country will be three times more in 20 years at 5% growth.

SCOPE FOR CONSERVATION

Before going into the larger energy area, let us look at the obviously avoidable waste of electricity which is a very expensive one. The transmission and Distribution (T&D) losses in Karnataka is a world record. The all India average is 25%. The same for other countries are: Japan-5.3% West Germany -4.7% and USA - 6.6%. Karnataka's T&D losses have been around 30%. In one curious instance, the Minister of State for Power is on record speaking of 72% peak load loss in case of Kolar District!

Improvement of the T & D system can reduce such losses considerably. But pretty little is done on this score since money flowinto some pockets will be disturbed if we did not have this bogey of shortage of power and 'need' to have new projects. A 10% reduction in the T & D losses is said to save the Karnataka Electricity Board alone Rs.100 crores annually. But look at the 7th Plan Outlay on Power for 1985-90 :

Item	1985-90 (Rs.in crores)
1. Generation	21,302
2. T & D	9,198
3. Rural Electrification	2,108
4. Renovation & Modernisation	978
5. Miscellaneous	693

CONSERVATION IN TOTAL ENERGY

The working Group on Energy Policy set up by the Central Government in 1983, after a detailed study, came up with very significant data both regarding energy conservation and utilisation. According to this study a 25% saving in energy is possible by taking some conservational steps and rationalisation and improvement of machineries. The table below shows details of the highlights:

SECTOR	CURRENT SHARE TAKEN	% THAT CAN BE CONSERVED	ANNUAL SAVING FROM THIS *	AVOIDABLE INVESTMENT TO PRODUCE THE NEW CAPACITY *	TOTAL INVESTMENT REQUIRED IN CONSERVATION MEASURES *
Industry	41%	25%	1,925	3,580	3,600
Agriculture	10%	30%	410	1,768	650
Transport	34%	20%	765	432	890
Domestic	15%	-	-	-	-
Total	100%	25%	3,100	5,780	5,140

* (Rs.in crores)

The fact these sensible and scientific recommendations are not being taken up reveals some significant truths about the energy situation in the country:

(a) The thousands of crores of rupees spent on the atomic energy establishment to produce a tiny fraction of electricity has nothing to do with finding solutions for the energy problems;

(b) No serious efforts are being made to improve energy efficiency in the country;

(c) Spending on additional installations instead of conserving and increasing efficiency has to do with extraneous interests; and

(d) What is lacking in finding solutions to the energy problem is not scientific information but political will.

Thirty to Forty per cent of the natural gas is being just flared every year. Why are the governments not finding money for putting the infrastructure for using, conserving and not wasting all this energy? These steps will not only save huge amounts of public money but will also create more jobs and assets within the country.

ALTERNATIVE ENERGY SOURCES

In the conventional energy sector, there is immense scope for upgrading. The thermal power stations' efficiency can be doubled, according to experts. Hardly 17% of our hydel potential has been tapped. Environmentally sound, renewable and economically viable energy sources have been proved to be available. The Department of Non-Conventional Energy sources (DNES) which has been working on the renewable sources of energy including biomass, solar, tidal and wind energy has said that with appropriate funding it can produce energy equivalent to 35,000 MWe. *

It has also been proved that in a country like ours decentralised energy systems as the non-conventional sources are more economical given the remote, far-flung areas not connected by grids. We shall not, however, go into the details of the prospects made by the different authorities here. But to present one alternative development model:

"At the Government-prescribed minimum wage for an agricultural labourer, we can employ 30,000 people for 10 years at a mere Rs.120 crores and afforest, at the rate of 10 acres a person, 31 lakh acres in one year. At the end of this period, we will have a standing biomass of 74 to 125 lakhtonnes for harvesting. For the cost of the proposed nuclear power plant at Kaiga, multiply this by seven folds..."

What could be better than re-greening the one quarter of the country's land lying barren, providing energy to the rural masses and getting high-quality organic manure all at one shot?

What our energy problem needs today are:

- an integrated management policy with a strict energy audit;
- promotion and encouragement of appropriate forms of energy end-use; and
- all the changes technological, social and *attitudenal*, that this demands.

* The alternative sources of energy are dealt with in a separate FACTSHEET.

Food irradiation

The Health Ministry of the Government of India has cleared the irradiation of onions, potatoes, frozen shrimphs and spices, and will soon be clearing for other food products also . Many scientists and scientific organizations all over the world have opposed food irradiation because of many research findings which have demonstrated adverse effects of consumption of irradiated food, on laboratory animals and human beings. It is for this reason that Dr. C. Gopalan former Director-General of Indian Council of Medical Research and President of the Nutrition Foundation of India has warned that consumption of irradiated food would be risking the health of millions of people.

The Process

Gamma rays produced by radioactive elements cobalt-60 and caesium-137 are bombarded on food materials to kill bacteria, fungi, viruses, and insects that would otherwise cause decay of these materials. Different intensities of radiation are needed for different objectives and different food materials for example:

For sprout inhibition of onions and potatoes	5 to 15 kilorads
Against parasites and insects	20 to 80 kilorads
For Pasteurising effect	100 - 300 kilorads
For sterilization (killing all bacteria, fungi etc)	2500 - 4000 kilorads

(1 chest x-ray gives bout 1 rad = 1/1000 of a kilorad, workers in a nuclear plant under normal conditions may receive upto 0.5 kilorads, Biologists consider that these low doses are risky and should be avoided.

The Effects of Irradiated Food on Cell Biology

Dr. S.G. Srikantaiah former director of National Institute of Nutrition, Hyderabad, testifying before a US Senate sub-committee,

in 1987, stated that rats and mice fed with irradiated wheat developed piolyploidy (increased number of chromosomes) in the cells of bone marrow. Such abnormal polyploidy is also seen in cancers. The same results were also obtained in monkeys and undernourished children ; deaths of foetuses inside the body of mice increased, indicating lethal genetic mutations.

Dr. H. W. Renner of W. Germany found in 1977, that consumption of irradiated wheat increased polyploidy in the bone-marrow cells of chinese hampsters; Dr. M.L.J. Clapper and others in UK (1981) conducted 4 tests, and found that in two tests irradiated wheat produced lethal mutations as reported above by the Indian Scientists.

Onion: Rodents fed with irradiated onions developed abnormal reproductive organs (ovaries and testes).

Chicken: A report was prepared in 1984 for the U.S. Department of Agriculture of 12 studies on the effect of feeding irradiated chicken to laboratory animals; mice developed higher incidence of testicular tumours, cancers, kidney diseases, and reduced life-span; fruitflies feeding on such meat had a higher death - rate.Undergoing genetic mutations the flies became impotent over some genarations.

Effect on Food Quality

Irradiation ejects electron from the atoms of many substances thereby ionizing them, affects chemical bonds and changes the structure and nature of carbohydrates, proteins, fats,enzymes and vitamins. This would affect the texture and flavor of fruits; reduce the protein value of food by chemically changing the component amino acids; change the properties of fats making them more rancid and less mutritious; destroy vitamins A and E, and in cetrtain foods vitamin C,and many of the B complex vitamins.

These and other effects make irradiated food less nutritious and wholesome because they contain less amount of proteins, and vitamins, rancid fats and some foods developing odd flavours because of breakages of sulfhydryl groups.

Release of toxic chemicals

Irradiation kills living cells of food material as well as bacteria, fungi etc. It destroys the nuleic acids DNA and RNA, proteins , carbohydrates, vitamins etc. It also produces about 65 radiolytic substances, some of which are known to cause cancers and genetic changes including mutations. A report of the USA in 1980, warns that foods irradiated at levels higher than 100 kilorads could be toxic to man. Irradiation of many food materials receives much higher doses than this and hence could be harmful to human health.

Increased chances of Food Poisoning

While irradiation at high doses kills off many bacteria and fungi, one species of bacterium *Clostridium botulinum* is not easily killed. Its spores survive, and grow on the Irradiated food more prufusely than before because irradiation has killed off its competetors. Consumption of such food can be lethal. In nature such poisonous food emits bad smell because of the growth of certain other bacteria which act as a warning. These warning bacteria are killed off by irradiation while the bacterium that produces 'botulism ' (the effect of the poison produced by *Clostridium botulinum*) flourishes.

For the same reason mentioned above, certain organisms that produce a toxin called 'aflatoxin' also flourish on irradiated food. This toxin can cause cancer in man even very In low concentrations.

Other possible effects

More exhaustive studies on the effect of irradiated food, on several generation of animals, have to be conducted and the adverse effectrs of various Irradiated foods cleanly assessed. Until that time, the British Medical Association has suggested, licensing irradiation should be postponed.

Dr Joseph Barna in 1979 reviewed the literature of 1223 studies on the effect of irradiated food and concluded that there were 1414 adverse effects, and 185 beneficial effects!

Spread of irradiating devices

Large scale generalized irradiation of food material would necessitate distribution of irradiating devices to a large number of operators all over the country. These devices contain extremely dangerous radioactive substances (Cobalt - 40 or Caesium - 137 . There is always a chance that many instances one such device could be stolen for the metal container, as has happend in many instances, and the radio active material mishandled because of ignorance about its dangers!

Scientists and Organizations Opposing Food Irradiation

Among the opponents of food irradiation are Dr.C. Gopalan and Dr.S.G.Srikantiah mentioned earlier Dr. Kusei Taka hashi, Dr. Joseph Barna, Dr M.L.J. Clapper and co-workers, Dr Geraldine Deltman (radiation and safety officer of Browns University USA); Organisations such as British Medical Association, Health and Energy Institute of Washington USA(which has an advisory board of 9 eminent doctors and nine scientists) the Nutrition Foundation of India, Consumers Association of Penang, Malaysia, and Friends the Earth an environmentalists organization of international repute.

Children used as guinea pigs to test irradiated grains?

Severely under-nourished Indian children who were fed with irradiated wheat had developed a kind of leukaemia called poliploidy (extra production of chromosomes in cells), according to ATOM, the officlal journal of the British Atomic Authority.

The Information is contained in an artlcle titled "Is food irradiation harmful?" by Mr John Quick published In the January 1988 Issue of the journal.

Stating this at a news conference here today,Malayalam poets, Ms. Sugathakumari and Prof.Vishnunarayan Namboodiri, who are activists of the Environment Protection Council here, demanded a probe by the Central Bureau of Investigation into the matter.

The article, they said, was a report of a seminar conducted jointly by the Royal Soclety and the Association of British Scientific Writers. Although the information that Indian children had been used as "guinea pigs" was contained in a seminar paper and had found its way into the journal roughly a year ago, none appeared to have taken note of it.

The HINDU, Dated 8.12.88

CANE NEWS

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WHY THIS NEWSLETTER

The popular movement against the proposed nuclear plant at Kaiga in the heart of the rainforests in the Western Ghats in Karnataka has been a pioneer in many respects. In the four plus years we have covered much ground and had many gains. The movement has the unique credit of having forced the Karnataka Government to hold a national debate on the subject. The credit ofcource is shared with the Government which has done it in a democratic spirit.

But our supporters are increasing everyday. There is a growing, mutually enriching mix of the so-called scientists or intellectuals and activists. This is gradually growing to be a formidable front.

The quality of our support has also shown a quantum leap. This is evident, among other things, from the report on the Jan 30th event (inside). Either because of being confronted to establish their anti-nuclear stand or because of interest in the widespread movement, many people from various walks of life, are beginning to take a deep interest in the whole energy and development issue. With the result, the debate in the houses, villages and towns is getting to be better informed and authentic everyday.

Another feature of the Kaiga struggle is that it has cut across all classes and categories of people. Deeply involved in the struggle are people professing both far left and far right political faith. Ofcourse, the bulk of the people are just concerned-about the environment, humanity the people who are going to be immediately and directly affected, people who care for life on earth and have foresight.

These children, women and men are taking risks are prepared to pay the price for the values they hold dear. While some individuals and groups are named and known, the movement is really being nurtured and sustained by hundreds of volunteers.

Through this brief newsletter, we want to place on record with appreciation and gratitude, the efforts of thousands of people, as also inform our well-wishers, in different parts of the country, what is actually happening in that remote corner of the world. The attempt here is to cover the period late Sept. '88 to earl y February.

QUOTE

..."**Heavy, dark, sluggish, hardy, fertile, productive with little care, far cleaner than it looks, docile enough to be led by a child, but suspicious of innovations and perfectly capable, when roused, of charging a tiger or a locomotive, the buffalo would be a fitting national symbol for India**"

- D D Kosambi

THE NUCLEAR CUCKOO

"Like cuckoos, the proponents of nuclear power have acquired a nasty habit of arranging for their offspring to be reared at someone else's expense. And once in the nest, the nuclear bird often proves so demanding and voracious a visitor that other fledgelings just dont get fed."

This prophetic statement was made long ago by Graham Hancock, who elucidated several arguments against nuclear energy-social, political as well as technological. He also warned against nuclear salesmen pushing for sales in the Third World in the face of growing opposition and shelving of nuclear plans in the West.

This ominous prediction rings more true than ever before, when one looks at the 1989-90 Budget allocation for nuclear power and other energy sources.

Nuclear power which accounts for about 2.5% of the installed capacity for power, has never produced, at any point of time, half that capacity has got 52% increase while the thermal source which is the bulk producer of power has received a cut-back from last year's allocation. The statedly best performing of the nuclear power stations-Madras one. is facing longer and costlier closures and innumberable disasters of leaks and cracks. The half time that they are in operation, they are on half the installed capacity. The 12 MW Fast Breeder in Kalpakkam which occasionally worked at a derated 8 MW has been closed down; heavy water production has been, as ever before, a fraction of the installed capacity and has been singularly responsible for several years of delay in commissioning built reactor. Yet nuclear power schemes get Rs. 725 crores as against Rs. 478 crores last year. The prototype FBTR gets 33 crores.

TANKS AND GUNS INSTEAD OF TURBINES

The public sector BHEL which supplies turbines and boilers and such equipment for 'development', is switching over to making tanks and guns, for destruction. According to a recent report, BHEL's orders have shrunk and to stay in business, it has made a Rs. 200 crore proposal to the Government, to assemble the Bofors guns which arrive in a completely knocked down (CKD) condition. For the electronic component of the guns it wants to involve the ECIL (another public sector enterprise with idling aplenty with the wholesale importing of computers when it wanted to make them locally). While waiting for a decision on the Bofors guns BHEL has been entrusted with the job of assembling battle tanks. The Tiruchi Unit which specialised in boiler manufacture has 8000 tones press capacity to spare for want of orders.

contd , in page 5

WHO IS OPPOSING KAIGA NUCLEAR-PLANT

In urban India, by and large, if the State wants to change the character of an area from residential to non or semi residential, it has to ask the people there for their objections and consider them. But no such law seems to exist in respect of rural India. Huge tracts of fertile lands are occupied to build industries or defense installations and such others. Lakhs of people are rendered destitute because of these "development" schemes. Although more than a quarter of the land lies barren such land is not taken for these non-agricultural uses.

The movement against the Kaiga nuclear plant is an expression of people questioning the official "development" strategies or schemes. It is one of several such struggles going on in the country. The wide cross-section of people opposing nuclear power raises several questions:

Is it unscientific?

Here is the list of organisations/groups who have passed resolutions against the Kaiga N-Plant

- Environmental scientists from 30 countries meeting at 'Global Conference on Environment'.
- Asia-Pacific Nuclear-free Conference at Hong Kong which was attended by delegates from countries.
- Karwar Medical Practitioners Association
- Honnavar Taluka India Medical Association
- Uttara Kannada Zilla Vijnana Parishat
- Scientific Workers Association, Mysore
- Karnataka Rationalists Forum, Mysore
- Secondary Teachers Association, Uttara Kannada

Are they not capable of scientific thinking?

Is the Opposition from an urban few?

Among the groups that have opposed the Kaiga N-Plant

- Karnataka Rajya Raitha Sangha, Uttara Kannada Unit
- Karnataka Rajya Raitha Sangha, Mysore Unit
- Fisherwomen Cooperative Society, Karwar
- Purseine Boat Union, Karwar
- Rickshaw Union, Karwar

Are the opponents alarmist or ill-informed?

Among the over 50 voluntary writers, environmentalist and student groups that have opposed Kaiga N-Plant:

- Ankola Parisara Samithi
- Parisara Jagriti Sangha, Honnavara
- Student christian movement
- Akhila Bharata Vidyarathi Parishad, U. Kannada and Mysore
- Progressive Writers Union, Mysore
- Writers Sangha, Mysore
- Samatha Vedike-a women's forum Mysore
- Karnataka Pragathi Ranga, Mysore
- Samagra Vikas, Bangalore
- Samaja Parivarthana Samudaya, Dharwad.

Apart from these, 65 eminant writers, doctors, lawyers, journalists, professors including the Jnanapith Award Winner, Dr. Shivram Karanth have appealed to the Government to drop the Kaiga N-Plant.

Where is Democracy?

The forming of Panchayats and Zilla Parishads was hailed to a democratisation process. But of what good is it if they are not listened to?

- The Uttara Kannada Zilla Parishad has passed an unanimous resolution against the Kaiga Plant
- The Karwar Municipality has passed a resolution asking the Government to drop the Kaiga N-Plant
- The Karwar Taluka Mandal Panchayats have all opposed
- Eight Mandal Panchayat members including the Pradhan of Anagod (Yellapur Taluka) have resigned over the Kaiga issue.

People's Struggle

The people have been using peaceful means to protest and persuade the Government to drop the Kaiga project. Here is the inventory of people's persuasive efforts:

Sept. 23: District-wide strike; women protest; schools and colleges closed; after a procession through the town in Sirsi, students and women present a memorandum to the Assistant Commissioner to pressurise the Government to stop the Kaiga project.

Sept. 25: Massive demonstration by high school students in Kadathoka,

Manalli Ganjanana Middle school called a bundh; College students in Yellapur boycott classes, go in a procession through the town and present a memorandum to the Tahsildar

Sept. 27: Vajralli Sarvodaya High School boycott classes.

Sept. 30: Signature campaign against Kaiga project started in Yallapur. All eminent writers sign.

Contd. in page 5

QUOTE

"I would personally rather put Rs. 2,000 crores into solar energy than into setting up a nuclear plant."
- Vasanth Sathe, Energy Minister, quoted in BUSINESS INDIA, 8-12 Aug. 88

faults have been found in the supa dam) the Atomic Energy Regulatory Board was not consulted in the selection of Kaiga site, and in fact, had not stamped its approval till date, radioactive materials are being transported through our towns and cities without the local people being informed of them, no repository as yet has been decided for the nuclear wastes. The DAE says, "it is not a problem yet".

The response of our legislators, ministers and officials to the debate was disappointing. Although all Karnataka MPs were officially invited to the debate none participated. Except for a couple of MLAs from the area no legislator , Senior officials of the State Government were very much visible when ministers were present but conspicuous by their absence during the technical sessions. The Minister for Industries and Power, Mr. JH Patel made his customary insolent remarks about the need to 'educate' anti-nuclear activists (including Justice Krishna Iyer, and was heckled by the enraged audience).

Though no one was satisfied with its outcome, the debate was an eye-opener. Many nuclear scientists, perhaps for the first time, discovered to their horror that they had lost people's trust and even their integrity as scientists was also in question. The representatives from uttara kannada held a meeting immediately after the debate and announced their decision to further intensify their agitation against the Kaiga reactor complex.

Tanks & Guns contd., from page 1

The Soviet tanks' armour plates which are now being imported are going to be made at Rourkela BHEL and thermo pressed at Tirchi; the turret casting is likely to be developed at Hardwar Unit. This is said to "...ultimately take India a step towards self- reliance." Think of all the fuel the tanks would consume even before they are made, being moved from one corner of the country to another! Think also of the priorities of the choices the Government makes in "development".

Tailpiece: Turbines made by BHEL for various nuclear power plants have cracked, broke and given way. (They were all fitted, one after another for the Kalpakkam plants). What now of the guns and tanks? Internal threats and external threats to the country are the same, like the ruling party has always said!?

Peoples Struggle contd., from page 2

Children demonstrate against Kaiga. Under the aegis of Rotract Club; Every single student of the Sarvodaya School sent a post card to the Prime Minister against Kaiga;

Oct. 02: Nearly 3000 people, including representatives from various voluntary organisations, from Bangalore, Mysore, Dharwad, South Kanara, Goa and Tamil Nadu throng Kaiga Project office, at Karwar.

Oct. 22: Procession and Dharna in Yellapur

Oct. 30: Hundreds of people, majority women, gherao Minister Deshpande asking him to stop work on Kaiga project. He says it is beyond the State Government but will ask the Chief Minister to pressurise the Centre.

Nov. 02: Karnataka-Goa Border bundh: over 100 leaders including a retired Dy SP, Fishermen's Union leader Sadashivghad Mandal Pradhan, Dr. Humayun Sheik and student leaders from Goa participate in the Road Block. Road blocking all over the district: 1500 people arrested in different places, including a large number of women. In Yellapur, Sirsi, Bhatkal, Honnavara, chipagi, Harugara, Kirkee, Bhairumbe, Kansur and Goa Border, Bisalakoppa.

Nov 04: Thousands gherao Minister Deshpande at Yellapur; symbolic road-block by hundreds of volunteers at Baleguli, Ankola

Nov 16: Devaraya Naik, MP is gheraoed by anti-nuclear activists asking him to define his stand on Kaiga project; BJP, District Unit demands stopping of K-project;

Nov 23: Petition to the Chief Minister at Karwar by opponents

PEOPLE'S VERDICT

An opinion poll conducted by a Sirsi daily, "JANA MADHYAMA" reveals that 88% of the people in the District are opposed to KAIGA Nuclear Plant.

Nov. 30: Karwar Municipality resolution against Kaiga Project

Dec. 16: Dr. Shivram Karanth, Jnanapeeth Award Winner, tells a massive gathering at Karwar that the nuclear scientists are lying to the country about its safety;

Dec. 24: Puppet show against Kaiga by Youth forum gains tremendous popularity.

Dec 27: State-level BJP leader condemn Kaiga Project.

STATE OF PREPARATION

It has been found that the bridges on the Kaiga route cannot take the load of the heavy vehicles that arrive for the project. Can preparation in case of an Emergency be only better ?

Dec. 28: Kanasur Mandal Panchayat opposes Kaiga Project

Jan. 16: People gherao government offices in Sirsi, Karwar and Ankola: 118 people arrested.

Jan. 17: Picketing of offices continues for the second day in Sirsi: 152 people arrested; In Mundagoda, people submit a memorandum to the Tahsildar.

MAMMOTH PEACE ACTION ON MARTYR'S DAY

The January 30th showdown at Kaiga and Karwar by thousands of people including farmers, fisherfolk, students, men, women and children of all classes and categories, had as much spontaneity as preparation behind.

Apart from the widespread preparation by countless volunteers in villages and towns, groups of leaders did a week-long intensive campaign in the interior villages between Kaiga and Karwar. Several leaders of groups like fisher folk, farmers and others had taken it upon themselves to prepare people in large numbers for the protest. Here is a first-hand account of the event:

On 30th the Padayatrees were the first to step into Kaiga. The Police were in full strength. Their vans and some K S R T C Buses were ready to pick up the Satyagrahis, the moment they began their agitation. The police with their guns & revolvers were guarding the gates of the Kaiga Nuclear site. Policemen holding Walkie Talkie instruments were also busy talking to their counterparts in Karwar and other Taluk centres of Uttara Kannada, feeding them with the latest information from Kaiga.

Dr. Kusuma, a live wire of the movement, Anath Ashisar, & myself went by the nearby road of about 8 K.M. Kusuma lead a section of satyagrahis to the Kaiga workspot through the thick forests. To our amazement and to the disappointment of the police, a batch of 100 women & 250 men marched in, as planned. The police did not anticipate that the Satyagrahis would march through woods and had not posted any policeman there. It was only when the Satyagrahis reached the workspot and jumped into the 20 ft deep foundation, the police came to know about it. Workers who were attending to work were scared and disappeared from the scene. The police came with vehicles and arrested all the Satyagrahis and put them in their vans.

Sathyagrahies in two batches of 100, who offered Satyagraha at the gates, were also arrested and taken to Karwar. Late in the evening Satyagrahis who entered Kaiga from Yellapur side were also brought in four K S R T C buses to Karwar. All of them were later released.

Those who were to offer Satyagraha, the next day numbering about 200 stayed back in Kaiga. In Kaiga there were no homes for shelter, and people stayed remain in the open in the thick forests. Some had brought bread, Roti, avalakki etc., and shared with others to sustain them for 3 days.

On the morning of 31st two more batches of Satyagrahis entered Kaiga from Yellapur side and were arrested. The police became panicky and decided to arrest all those who stayed overnight on 30th, to offer Satyagraha, the next day. When they resisted there was a mild lathi charge. Eventually all were arrested and sent to Karwar, where they were let off.

All the Satyagrahis arrested and released on 30th joined those who were brought and released at Karwar on 31st. They all decided to march to the Kaiga Administrative Office at Karwar. The police were taken unawares. The Satyagrahis entered the premises of the Kaiga office and squatted. Later they were arrested in the evening and let off at dusk. About 1300 persons were arrested on 31st.

On February 1, we decided to have Rasta Roko programme for 3 hours in the morning & to offer Satyagraha at the Kaiga administrative office at 12 noon. When we tried to enter the office, a policeman struck a 15 year old girl Satyagrahi with lathi and blood gushed through her nose. She was taken to a nearby hospital immediately by a couple of Satyagrahis.

The fisherman leader Sri. Krishnapur was annoyed and rushed to the policeman who beat that girl, snatched the lathi and threw it away. The police cautiously avoided any more ugly incident arrested all the Satyagrahis.

Nineteen Fishermen leaders were taken in police vans to the magistrate's court. The others were put into police vans & buses and were taken to the Tahasildar's office.

While the fishermen were remanded to judicial custody for 14 days others were all released. The released Satyagrahis protested against the police attitude and sat in a dharna demanding that either the fisherman leaders should be released or they be taken to jail because both had committed the same offense. The dharna continued for four days in the premises and the Thasildar's office. Food was supplied to the Satyagrahis by the people of Karwar in turns. A bundh call was given by the fisherman leaders and the Uttar Kannada Parisar Samrakshna Samithi on the 2nd of February and had excellent response and was total.

B.P. Kadam, Dr. Kusuma, the fisherman leaders and myself met the Deputy Commissioner and urged him to withdraw the charges leveled against the fishermen leaders. The District Magistrate assured that the charges would be withdrawn after referring to the Chief Minister, meanwhile the fisherman leaders were released on personnel surety.

The bulk of the Satyagrahis were from Karwar, Yellapur, Sirsi, Siddapur, Honnavar, Bhatkal, Ankola Talukas of uttara kannada District. Bangalore city, Koppa, Shimoga, Belgaum were also well represented.

The next phase of the fight will commence during March & is likely to continue for 3 months.

H.S. DORESWAMY

QUOTE

"Peak load losses in some towns were as high as 72% (Two instances quoted - Kyalanoor - 72.27% and Kembori - 71.47%, both in Kolar District)
- Lakshminarasimhiah, Minister of State for Power, quoted in HINDU, 24.6.87

SLOW POISONING

When we started the campaign against Kaiga Plant, people often were full of disbelief. "If it is so bad, how does the Government allow such a thing?" was a common reaction. Now what can one say to/of a Government that allows import of radioactive milk from the EEC? More than 12 countries in Africa and Asia have refused the Chernobyl-affected European milk products. India is the sole exception to accept it.

In a public interest litigation by the Maharashtra State Employees Federation, the Supreme Court dismissed the petition accepting BARC's certificate as to the "safety" of the milk. In this country, only BARC which is a wing of the Department of Atomic Energy, is the recognised authority in radioactive matters. (When beryllium pencils are lost in Calcutta or Hyderabad or Bangalore, BARC officials have to rush there with their GM Countries to try to trace them !

The Operation Flood and the centralised urban dairies, which is a prestigious brainchild of another techno-maniac, cannot survive without the EEC dump.

KOODANGULAM QUESTIONS

Anti-nuclear movements in the country have come to stay. While the movements against the older, half-built Reactors were rather late to start, the new sites are producing resistance as soon as the knowledge about the siting becomes public. The movements in Nagarjunasagar and Koodangulam in Tamil nadu have pre-empted starting on the work at the site. In Koodangulam, as in Kaiga, the people involved in the agitation are of all sections and classes-students, (including of the primary class), teachers, farmers, fisherfolk, the clergy, the lay, the workers and the white-collared.

The determined agitation prevented the PM from laying the foundation stone for the plant. Anxiety has been expressed also by people in Sri Lanka as they would be affected, too.

The Soviet-built VVER reactor model of 1000 MW that the Government wants to put in Koodangulam is listed by the Greenpeace as 'having several inherent defects... including inadequate containment structure, rudimentary emergency cooling systems, fault-prone pressure reduction systems, leakage of primary coolant through brittle fracturing of weld seams of the reactor vessel and signs of wear in valves and in the electrical,system...'

The Rs.6000 crore Soviet "package" includes setting up of reactors, regular supply or enriched uranium and taking back of the spent fuel. The opponents have raised several relevant questions regarding the inherent hazards of moving the deadly Uranium and Plutonium over the thousands of miles by all modes of transport. Is USSR using Indian territory and

People as its backyard for making its bombs ?

DECEMBER DEBATE HIGHLIGHTS

The long awaited National Workshop on Nuclear Power Projects with Specific Reference to Kaiga was finally held on December 10 and 11, 1988. The massive demonstration in Karwar on October 2 was followed by picketing of NPC office next day in which more than 300 activists led by Swamiji of Pejawar Math courted arrest. The news made headlines, led to a discussion in State Legislature and forced the Government to hold debate. The nuclear establishment, which had stalled the debate on several occasions earlier, had no option but to participate this time. It's attempts to dominate the proceedings met with some initial success. As a demoralising attempt, 15 days before the debate, the Central Government 'sanctioned' four more reactors in Kaiga.

However, the anti-nuclear activists (gathered in strength at the venue and) ensured that the proceedings were not reduced to a farce. Their main speakers, Prof AKN Reddy, Dr. Deivanayagam, Nagesh Hegde, Prof T Shivaji Rao, Dr Vishnu Kamath made well prepared presentations. (Former Justice VR Krishna Iyer fired the first Salvo, giving an overall picture of the failure of nuclear power elsewhere in the world. Dr Shivaram Karanth, who had been persuaded at the last minute to participate by the Karnataka CM, lashed out at the nuclear scientists and their tall talk which had lost all credibility with the people. Prof Dhirendra Sharma pointed out that nuclear establishment was misleading the press, the people, the Prime Minister and the Parliament with false statements.

The nuclear scientists fared badly in their defense. These was a sense of deja vu as many of them merely repeated their routine public relations speeches. Except for Dr M R Srinivasan, who put up a brave front, the other scientists were unprepared and/or were unequal to the task. Not one of our nucleocrats had the faintest idea of the crucial ecological issues involved in Kaiga. Instead they went to the extent of claiming that there were no forests in Kaiga. There was also a tendency to stray from their subjects to elaborate on how desperate the energy scenario in the country was and how atomic energy was imperative. (One of the main speakers from BARC, Dr. S D Soman, instead of discussing the impact of a reactor on the tropical rainforests, went on and on about the virtues of nuclear energy Vs coal). As the AEC's speakers constantly strayed from the subject the audience, particularly representatives from uttara kannada, found the proceedings irrelevant and demanded that the speaker stick to the main theme of the debate viz., Kaiga.

A common refrain throughout the debate was the shroud of secrecy that surrounds the atomic energy projects and its lack of public accountability. Dr. Srinivasan's defense that his Department cannot afford the paper to print reports on was met with derision. Several other cats were also let out of the bag. The probability of an earthquake at Kaiga, (when

faults have been found in the supa dam) the Atomic Energy Regulatory Board was not consulted in the selection of Kaiga site, and in fact, had not stamped its approval till date, radioactive materials are being transported through our towns and cities without the local people being informed of them, no repository as yet has been decided for the nuclear wastes. The DAE says, "it is not a problem yet".
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PEOPLE'S VERDICT

An opinion poll conducted by a Sirsi daily, "JANA MADHYAMA" reveals that 88% of the people in the District are opposed to KAIGA Nuclear Plant.

Nov. 30: Karwar Municipality resolution against Kaiga Project

Dec. 16: Dr. Shivram Karanth, Jnanapeeth Award Winner, tells a massive gathering at Karwar that the nuclear scientists are lying to the country about its safety;

Dec. 24: Puppet show against Kaiga by Youth forum gains tremendous popularity.

Dec. 27: State-level BJP leader condemn Kaiga Project.

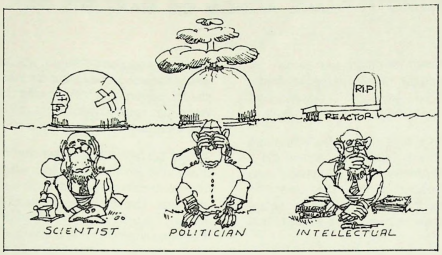
STATE OF PREPARATION

It has been found that the bridges on the Kaiga route cannot take the load of the heavy vehicles that arrive for the project. Can preparation in case of an Emergency be Done better?

Dec. 28: Kanasur Mandal Panchayat opposes Kaiga Project

Jan. 16: People gherao government offices in Sirsi, Karwar and Ankola: 118 people arrested.

Jan. 17: Picketing of offices continues for the second day in Sirsi: 152 people arrested; In Mundagoda, people submit a memorandum to the Tahsildar.



Indian Nuclear Scene

Jan. 20: Bharatiya Kisan Sangha, Sirsi resolves to oppose

Jan. 23: Chipagi Primary School organises an anti-Kaiga Meet.

Jan. 26: Seminar and public meeting in Shimoga, organised by AVINASHA, large gathering of students, teachers and people from all walks of life.

Jan. 30: Tyagili Youth Sangha resolves to fight Kaiga project

Jan. 30: Thousands throng Kaiga Project Office at Karwar and Project site at Kaiga: Over 400 arrested. 145 arrested in Siddapura.

Jan. 31: Picketing of Kaiga Project Office, Police lathi charge

Feb. 01: Students of Karwar boycott classes and join the picketing; Fisherfolk join in; thousands arrested;

Feb. 02: Picketing of Commissioner's Office in Karwar against criminal charges being filed against Fisherman leaders; lightning response at Sirsi calling for release of arrested leaders picketing of offices: over 400 people arrested.

Feb. 03: Arrested leaders go on hunger strike; Kadra Bundh.

QUOTE

"... the Gulfs of Kutch and Cambay taken together could generate 6,000 to 7,000 MW of electricity, which is nearly 40% of the electricity generated in India today"

Dr. P.C. Saxena, Director, Central Water Power Reserch Station, PUNE.

Published by: Cane, ~~809, 17th Block, Rajajinagar, Bangalore 560 010~~

BOOK POST

Citizens for Alternatives to Nuclear Energy (CANE)
809, 17th E Main, 6th Block,
Rajajinagar, Bangalore - 560 010.
INDIA

NUCLEAR NEWSPEAK

Unlike their power plants, our nuclear experts are a dependable lot. Year after year, occasion after occasion, speech after speech, you can rely on them to utter the same half-truths. Given below are some of their favourite assertions followed by our comments.

"Nuclear power is the cleanest way of producing electricity"

Nuclear radiation is invisible. It has no properties that human senses can percieve, but by no means can it be called 'clean'. The pollution caused by nuclear power is biological in nature rather than chemical.

"Radiation from our reactors is well below the safe limits. It is in fact only 5 millirems"

There is no such thing as a 'safe limit' for radiation. Even one atom of plutonium has the potential to kill. The 5 millirem figure refers only to the gamma radiation emitted by the reactors. The contamination of air, water and soil by release of radioactive substances is immeasurable.

"Actually thermal power stations are more radioactive than nuclear reactors"

There is much more to atomic energy than a reactor. The complete nuclear fuel cycle involves mining, milling, processing, fuel fabrication, fission, reprocessing, transport and waste storage operations spread over several years. In every one of these processes the environment is contaminated with radioactivity. Gamma ray emission from nuclear reactors forms only a small fraction of the total biological pollution by nuclear power programmes.

The emissions from a thermal station represent the worst of its pollution. Technology is also available for minimising such pollution. The comparison is therefore misleading and unwarranted.

"Nobody has died of radiation in India"

There is no way to identify the specific cause of cancer or genetic damage and no way to prove beyond any shadow of doubt that they were caused by nuclear radiation. Radiation tends to accumulate in the body, with increasing probability of cell damage. The carcinogenic and mutagenic effects of radiation may manifest themselves randomly after a delay of several years, obliterating any connection between nuclear power and its victims. The relevant question in this issue is, What basis do the nucleocrats have to assert that all deaths in India are due only to non-nuclear causes?

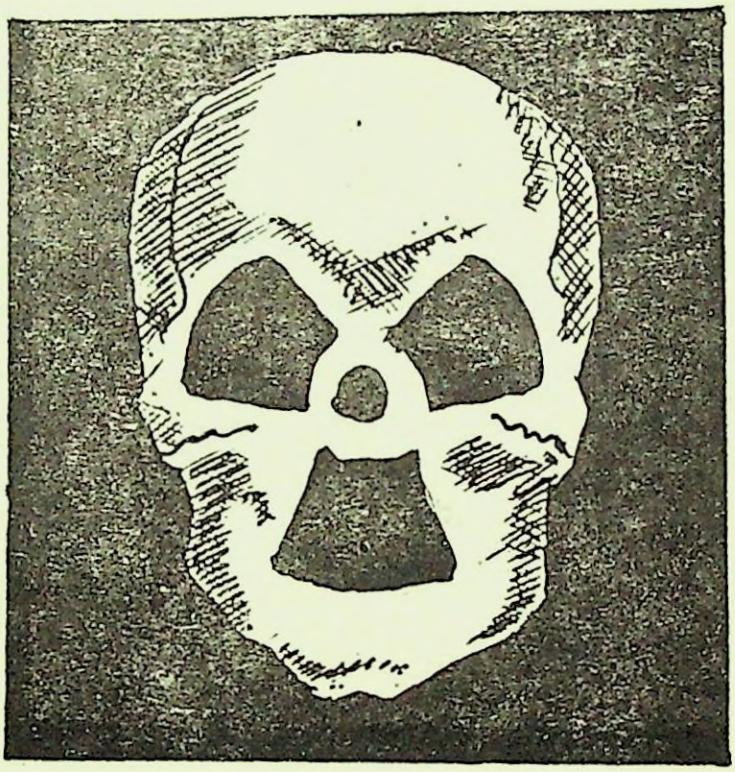
"Contrary to popular misconception, nuclear reactors cannot explode like nuclear bombs"

They don't have to ; they are the 'Silent Bombs'. Vast amounts of radioactivity from a reactor can be released into the environment without the accompaniment of a big bang. The Charnobyl reactor, for example, caught fire while the fuel assembly at Three Mile Island melted down into the earth.

"Chernobyl was of an old design. There is very little that it has in common with our reactors"

Citizens for Alternatives to Nuclear Energy (CANE)
809, 17th E Main, 5th Block,
Rajajinagar, Bangalore - 560 010,
INDIA

ಅಣುಶಕ್ತಿ



10 ಕಣ್ಣ ಮುಚ್ಚಿಗಳು 10 ಎಕ್ಕ ಸತ್ಯಗಳು 10

ನಾಗೇಶ್ ಹೆಗಡೆ

ಜನಜಾಗೃತಿ ಪುಸ್ತಕಮಾಲೆ

ANU-SHAKTI : HATTU KARALA MUKHAGALU, HATTU VAKRA SATYAGALU (Ten dark aspects of nuclear energy). Kannada. By NAGESH HEGDE.

Jointly published by Anushakti-Virodhi-Nagarika-Shakti (AVINASHA: Citizens Against Nuclear Energy), Bangalore, Mannu Rakshana Koota ('Save Soil' Fourm,) Bangalore, and Samaja Parivartana Samudaya, Dharwad-580 001 (India)
Pages: 23 1987

ಮುದ್ರಣ : ಆರ್ಕೆ ಎಂಟರ್‌ಪ್ರೈಸಸ್, ರಾಜಾಜಿನಗರ, ಬೆಂಗಳೂರು-೫೬೦ ೦೧೦

ಅಣುಶಕ್ತಿ —
10 ಕರಾಳ ಮುಖಗಳು,
10 ವಕ್ರ ಸತ್ಯಗಳು

ನಾಗೇಶ್ ಹೆಗಡೆ

ಸಹ–ಪ್ರಕಾಶನ :

ಅಣುಶಕ್ತಿ ವಿರೋಧಿ ನಾಗರಿಕ ಶಕ್ತಿ (ಅವಿನಾಶ), ಬೆಂಗಳೂರು

ಮಣ್ಣು ರಕ್ಷಣಾ ಕೂಟ, ಬೆಂಗಳೂರು

ಸಮಾಜ ಪರಿವರ್ತನ ಸಮುದಾಯ, ಧಾರವಾಡ

ಅರಿಕೆ

1986ರ ಫೆಬ್ರುವರಿ 16 ರಿಂದ 18ರ ವರೆಗೆ ಬೆಂಗಳೂರು ಸಮೀಪದ ಅರಸಿನಕುಂಟೆಯಲ್ಲಿ 'ಪರ್ಯಾಯ ಅಭಿವೃದ್ಧಿ ನೀತಿ' ಕುರಿತ ಕಾರ್ಯಗಾರವೊಂದು ನಡೆಯಿತು. ಅದನ್ನು ಸಂಯೋಜಿಸಿದ್ದುದು ಮಣ್ಣು ರಕ್ಷಣಾ ಕೂಟ, ಜನತಂತ್ರ ಸಮಾಜ (ಸಿಟಿಜನ್ಸ್ ಫಾರ್ ಡೆಮಾಕ್ರಸಿ ಕರ್ನಾಟಕ) ಮತ್ತು ಸಮಾಜ ಪರಿವರ್ತನ ಸಮುದಾಯ. ಅರಣ್ಯಗಳು, ಇಂಧನ, ವಿಜ್ಞಾನ, ಮಹಿಳಾಭಿವೃದ್ಧಿ ಮುಂತಾದ ವಿವಿಧ ವಿಷಯಗಳ ಬಗೆಗೆ ಅಲ್ಲಿ ಅಭಿಪ್ರಾಯ ವಿನಿಮಯ ನಡೆಯಿತು. ತಜ್ಞರೂ ಸಾಮಾಜಿಕ ಕಾರ್ಯಕರ್ತರೂ ಗಣನೀಯ ಸಂಖ್ಯೆಯಲ್ಲಿ ಭಾಗವಹಿಸಿದ್ದ ಆ ಕಾರ್ಯಕ್ರಮದಲ್ಲಿ ಕರ್ನಾಟಕ ಮಾತ್ರವಲ್ಲದೆ ಬೇರೆ ರಾಜ್ಯಗಳ ಹಲವರೂ ತಮ್ಮ ಚಿಂತನೆಯನ್ನು ಹಂಚಿಕೊಂಡರು. ವಿವಿಧ ಕ್ಷೇತ್ರಗಳಿಗೆ ಸಂಬಂಧಿಸಿದಂತೆ ಸರ್ಕಾರಿ ಹಾಗೂ ಸಾಮಾಜಿಕ ಧೋರಣೆಗಳು ಬದಲಾಗಬೇಕಾಗಿದೆಯೆಂದು ಎಲ್ಲರ ಅಭಿಪ್ರಾಯವಾಗಿತ್ತು. ಈ ಪರಿವರ್ತನೆಗೆ ದಾರಿಮಾಡಲು ಸಾಮಾಜಿಕ ಜಾಗೃತಿ ಹರಡಬೇಕಾಗಿದೆ. ಅದಕ್ಕೆ ಅನುಕೂಲವಾದ ಭೂಮಿಕೆಯನ್ನು ನಿರ್ಮಿಸಲು ಕೆಲವು ಕಿರುಹೊತ್ತಿಗೆಗಳ ಮೂಲಕವೂ ಜ್ಞಾನಪ್ರಸಾರ ಮಾಡಬೇಕೆಂದು ತೀರ್ಮಾನಿಸಲಾಯಿತು. ಆ ದಿಶೆಯ ಒಂದು ಪ್ರಯತ್ನ—ಅಣುವಿದ್ಯುತ್ತನ್ನು ಕುರಿತ ಈ ವಿಶ್ಲೇಷಣ ಪ್ರಬಂಧ. ಇದನ್ನು ಪ್ರಕಟನೆಗಾಗಿ ಸಿದ್ಧಪಡಿಸಿಕೊಟ್ಟ ನಾಗೇಶ್ ಹೆಗಡೆ ಅವರಿಗೆ ನಾವು ಕೃತಜ್ಞರಾಗಿದ್ದೇವೆ. ಗ್ರಾಮೀಣ ಜೀವನದ ಬಗೆಗೆ ಕಾಳಜಿಯಿರುವ ಅನ್ಯಾನ್ಯ ವ್ಯಕ್ತಿಗಳಿಂದಲೂ ಸಂಘಟನೆಗಳಿಂದಲೂ ಪ್ರೋತ್ಸಾಹ ಕೋರುತ್ತೇವೆ.

ಏಪ್ರಿಲ್ 5, 1987

—ಪ್ರಕಾಶಕರು

1. ಅಣುಶಕ್ತಿಯು 10 ಕರಾಳ ಮುಖಗಳು :

1. ಅಣು ವಿಕಿರಣ ಜೀವಪರಿಸರಕ್ಕೆ ಅಪಾಯಕಾರಿ. ಅದು ಜೀವವಿಕಾಸಕ್ಕೇ ವಿರೋಧಿ.

2. ವಿಕಿರಣದ ಪರಿಣಾಮ ಪ್ರತ್ಯಕ್ಷ ಕಾಣುವುದಿಲ್ಲ. ಶೀಘ್ರ ಗೊತ್ತಾಗುವುದೂ ಇಲ್ಲ. ರೋಗಕ್ಕೆ ತುತ್ತಾದರೆ ಪರಿಹಾರ ಇಲ್ಲ.

3. ಅಣುಶಕ್ತಿಯಿಂದ ವಿದ್ಯುತ್ ಉತ್ಪಾದಿಸಿದರೆ ಆರ್ಥಿಕ ಲಾಭಕ್ಕಿಂತ ಹಾನಿಯೇ ಹೆಚ್ಚು.

4. ಕೇಂದ್ರೀಕೃತ ವ್ಯವಸ್ಥೆಯಲ್ಲೇ ಅದು ಕಾರ್ಯಾಚರಣೆ ನಡೆಸುತ್ತದೆ. ಅದು ಮನುಷ್ಯರನ್ನು ದಾಸ್ಯತ್ವದಲ್ಲಿಡುತ್ತದೆ.

5. ಅಣುಶಕ್ತಿಯು ಶಾಂತಿವಿರೋಧಿ. ಬಾಂಬ್ ಉತ್ಪಾದನೆಗೆ ಹಾಗೂ ಭಯೋತ್ಪಾದಕರಿಗೆ ಪ್ರಚೋದನೆ ನೀಡುತ್ತದೆ.

6. ಅದು ಪ್ರಜಾತಂತ್ರ ವಿರೋಧಿ. ರಕ್ಷಣೆಯ ನೆಪದಲ್ಲಿ ಹಾಗೂ ರಹಸ್ಯದ ನೆರಳಲ್ಲಿ ಅದು ವ್ಯಕ್ತಿಸ್ವಾತಂತ್ರ್ಯವನ್ನು ಹತ್ತಿಕ್ಕುತ್ತದೆ.

7. ಮುಂದಿನ ಪೀಳಿಗೆಯ ಮೇಲೆ ಅದು ಋಣಭಾರ ಹೇರುತ್ತದೆ. ನಮ್ಮ ತಪ್ಪಿಗೆ ಮುರಿಮಕ್ಕಳನ್ನು ಬಲಿ ತೆಗೆದುಕೊಳ್ಳುತ್ತದೆ.

8. ಇಂದಿನವರು ಮಾಡಿದ ತಪ್ಪನ್ನೇ ಮುಂದಿನ ಜನಾಂಗದವರೂ ಕಡ್ಡಾಯ ಮುಂದುವರಿಸಬೇಕಾಗುತ್ತದೆ.

9. ಅಣುಶಕ್ತಿ ದುಂದುವೆಚ್ಚವನ್ನು ಪ್ರೇರೇಪಿಸುತ್ತದೆ,

10. ಬದಲೀ ಶಕ್ತಿಮೂಲ ಶೋಧಕ್ಕೆ ತಡೆ ಒಡ್ಡುತ್ತದೆ. ಶೋಧ ನಿಧಿಯನ್ನೆಲ್ಲ ತಾನೇ ಕಬಳಿಸುತ್ತದೆ.

2. ಭೂಚರಿತ್ರೆಯಲ್ಲಿ ಅಣುಶಕ್ತಿ

ಸುಮಾರು 450 ಕೋಟಿ ವರ್ಷಗಳ ಹಿಂದೆ ಅದೇ ತಾನೇ ಸೂರ್ಯನಿಂದ ಸಿಡಿದು ಬಂದು ಬುಧ, ಶುಕ್ರ, ಭೂಮಿ, ಮಂಗಳ, ಗುರು, ಶನಿ ಇತ್ಯಾದಿ ನವಗ್ರಹಗಳು ಕೆಂಡದ ಉಂಡೆಯ ರೂಪದಲ್ಲಿ ಜನ್ಮ ತಾಳಿದವು. ಭೂಮಿಯಂತೂ ಸುಡುವ ಸೂರ್ಯನ ತುಣುಕಾಗಿತ್ತು. ಅದರಿಂದ ಸೂಸುವ ವಿಕಿರಣ ವಸ್ತುಗಳೆಲ್ಲ ಅಳಿದು ಭೂಮಿಯ ಮೇಲ್ಮೈ ತಂಪಾಗಲು 250 ಕೋಟಿ ವರ್ಷಗಳೇ ಬೇಕಾದವು. ಜ್ವಾಲಾಮುಖಿಗಳೆಲ್ಲ ಅಳಿದು, ಮೋಡ-ಮಳೆ-ಸರೋವರ-ಸಮುದ್ರಗಳೂ ನಿರ್ಮಾಣವಾದವು. ನೀರಲ್ಲಿ ಪಾಚಿ, ಜಲಚರಗಳು ಸೃಷ್ಟಿಯಾದವು. ವಿಕಿರಣ ಸೂಸುವ ಖನಿಜಗಳು ಭೂಮಿಯ ಒಡಲಲ್ಲಿ ಮಾತ್ರ ಉಳಿದವು. ಬಾಹ್ಯ ವಿಶ್ವದಿಂದ ಬರುವ ಅಪಾಯಕಾರಿ ಕಿರಣಗಳನ್ನು ತಡೆಗಟ್ಟುವಂತೆ ಭೂಮಿ ತನ್ನ ಸುತ್ತ ಹವಾ ಕವಚ ನಿರ್ಮಿಸಿಕೊಂಡಿತು. ಜೀವಸೃಷ್ಟಿಗೆ ನೆಲ ಹದವಾಯಿತೆಂದಾಗ, ಸುಮಾರು 40 ಕೋಟಿ ವರ್ಷಗಳ ಹಿಂದೆ, ನೀರಿನ ಜೀವಿಗಳು ಮೆಲ್ಲಗೆ ದಡ ಏರಿದವು. ಅಣುಶಕ್ತಿಯ ಕಾವು ನಿಸರ್ಗದಲ್ಲಿ ಕಮ್ಮಿಯಾಗುತ್ತಾ ಬಂದಹಾಗೆ, ಜೀವಿಗಳು ವಿಕಾಸಗೊಳ್ಳುತ್ತಾ ಬಂದು ಮತ್ಸ್ಯ, ಕೂರ್ಮ, ವರಾಹಗಳಿಂದ ಹಿಡಿದು ಕೃಷ್ಣ ರಾಮರ ವರೆಗೂ ಹಂತ ಹಂತವಾಗಿ ಬುದ್ಧಿಶಕ್ತಿ ವರ್ಧಿಸುತ್ತ ಬಂತು. ನಂತರ ಕಲಿಕಾಲ ಬಂತು.

ಜೀವಿಗಳಿಗೆ ಮಾರಕ ಆಗಬಲ್ಲ ಎಲ್ಲ ವಸ್ತುಗಳನ್ನೂ ಭೂಮಿ ತನ್ನ ಮಡಿಲಲ್ಲಿ ಅಡಗಿಸಿಕೊಂಡಿತ್ತು. ಆದರೆ ಬುದ್ಧಿವಂತ ಮಾನವ ಅವುಗಳನ್ನೆಲ್ಲ ಒಂದೊಂದಾಗಿ ಮತ್ತೆ ಹೊರತೆಗೆಯ ತೊಡಗಿದ. ಗಂಧಕ ಹೊರತೆಗೆದು ಸಿಡಿಮದ್ದು ತಯಾರಿಸಿದ, ಕಲ್ಲಿದ್ದಲು ಅಗೆದು ಉದ್ಯಮಕ್ರಾಂತಿ ಮಾಡಿದ. ಇನ್ನೂ ಆಳಕ್ಕಿಳಿದು ಪೆಟ್ರೋಲಿಯಂ ದ್ರವ್ಯಗಳನ್ನು ಭೂಗರ್ಭದಿಂದ ಹೊರಗೆಳೆದು ತನ್ನ ಶಕ್ತಿಯನ್ನು ಸೂರ್ಮಡಿ ಹೆಚ್ಚಿಸಿಕೊಂಡ. ಹೊಗೆ, ವಿಷಾನಿಲಗಳಳ್ನು ಸೃಷ್ಟಿಸಿ ಗಾಳಿಗೆ, ನೀರಿಗೆ, ಮಣ್ಣಿಗೆ ತೂರಿದ. ನಿಸರ್ಗ ಅತ್ಯಂತ ನಿಗೂಢವಾಗಿ ಬಚ್ಚಿಟ್ಟಿದ್ದ ಅಣುಶಕ್ತಿಯನ್ನೂ ತನ್ನ ಅಗಾಧ ಬುದ್ಧಿಮತ್ತೆಯಿಂದ ಪತ್ತೆಹಚ್ಚಿ ಪಶುಪ್ರವೃತ್ತಿಗೆ ಕುಮ್ಮಕ್ಕು ಕೊಟ್ಟು ಬಾಂಬ್ ತಯಾರಿಸಿಬಿಟ್ಟ.

ಹಿರೋಶಿಮಾ - ನಾಗಾಸಾಕಿಯ ಮುಗ್ಧ ಜನರ ಮೇಲೆ ಅಣ್ವಸ್ತ್ರ ಝಳಪಿಸಿ ಅನೇಕ ಲಕ್ಷ ಜನರನ್ನು ಹೊಸಕಿಹಾಕಿದ. ಅಪರ ವಂಶವೂ ತಲೆತಲಾಂತರ ನರಳು

ಪಂತೆ ಮಾಡಿದ. ಕೊನೆಗೆ, ಈ ದೈತ್ಯಶಕ್ತಿಗೇ ಅವತಾರ ಪುರುಷನ ವೇಷ ತೊಡಿಸಿ, ಮಾನವ ಕಲ್ಯಾಣಕ್ಕೆಂದೇ ಸೃಷ್ಟಿಸಿದ್ದೆಂದು ಹೇಳುತ್ತ ತನ್ನವರ ಮೇಲೆ ಮುಂಕುಬೂದಿ ಎರಚುತ್ತ ಬಂದ. ನಿಸರ್ಗದಲ್ಲಿ ಹಿಂದೆಂದೂ ಇಲ್ಲದಿದ್ದ 'ಪ್ಲುಟೋನಿಯಂ' (ನರಕದೇವತೆ) ಎಂಬ ಮೂಲವಸ್ತುವನ್ನು ಸೃಷ್ಟಿಮಾಡಿ ಶಾಂತಿಯ ಹೆಸರಿನಲ್ಲಿ ಇನ್ನಷ್ಟು ಬಾಂಬ್‌ಗಳನ್ನು ತಯಾರಿಸುತ್ತ ಬಂದ.

3. ಜೀವವಿರೋಧಿ ಅಣುಶಕ್ತಿ

ಈ ಶತಮಾನದ ಪ್ರಾರಂಭದಲ್ಲೇ ರೇಡಿಯಂ ಎಂಬ ವಿಕಿರಣ ಸೂಸುವ ವಸ್ತುವಿನ ಸಂಶೋಧನೆಯಾಯಿತು. ಆಗ ವಿಕಿರಣ ಎಷ್ಟು ಅಪಾಯಕಾರಿ ಎಂಬುದು ಯಾರಿಗೂ ತಿಳಿದಿರಲಿಲ್ಲ. ವರ್ಷ ಕಳೆದಂತೆ ಸ್ವತಃ ಅವರ ಮೂಲ ಸಂಶೋಧಕ ಪಿಯರಿ ಕ್ಯೂರಿ ತಾನೇ ವಿಕಿರಣರೋಗಕ್ಕೆ ತುತ್ತಾದ. ಆತ ಅಪಮೃತ್ಯುವಿಗೆ ಈಡಾದ ಮೇಲೆ ಅವನ ಪತ್ನಿ ಮೇಡಮ್ ಕ್ಯೂರಿ ಸಂಶೋಧನೆ ಮುಂದುವರಿಸಿ ಎರಡೆರಡು ನೊಬೆಲ್ ಪ್ರಶಸ್ತಿ ಗೆದ್ದರೂ ಹತ್ತು - ಹನ್ನೆರಡು ಬಗೆಯ ವಿಕಿರಣ ಕಾಯಿಲೆಗಳಿಗೆ ಗುರಿಯಾಗಿ ದಾರುಣ ನೋವು ಅನುಭವಿಸುತ್ತ ಅಸುನೀಗಬೇಕಾಯಿತು. ಅಂದಿನ ದಿನಗಳಲ್ಲಿ ವಾಚಿನ ಡಯಲ್‌ಗಳಿಗೆ ರೇಡಿಯಂ ಬಣ್ಣ ಬಳಿಯುತ್ತಿದ್ದ ಅಸಂಖ್ಯಾತ ಮಹಿಳಾ ಕಾರ್ಮಿಕರು ಚಿತ್ರವಿಚಿತ್ರ ರೋಗಗಳಿಗೆ ಸಿಲುಕಿದರು.

ರೇಡಿಯಂ ಅಂಥದೇ ಯುರೇನಿಯಮ್ ಎಂಬ ಅದುರನ್ನು ಶುದ್ಧೀಕರಿಸಿದರೆ ತನ್ನ ಕಿರಣದಿಂದ ಅದು ತಾನೇ ಜ್ವಲಿಸುತ್ತದೆ ಎಂದು ತಿಳಿದು ಬಂದಾಗ, 1940 ರಲ್ಲಿ ಅಮೆರಿಕ ಮತ್ತು ಇಂಗ್ಲೆಂಡ್‌ಗಳಲ್ಲಿ ಅದನ್ನು ಬಾಂಬ್ ತಯಾರಿಕೆಗೆಂದು ರಹಸ್ಯವಾಗಿ ಶುದ್ಧೀಕರಿಸುವ ಕೆಲಸ ಪ್ರಾರಂಭವಾಯಿತು. ಜರ್ಮನಿಯ ಹಿಟ್ಲರ್ ಕೂಡಾ ಅದೇ ಕೆಲಸವನ್ನು ವಿಜ್ಞಾನಿಗಳಿಂದ ಮಾಡಿಸುತ್ತಿದ್ದಾನೆಂಬ ವದಂತಿಯೂ ಇತ್ತು. ಆದರೆ ಬಾಂಬ್ ತಯಾರಿಸಿ, ಅಮೆರಿಕದ ಮರುಭೂಮಿಯಲ್ಲಿ ಪರೀಕ್ಷಾರ್ಥ ಸಿಡಿಸುವ ಹೊತ್ತಿಗೆ ಎರಡನೇ ಮಹಾಯುದ್ಧ ಮುಗಿದಿತ್ತು. ಹಿಟ್ಲರ್ ಸತ್ತು ಜರ್ಮನಿ ಶರಣಾಗತಿ ಪಡೆದಿತ್ತು. ಜಪಾನ್ ಕೂಡಾ ಶರಣಾಗುತ್ತೇನೆಂದು ರಹಸ್ಯ ಸಂದೇಶ ಕಳುಹಿಸಿತ್ತು. ಬಾಂಬ್ ತಯಾರಿಸಿದ್ದನ್ನು ಪ್ರಯೋಗಿಸಿ ನೋಡುವ ಚಪಲದಿಂದ ಅಮೆರಿಕನ್ ಪ್ರಭುಗಳು ಜಪಾನ್‌ನ ಹಿರೋಶಿಮಾ ನಾಗರಿಕರ ಮೇಲೆ ಯುರೇನಿಯಂ ಬಾಂಬ್ ಹಾಕಿದರು. ಒಂದೂವರೆ ಲಕ್ಷ ಜನ ಗತಿಸಿ, ನಗರ

ಸಪಾಟಾಯಿತು. ಅಮೆರಿಕ, ಯುರೇನಿಯಂ ಭಸ್ಮ ಪ್ಲುಟೋನಿಯಂ ಬಳಸಿ ರಚಿಸಿದ್ದ ಇನ್ನೂ ಒಂದು ಬಾಂಬನ್ನು ಮೂರು ದಿನಗಳ ನಂತರ ನಾಗಾಸಾಕಿಯ ಮೇಲೆ ಅಸ್ಫೋಟಿಸಿತು.

ವಿಶ್ವಾದ್ಯಂತ ಛೀಮಾರಿ ಹಾಕಿಸಿಕೊಂಡ ಅಮೆರಿಕಕ್ಕೆ ಅಣುಶಕ್ತಿಯಿಂದ ವೀರು ಕಾಯಿಸಿ ವಿದ್ಯುತ್ ಕೂಡಾ ಉತ್ಪಾದನೆ ಮಾಡುವ ತಂತ್ರ ಲಭಿಸಿತ್ತು. ಇತರ ರಾಷ್ಟ್ರಗಳಿಗೂ ಈ ತಂತ್ರ ಹಣವನ್ನೂ ಮಾನವನ್ನೂ ಗಳಿಸುವ ಹಂಬಿಕೆ ಹೂಡಿತು. "ಅಣು ವಿದ್ಯುತ್ ಎಷ್ಟು ಅಗ್ಗವೆಂದರೆ ಅದಕ್ಕೆ ವಿೂಟರ್ ಜೋಡಿಸುವ ಅಥವಾ ಬಿಲ್ ಪಾವತಿ ಮಾಡುವ ಅಗತ್ಯವೇ ಇಲ್ಲ-ಅಷ್ಟು ಪುಕ್ಕಟೆ" ಎಂದೆಲ್ಲ ಶ್ಲಾಘಿಸಿತು. ಇತರ ದೇಶಗಳ ಪ್ರತಿಭಾವಂತ ವಿಜ್ಞಾನಿಗಳನ್ನು ಕರೆಸಿ, ಅಣು ತಂತ್ರದ ಪಾಠ ನೀಡಿತು. ಪ್ರಶಸ್ತಿ ಪುರಸ್ಕಾರ ನೀಡಿ ಶಾಭಾಸ್ ಹೇಳಿ ಅಪರವರ ದೇಶಗಳಲ್ಲಿ ಅಣು ಬೀಜ ಬಿತ್ತಲು ಪ್ರಸಲಾಯಿಸಿ ಕಳುಹಿಸಿತು. ತಾನು ಬ್ರಿಟನ್ ಮತ್ತು ಫ್ರಾನ್ಸ್ ಜತೆಗೂಡಿ ಅಣುಸ್ಥಾವರಗಳನ್ನು ನಿರ್ಮಿಸಿ ಅದರಿಂದ ಸಿಗುವ ಭಸ್ಮದಿಂದ ಬಾಂಬ್ ತಯಾರಿಸಿ ಪೇರಿಸುತ್ತ ಬಂತು. ಅಣುಕಾರ್ಮಿಕರ ಆರೋಗ್ಯಕ್ಕೆ ಹಾಗೂ ರಾಷ್ಟ್ರದ ಬೊಕ್ಕಸಕ್ಕೆ ಉಂಟಾಗುವ ನಷ್ಟವನ್ನೆಲ್ಲ ಮರೆಮಾಚುತ್ತ ಬಂತು.

ಅಣುಕಿರಣ ಸೋಂಕಿದರೆ ಕೂದಲು ಉದುರುತ್ತದೆ. ನಪುಂಸಕತ್ವ ಬರುತ್ತದೆ. ರಕ್ತದ ಕ್ಯಾನ್ಸರ್, ಕರುಳಿನ ಕ್ಯಾನ್ಸರ್, ಶ್ವಾಸಕೋಶದ ಕ್ಯಾನ್ಸರ್ ಮುಂತಾದ 2000ಕ್ಕೂ ಹೆಚ್ಚು ಬಗೆಯ ರೋಗಗಳು ತಲೆದೋರುತ್ತವೆ. ಯುರೇನಿಯಂ ಗಣಿಯಲ್ಲಿ ಕೆಲಸ ಮಾಡುವವರು ಕ್ರಮೇಣ ಪುಪ್ಪುಸದ ಕ್ಯಾನ್ಸರ್‌ಗೆ ತುತ್ತಾಗುತ್ತಾರೆ. ಗಣಿಯಿಂದ ತೆಗೆದ ಅದುರನ್ನು ತೊಳೆದ ನೀರು ನದಿಗೆ ಸೇರಿದರೆ ಜಲಚರಗಳಿಗೆ ಅಪಾಯ. ಗಣಿಬಳಿ ಬಿಸಾಕಿದ ಮಣ್ಣಿನ ರಾಶಿಯಲ್ಲಿ ಬಿಡಾರ ಹೂಡಿಕೊಂಡವರಿಗೆ ವಿಕಾರ ರೂಪದ ಮಕ್ಕಳು ಜನಿಸಿದ ಉದಾಹರಣೆಗಳಿವೆ. ಆದರೆ ಈ ಯಾವ ರೋಗ ಬಂದರೂ ಸರಕಾರವಾಗಲೀ, ಗಣಿ ಗುತ್ತಿಗೆದಾರರಾಗಲೀ ಪರಿಹಾರ ನೀಡುವುದಿಲ್ಲ. ಏಕೆಂದರೆ, ಈ ರೋಗಗಳು ತಕ್ಷಣ ತಲೆದೋರುವುದಿಲ್ಲ. ನಿಧಾನವಾಗಿ ಆಕ್ರಮಿಸಿದರೂ, ಅಣುವಿಕಿರಣದಿಂದಾಗಿಯೇ ರೋಗ ಬಂತೆಂದು ಯಾವ ವೈದ್ಯನೂ ಹೇಳುವ ಹಾಗಿಲ್ಲ.

ಅಣುವಿಕಿರಣದಿಂದ ಬರುವ ರೋಗಕ್ಕೂ ಅಣುಶಕ್ತಿಯ ಇಲಾಖೆಗೂ ಯಾವ ಸಂಬಂಧವೂ ಇರುವುದಿಲ್ಲ. ಅಣುಸ್ಥಾವರದಿಂದ ಹತ್ತಾರು ಮೈಲು ದೂರ

ದಲ್ಲಿ ತನ್ನ ಪಾಡಿಗೆ ತಾನು ಬದುಕುತ್ತಿದ್ದರೂ, ಗಾಳಿಯ ಮೂಲಕ, ನೀರಿನ ಮೂಲಕ, ತರಕಾರಿ ಆಥವಾ ಹಸುವಿನ ಹಾಲಿನ ಮೂಲಕ ರೋಗಗಳು ಬರುತ್ತವೆ. ರೋಗದ ಲಕ್ಷಣಗಳು ಗೊತ್ತಾಗುವ ಮೊದಲೇ ನಾವು ಸತ್ತುಹೋದರೂ, ನಮ್ಮ ಮಕ್ಕಳು-ಮರಿ ಮಕ್ಕಳಿಗೆ ಬಾಲ್ಯದಲ್ಲಿಯೇ ರಕ್ತದ ಕ್ಯಾನ್ಸರ್ ಬರಬಹುದು. ನಮ್ಮ ದೇಶದ ಆಚೆ ಸಾವಿರಾರು ಮೈಲು ದೂರದಲ್ಲಿ ಅಣುಸ್ಥಾವರ ಸ್ಫೋಟವಾದರೂ ನಾವು ರೋಗಕ್ಕೆ ಬಲಿಯಾಗಬಹುದು. ರಷ್ಯದ ಚೆರ್ನೊಬಿಲ್ ಅಣುಸ್ಥಾವರ ಸಿಡಿದು ಒಂದು ವರ್ಷವಾದರೂ ಈಗಲೂ ಎರಡು ಸಾವಿರ ಕಿಲೋಮೀಟರ್ ಆಚೆ ನಾರ್ವೆ ದೇಶದ ಬಡ ಮೂಲ ನಿವಾಸಿಗಳು ತಮ್ಮ ಬದುಕಿನ ಏಕೈಕ ಆಧಾರವಾದ ರೇನ್ ಡಿಯರ್ ಪ್ರಾಣಿಯ ಹಾಲು ಕುಡಿಯುವಂತಿಲ್ಲ, ಮಾಂಸ ತಿನ್ನುವಂತಿಲ್ಲ. ಅಲ್ಲಿಯ ಹುಲ್ಲೂ ವಿಕಿರಣ ಪೂರಿತವಾಗಿದೆ. ಆದರೆ ವಿಕಿರಣ ವಿಷ ಕಣ್ಣಿಗೆ ಕಾಣುವುದಿಲ್ಲ ; ಬಣ್ಣ-ವಾಸನೆ-ರುಚಿ ಏನೂ ಅದಕ್ಕಿರುವುದಿಲ್ಲ. ವಿಜ್ಞಾನಿಗಳು ಬಂದು ಪರೀಕ್ಷೆ ಮಾಡಿದರೆ ಬದಲೀ ಆಹಾರ ಹುಡುಕಬೇಕು. ಇಲ್ಲವಾದರೆ ವಿಕಿರಣ ವಸ್ತುವನ್ನೇ ಹೊಟ್ಟೆಗೆ ಸೇವಿಸುತ್ತ, ಏನೇನೋ ರೋಗಗಳಿಗೆ ತುತ್ತಾಗಿ, ವಿಕಲಾಂಗ ಮಕ್ಕಳಿಗೆ ಜನ್ಮ ಕೊಡಬೇಕು.

4. ಅಣುಶಕ್ತಿಯಿಂದ ಆರ್ಥಿಕ ಹಾನಿ

ನೀರಿನಿಂದ ವಿದ್ಯುತ್ ಉತ್ಪಾದಿಸಿದರೆ ಪ್ರತಿ ಯೂನಿಟ್‌ಗೆ 30 ಪೈಸೆ ವೆಚ್ಚ ಬರುತ್ತದೆಂದು ಅಂದಾಜಿದೆ. ರಾಯಚೂರಿನ ಥರ್ಮಲ್ ವಿದ್ಯುತ್ ಘಟಕದಲ್ಲಿ ಕಲ್ಲಿದ್ದಲನ್ನು ಉರಿಸಿ, ನೀರು ಕುದಿಸಿ ಆವಿಯಿಂದ ವಿದ್ಯುತ್ ಉತ್ಪಾದಿಸಿದರೆ ಪ್ರತಿ ಯೂನಿಟ್‌ಗೆ 60 ಪೈಸೆ ವೆಚ್ಚವಾಗುತ್ತದೆ. ಅಣು ವಿದ್ಯುತ್ ಕೂಡಾ ಅಷ್ಟೇ ವೆಚ್ಚದ್ದೆಂದೂ, ಹೆಚ್ಚೆಂದರೆ 80 ಪೈಸೆ ಆದೀತೆಂದೂ ಅಣುವಿಜ್ಞಾನಿಗಳು ಹೇಳುತ್ತಾರೆ. ಬಹುಶಃ ಬಳಕೆದಾರನಿಂದ ನೇರವಾಗಿ ಅಷ್ಟೇ ದರದಲ್ಲಿ ವಿದ್ಯುತ್ ಶುಲ್ಕ ವಸೂಲು ಮಾಡಬಹುದು. ಆದರೆ ಸರಕಾರಕ್ಕೆ ಅಣುವಿದ್ಯುತ್ ಉತ್ಪಾದನೆಯಿಂದ ನಿಜಕ್ಕೂ ಪ್ರತಿ ಯೂನಿಟ್‌ಗೆ 2 ರೂಪಾಯಿಗಳಷ್ಟು ವೆಚ್ಚ ಬೀಳುತ್ತದೆಂದು ಆರ್ಥಿಕ ತಜ್ಞರು ಲೆಕ್ಕ ಹಾಕಿದ್ದಾರೆ. ಏಕೆಂದರೆ ಸಂಶೋಧನೆಯ ವೆಚ್ಚ, ಗಣಿ ಅಗೆತದ ವೆಚ್ಚ, ಭಸ್ಮ ಹೂಳುವ ವೆಚ್ಚ, ಅಣು ಸ್ಥಾವರವನ್ನು ಭವಿಷ್ಯದಲ್ಲಿ ಕಳಚಿ ಹೂಳುವ ವೆಚ್ಚ ಇತ್ಯಾದಿಗಳನ್ನು ಲೆಕ್ಕಕ್ಕೆ ಪರಿಗಣಿಸುವ ಪದ್ಧತಿ ಇಲ್ಲ. ಅಂದರೆ ಪ್ರತಿ ಯೂನಿಟ್ ವಿದ್ಯುತ್ತಿಗೆ ನಾವು ನೇರ

80 ಪೈಸೆ ನೀಡಿದರೂ, ಪರೋಕ್ಷವಾಗಿ ತೆರಿಗೆ ರೂಪದಲ್ಲಿ ಅದರ ದುಪ್ಪಟ್ಟು ನೀಡಬೇಕಾಗುತ್ತದೆ. ವಿದ್ಯುತ್ ಬಳಸದೇ ಇದ್ದರೂ ಸರಕಾರೀ ವೆಚ್ಚವೆಂದರೆ ನಾವೇ ಜೊಕ್ಕಸಕ್ಕೆ ಹಣ ಭರ್ತಿ ಮಾಡಬೇಕಾಗುತ್ತದೆ.

ಅಷ್ಟೇ ಅಲ್ಲ, ಅಣುಸ್ಥಾವರವೊಂದು ತನ್ನ ಜೀವಿತದ 20 ವರ್ಷ ಅವಧಿಯಲ್ಲಿ ಉತ್ಪಾದಿಸುವ ವಿದ್ಯುತ್ತಿಗಿಂತ, ತಾನು ನುಂಗುವ ಶಕ್ತಿಯು ಮೊತ್ತವೇ ಹೆಚ್ಚಾಗಿರುತ್ತದೆಂದು ವಾದಿಸುವವರೂ ಇದ್ದಾರೆ. ಅಣುಸ್ಥಾವರದ ನಿರ್ಮಾಣದ ಹತ್ತು ವರ್ಷದ ಅವಧಿಯಲ್ಲಿ ಸಿಮೆಂಟು, ಉಕ್ಕು, ಸಾಗಾಟ, ಅಗೆತ, ವಿದ್ಯುತ್ ಜಾಲ ನಿರ್ಮಾಣ, ಯುರೇನಿಯಮ್ ಸಂಸ್ಕರಣ ಇತ್ಯಾದಿಗೆಲ್ಲ ಎಷ್ಟು ಶಕ್ತಿ ವ್ಯಯ ಮಾಡುತ್ತದೆಂದು ಯಾರೂ ಈವರೆಗೆ ಲೆಕ್ಕ ಒಪ್ಪಿಸಿಲ್ಲ. ಪ್ರತಿ ಬಾರಿ ಅಣುಸ್ಥಾವರ ಕೆಟ್ಟುಕೂತಾಗಲೂ ಬೇರೆ ಕಡೆಯಿಂದ ವಿದ್ಯುತ್ತನ್ನು ಎರವಲು ತಂದು ಸ್ಥಾವರದ ಯೋಗಕ್ಷೇಮ ನೋಡಿಕೊಳ್ಳಬೇಕು. ಅಣುಸ್ಥಾವರವನ್ನು ಆಮೇಲೆ ಸಮಾಧಿ ಮಾಡುವಾಗಲೂ ಶಕ್ತಿಯನ್ನು ಎರವಲು ತೆರಬೇಕು. ಇವೆಲ್ಲವನ್ನೂ ಪರಿಗಣಿಸಿದರೆ ಜಮೆಗಿಂತ ಖರ್ಚೇ ಹೆಚ್ಚಾದೀತೆಂದು ಸುಲಭವಾಗಿ ಊಹಿಸಬಹುದು. ತಾರಾಪುರದ ಸ್ಥಾವರ 11 ವರ್ಷಗಳಲ್ಲಿ 344 ಬಾರಿ, ರಾಜಸ್ಥಾನದ ಕೋಟಾ ಸ್ಥಾವರ 10 ವರ್ಷಗಳಲ್ಲಿ 251 ಬಾರಿ ಕೆಟ್ಟು ಕೂತು ವಿದ್ಯುತ್ತನ್ನು ಎರವಲು ಪಡೆದಿತ್ತು. ಅಣು ಶಕ್ತಿ ಇಲಾಖೆ ಈವರೆಗೂ ಶಕ್ತಿಯ ಜಮಾಖರ್ಚಿನ ಲೆಕ್ಕ ತೋರಿಸಿಲ್ಲ. ತನ್ನನ್ನು ನಂಬಿದವರಿಗೆ ಅದು ಎಂದೂ ನಿರಂತರ ವಿದ್ಯುತ್ ಸರಬರಾಜು ಮಾಡಿಲ್ಲ. ರಾಜಸ್ಥಾನದ ಎರಡೂ ಸ್ಥಾವರ ಕೆಟ್ಟುಕೂತು ಇಡೀ ರಾಜ್ಯದಲ್ಲಿ ಒಮ್ಮೆ ಶೇ. 85 ರಷ್ಟು ವಿದ್ಯುತ್ ಕಡಿತ ಮಾಡಬೇಕಾಗಿ ಬಂದು ಅಂಧಕಾರ ಕವಿದಿತ್ತು.

5. ಅಣುಶಕ್ತಿ ಶಾಂತಿವಿರೋಧಿ

ಅಣುಶಕ್ತಿ ಹುಟ್ಟಿದ್ದೇ ಯುದ್ಧಾಸ್ತ್ರ ನಿರ್ಮಾಣಕ್ಕಾಗಿ. ವಿದ್ಯುತ್ ಉತ್ಪಾದನೆ ಆನಂತರ ಉಳಿಯುವ ಭಸ್ಮವನ್ನು (ಪ್ಲುಟೋನಿಯಮ್) ಬಾಂಬ್ ತಯಾರಿಕೆಗೆ ಬಳಸಲಾಗುತ್ತದೆ. ಅಮೆರಿಕ, ಇಂಗ್ಲೆಂಡ್, ಫ್ರಾನ್ಸ್, ರಷ್ಯ, ಚೀನ ಎಲ್ಲವೂ ಬಾಂಬ್ ತಯಾರಿಸುತ್ತಿವೆ. ಭಾರತವೂ 1974ರಲ್ಲಿ ಯಾವ ಬಾಹ್ಯ ಪ್ರಚೋದನೆಯೂ ಇಲ್ಲದಿದ್ದರೂ, ಅಂತರರಾಷ್ಟ್ರೀಯ ಒಪ್ಪಂದವನ್ನು ಕಡೆಗಣಿಸಿ ಅಣುಸ್ಫೋಟ ಮಾಡಿತು. ಪ್ಲುಟೋನಿಯಮ್ ಉತ್ಪಾದನೆ ಆಗುತ್ತಿದ್ದರೆ ಬಾಂಬ್

ತಯಾರಿಸುವ ಚಪಲ ಹೆಚ್ಚುತ್ತದೆ. ಅಣುಭಸ್ಮವನ್ನು ಬಾಂಬ್‌ಗೆಂದು ಸಂಸ್ಕರಿಸುವಾಗ ಪೆಚ್ಚಿದ ಹೊರೆ ಪ್ರಜೆಗಳ ತಲೆಯಮೇಲೆ ಬೀಳುತ್ತದೆ. ಬಾಂಬ್ ತಯಾರಾದರೆ ಅದನ್ನು ಬಳಸುವ ಚಪಲವೂ ಹೆಚ್ಚುತ್ತವೆ. ಗಡಿರಾಷ್ಟ್ರಗಳ ಜತೆ ಬಿಕ್ಕಟ್ಟು ತೀವ್ರವಾಗುತ್ತದೆ. ಗಡಿಯಲ್ಲಿ ಮಾತ್ರವಲ್ಲ, ಇಡೀ ರಾಷ್ಟ್ರವೇ ರಣರಂಗವಾಗುತ್ತದೆ.

ಅಣುಸ್ಥಾವರ ಇದ್ದಲ್ಲೆಲ್ಲ ಬಾಂಬ್ ದಾಳಿಯ ಭಯ ಇದ್ದೇ ಇರುತ್ತದೆ. ಹಾಗಾಗಿ ಅಣುಸ್ಥಾವರದ ಸುತ್ತ ರಕ್ಷಣಾದಳಗಳ ಕಾವಲು ಇರಬೇಕಾಗುತ್ತದೆ. ಪ್ಲುಟೋನಿಯಂ ಭಸ್ಮದ ಕಳ್ಳಸಾಗಣೆ ಆಗದಂತೆ ಸದಾಕಾಲ ಕಣ್ಣಿಟ್ಟಿರಬೇಕಾಗುತ್ತದೆ. ಭಯೋತ್ಪಾದಕರಿಗಾಗಲಿ, ದುರ್ಬುದ್ಧಿಯ ಕಾರ್ಮಿಕರಿಗಾಗಲಿ ಒಂದು ಚಿಟಿಕೆ ಪ್ಲುಟೋನಿಯಂ ಸಿಕ್ಕರೂ ಅನರ್ಥಕ್ಕೆ ಕಾರಣವಾಗುತ್ತದೆ. ಕಳೆದ ವರ್ಷ ಹೈದರಾಬಾದ್‌ನ ಅಣು ಇಂಧನ ಸಂಸ್ಕರಣ ಕಾರ್ಯಾಗಾರದಲ್ಲಿ ಕುಡಿಯುವ ನೀರಿಗೆ ಯಾರೋ ಪ್ಲುಟೋನಿಯಂ ಬೆರೆಸಿದ್ದರು. ಕೊಳಾಯಿಗಳನ್ನೇ ಬದಲಿಸುವ ಪ್ರಸಂಗ ಬಂದಿತ್ತು. 1980ರಲ್ಲಿ ಇರಾಕ್ ದೇಶದ ಅಣುಸ್ಥಾವರವೊಂದು ನಿರ್ಮಾಣ ಹಂತದಲ್ಲಿದ್ದಾಗ ಇಸ್ರೇಲೀ ಯುದ್ಧವಿಮಾನಗಳ ದಾಳಿಗೆ ಬಲಿಯಾಯಿತು. ಅದೇ ಅಣುಸ್ಥಾವರ ಕಾರ್ಯನಿರತವಾಗಿದ್ದಿದ್ದರೆ ಬಾಂಬ್ ದಾಳಿಯಿಂದ ಚೆರ್ನೊಬಿಲ್ ನಂಥದೇ ದುರಂತವಾಗಬಹುದಾಗಿತ್ತು. ಇಂಥ ಅನರ್ಥದ ಕೆಲಸ ಮಾಡಿದ ಮೇಲೂ ಇಸ್ರೇಲ್ ಸರಕಾರಕ್ಕೆ ಫ್ರಾನ್ಸ್ ದೇಶ ಅಣುಸ್ಥಾವರ ನಿರ್ಮಾಣಕ್ಕೆಂದು ತಾಂತ್ರಿಕ ಸಹಕಾರ ನೀಡುತ್ತಿದೆ.

ತೃತೀಯ ಜಗತ್ತಿನ ಬಡರಾಷ್ಟ್ರಗಳ ಜನತೆಗೆ ಊಟ, ವಸತಿ, ಆರೋಗ್ಯ, ಶಿಕ್ಷಣದಂಥ ಮೂಲಭೂತ ಸೌಕರ್ಯಗಳೂ ಇಲ್ಲದಿರುವಾಗ ಅವರಿಗೆ ಅಣುಸ್ಥಾವರ, ಅಣುಬಾಂಬ್ ತಯಾರಿಕಾ ತಂತ್ರವನ್ನು ಲಭ್ಯವಾಗುವಂತೆ ಮಾಡಿ ಈ ರಾಷ್ಟ್ರಗಳು ತಂತಮ್ಮಲ್ಲಿ ಕಾದಾಡುವಂತೆ ಪ್ರೇರೇಪಿಸುವಲ್ಲಿ ಧನಿಕ ರಾಷ್ಟ್ರಗಳ ಯುದ್ಧಾಸ್ತ್ರ ದಲ್ಲಾಳಿಗಳಿಗೆ ಹೇರಳ ಲಾಭವಿದೆ. ಬಡರಾಷ್ಟ್ರಗಳ ಧುರೀಣರು ತಮ್ಮ ಮೂಲ ಭೂತ ಸಮಸ್ಯೆಗಳನ್ನು, ಬಗೆಹರಿಸುವ ಬದಲು, ಯುದ್ಧ ಯುದ್ಧವೆಂದು ಜನತೆಯ ಗಮನವನ್ನು ಸದಾ ಗಡಿಯತ್ತ ಸೆಳೆಯುತ್ತ ಶಸ್ತ್ರಾಸ್ತ್ರ ಖರೀದಿಗೆ ಅಮೂಲ್ಯ ಸಂಪನ್ಮೂಲವನ್ನು ಸುರಿಯುತ್ತ ಜನರನ್ನು ಇನ್ನಷ್ಟು ಸಂಕಟಕ್ಕೆ ಗುರಿ ಮಾಡುತ್ತಾರೆ. ಶಾಂತಿ ಎಂದೂ ನೆಲಸದಂತೆ ನೋಡಿಕೊಳ್ಳುತ್ತಾರೆ. ದಕ್ಷಿಣ ಆಫ್ರಿಕಾ, ಅರ್ಜೆಂಟಿನಾ, ಭಾರತ, ಪಾಕಿಸ್ತಾನ, ಇಸ್ರೇಲ್, ಇರಾಕ್‌ನಂಥ ರಾಷ್ಟ್ರಗಳಲ್ಲಿ ಅಣುಸ್ಥಾವರಗಳು ಶಾಂತಿ ಕದಡುವ ಕಡೆಗೋಲಾಗುತ್ತಿವೆ.

6. ಅಣುಶಕ್ತಿ ಪ್ರಜಾತಂತ್ರವಿರೋಧಿ

ಅಣುಶಕ್ತಿಯ ಅಗೋಚರ ಅಪಾಯಗಳಿಂದಾಗಿ ಅದಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ಎಲ್ಲ ಕಾರ್ಯಾಚರಣೆಗಳನ್ನೂ ರಹಸ್ಯವಾಗಿ ನಡೆಸುವ ಪರಿಪಾಠ ಬೆಳೆದು ಬಂದಿದೆ. ಅದರಿಂದ ನಾಗರಿಕರಿಗೆ ರಕ್ಷಣೆ ನೀಡುವ ಬದಲು ನಾಗರಿಕರಿಂದ ಅಣುಸ್ಥಾವರಕ್ಕೆ ಅಪಾಯ ಒದಗೀತೆಂಬ ವಿಪರ್ಯಾಸಕರ ಭಯವೇ ಅಧಿಕಾರಿಗಳಿಗೆ ಹಾಗೂ ತಂತ್ರಜ್ಞಾನಿಗಳಿಗೆ ಇದ್ದಂತಿದೆ. ಅದ್ದರಿಂದಲೇ ಭಾರತದಲ್ಲಿ 1972ರಲ್ಲಿ ಅಣುಶಕ್ತಿ ಕಾಯಿದೆಯನ್ನು ಜಾರಿಗೊಳಿಸಿದ್ದಾರೆ. ಯಾರೂ ಅಣುಶಕ್ತಿಯ ಬಗ್ಗೆ ಮಾಹಿತಿ ಕೇಳುವಂತಿಲ್ಲ. ಖರ್ಚು ವೆಚ್ಚದ ಲೆಕ್ಕಪತ್ರ ಕೇಳುವಂತಿಲ್ಲ. ಸ್ವತಂತ್ರವಾಗಿ ಯಾವ ವಿಶ್ವವಿದ್ಯಾಲಯ ಕೂಡಾ ಸಂಶೋಧನೆ ನಡೆಸುವಂತಿಲ್ಲ. ಅಣುಶಕ್ತಿ ಕುರಿತು ಯಾರೂ ಮಾಹಿತಿಯನ್ನು ಸಂಗ್ರಹಿಸುವಂತಿಲ್ಲ, ಸಂಗ್ರಹಿಸುವ ಯತ್ನ ಮಾಡುವಂತಿಲ್ಲ, ಅಥವಾ ಇತರರಿಗೆ ಮಾಹಿತಿ ನೀಡುವಂತಿಲ್ಲ. ಯಾರ ಆಸ್ತಿಯನ್ನಾಗಲಿ ಯಾವುದೇ ವಿವರಣೆ ನೀಡದೇ ಅಣುಶಕ್ತಿ ಇಲಾಖೆ ಮುಟ್ಟುಗೋಲು ಹಾಕಿಕೊಳ್ಳಬಹುದು. ಅಣುಶಕ್ತಿಯಿಂದಾಗಿ ಆರೋಗ್ಯಕ್ಕೆ ಧಕ್ಕೆ ತಗಲಿದರೆ ಪರಿಹಾರ ಕೊಡದೇ ಇರಬಹುದು.

ಇಂಥ ಕಾನೂನುಗಳ ಭದ್ರ ಕೋಟೆಯಲ್ಲಿ ಅವಿತಿಟ್ಟುಕೊಂಡ ಅಣುಶಕ್ತಿ ಇಲಾಖೆ ಜನಶಕ್ತಿಯನ್ನೂ ಪ್ರಜಾತಂತ್ರವನ್ನೂ ಹತ್ತಿಕ್ಕುತ್ತದೆ. ಅಣುಶಕ್ತಿಯ ಕರಾಳ ಸ್ವರೂಪದ ಬಗ್ಗೆ ಜನರಿಗೆ ತಿಳಿಹೇಳುವವರನ್ನು ಶಿಕ್ಷಿಸುತ್ತದೆ. ಹೈದರಾಬಾದ್‌ನ ಅಣು ಇಂಧನ ಸಂಸ್ಕರಣ ಕಾರ್ಯಾಗಾರದಿಂದ ಭೂಗರ್ಭಕ್ಕೆ ಸೇರಿದ ವಿಕಿರಣ ವಸ್ತುಗಳು ಅಲ್ಲಿಂದ ನಾಲ್ಕು ಕಿಲೋಮೀಟರ್ ದೂರದಲ್ಲಿನ ಬಾವಿಯಲ್ಲಿ ಪತ್ತೆಯಾದುದನ್ನು ವಾರ್ತಾಸಂಸ್ಥೆಗಳಿಗೆ ತಿಳಿಸಿದ ಆರೋಗ್ಯ ಅಧಿಕಾರಿಯನ್ನು ಕೆಲಸದಿಂದ ತೆಗೆದುಹಾಕಲಾಯಿತು. ಇತ್ತೀಚೆಗೆ ಮುಂಬೈನಲ್ಲಿ ವಿಕಿರಣ ಪೂರಿತ ಪೆನ್ಸಿಲ್ ಹಿಡಿದು ಕೆಲಸ ಮಾಡುತ್ತಿದ್ದ ಕಾರ್ಮಿಕನೊಬ್ಬನ ಬೆರಳುಗಳನ್ನು ಒಂದೊಂದಾಗಿ ಕತ್ತರಿಸದೇಕಾಗಿ ಬಂದಾಗ, ಆ ಕುರಿತು ಪತ್ರಕರ್ತರೊಡನೆ ಮಾತನಾಡಿದ ಅಧಿಕಾರಿ ಕೆಲಸ ಕಳೆದುಕೊಳ್ಳಬೇಕಾಯಿತು.

ಅಣುಸ್ಥಾವರವನ್ನು ರಕ್ಷಿಸುವ ನೆಪದಲ್ಲಿ ರಕ್ಷಣಾ ಅಧಿಕಾರಿಗಳು ಯಾರ ಮನೆಯನ್ನೂ ಶೋಧಿಸಬಹುದು. ಯಾರನ್ನೂ ಬಂಧಿಸಬಹುದು ಅಥವಾ ಯಾರ ಆಸ್ತಿಯನ್ನೂ ಮುಟ್ಟುಗೋಲು ಹಾಕಿಕೊಳ್ಳಬಹುದು. ಅಣುಶಕ್ತಿ ಇದ್ದಲ್ಲಿ ಜನಶಕ್ತಿ ನಿರ್ವೀರ್ಯವಾಗುತ್ತದೆ.

7. ಅಣುಶಕ್ತಿ ಮುಂದಿನ ಪೀಳಿಗೆಗೆ ಹೊರೆಯಾಗುತ್ತದೆ

ಅಣುವಿಕಿರಣದ ದುಷ್ಪರಿಣಾಮ ಮುಂದೆ ಹುಟ್ಟಲಿರುವ ಮಕ್ಕಳ ಮೇಲೂ ಆಗುತ್ತದೆಂಬುದಕ್ಕೆ ಹಿರೋಶಿಮಾ-ನಾಗಾಸಾಕಿಯ ವಿಕೃತ ಸಂತಾನಗಳೇ ಸಾಕ್ಷಿಯಾಗಿವೆ. ಹುಟ್ಟುವಾಗಲೇ ಹಲವು ಬಗೆಯ ರೋಗ ರುಜಿನಗಳನ್ನೂ ವಿಕಲಾಂಗಗಳನ್ನೂ ಪಡೆದು, ಯಾವ ತಪ್ಪನ್ನೂ ಘಾಡದ ಮುಗ್ಧ ಜೀವಿಗಳು ಶಾಪಗ್ರಸ್ತ ಜೀವನ ನಡೆಸಬೇಕಾಗುತ್ತದೆ. ಅದಷ್ಟೇ ಅಲ್ಲ, ನಾವು ನಾವು ಇಂದು ಸೃಷ್ಟಿಸಿರುವ ಅಣು ಕೊಳೆಗಳನ್ನು ಚೊಕ್ಕಟ ಮಾಡಲು ಮುಂದಿನ ಪೀಳಿಗೆಯವರು ಪರದಾಡಬೇಕಾಗುತ್ತದೆ. ಅಪಾರ ಹಣ ವ್ಯಯಿಸಬೇಕಾಗುತ್ತದೆ. ಇಂದು ವಿಶ್ವಾದ್ಯಂತ ಸುಮಾರು 315 ಅಣುಸ್ಥಾವರಗಳು ಭಸ್ಮವನ್ನು ಸೃಷ್ಟಿಸುತ್ತಿವೆ. ಅದನ್ನು ಎಲ್ಲಿ ಬಚ್ಚಿಡಬೇಕು, ಎಲ್ಲಿ ಬಿಸಾಡಬೇಕು ಎಂಬ ಸಮಸ್ಯೆಗೆ ಇನ್ನೂ ಉತ್ತರ ಸಿಕ್ಕಿಲ್ಲ. ಮುಂದಿನ ಪೀಳಿಗೆಯ ಮೇಲೆ ಈ ಸಮಸ್ಯೆಯ ಭಾರ ಕೂರಲಿದೆ. ಜೊತೆಗೇ ಇನ್ನು 15 ವರ್ಷಗಳಲ್ಲಿ 300 ಅಣುಸ್ಥಾವರಗಳು ನಿವೃತ್ತಿ ಪಡೆದು ಸಮಾಧಿಯ ಸ್ಥಿತಿಗೆ ಬರುತ್ತವೆ. ಅಂಥ ನಿಷ್ಕ್ರಿಯ ಅಣುಸ್ಥಾವರಗಳನ್ನು ಕಳಚಿ ದೂರ ಸಾಗಿಸಿ ಹೂಳುವ ತಂತ್ರ ಇನ್ನೂ ಕರಗತವಾಗಿಲ್ಲ. ಅದರ ಸಂಶೋಧನೆಯ ವೆಚ್ಚವನ್ನು ಮುಂದಿನ ಜನಾಂಗದವರೇ ಭರಿಸಬೇಕು. ಉತ್ತರ ಸಿಗುವವರೆಗೆ ಇಂಥ ಮೃತ ಸ್ಥಾವರಗಳಿಗೆ ಭದ್ರ ಕಾವಲು ಹಾಕಿರಬೇಕು. ಅಂತೂ ಅಣುಶಕ್ತಿಯ "ಫಲ ನಮಗೆ, ಮಲ ಮುಂದಿನವರಿಗೆ."

ಭಾವೀ ಜನಾಂಗದ ಮೇಲೆ ದುಃಸ್ಥಿತಿಯಲ್ಲಿರುವ ಸ್ಥಾವರಗಳನ್ನೂ ಸಾಲದ ಹೊರೆಯನ್ನೂ ಹೊರಿಸಿದರೆ ಅಷ್ಟಕ್ಕೇ ಮುಗಿಯುವುದಿಲ್ಲ ಅಣು ಕತೆ. ಇನ್ನು ಇಪ್ಪತ್ತು ವರ್ಷಗಳಲ್ಲಿ ಅಣುಶಕ್ತಿ ಇಲಾಖೆಯ ಶಾಖೋಪಶಾಖೆಗಳೂ, ಪಳಗಿದ ತಂತ್ರಜ್ಞರ ಸಂಖ್ಯೆಯೂ ಎಷ್ಟು ಹೆಚ್ಚಾಗುತ್ತವೆಂದರೆ ಅಣುವಿಗೆ ಇತಿಶ್ರೀ ಹಾಕುವುದು ತೀರ ಕಠಿಣವಾಗುತ್ತದೆ. ಅಣುಶಕ್ತಿ ಅಪಾಯವೆಂದು ಎಲ್ಲರಿಗೂ ಮನದಟ್ಟಾದರೂ ಕೂಡ ಈ ದೈತ್ಯಶಕ್ತಿಗೆ ಹಣ ಸುರಿಯುತ್ತಲೇ ಇರಬೇಕಾಗುತ್ತದೆ. ಅಣುಭಸ್ಮ ಹೂಳುವ ತಂತ್ರಕ್ಕಾಗಿ ಶೋಧ ನಡೆಸಲೇಬೇಕಾಗುತ್ತದೆ. ಮೃತ ಸ್ಥಾವರಗಳು ಭೂಕಂಪಕ್ಕೋ, ಮಹಾಪೂರಕ್ಕೋ ಗುರಿಯಾಗದಂತೆ ಸದಾ ಎಚ್ಚರದಿಂದಿರಲೇಬೇಕಾಗುತ್ತದೆ. ಆ ವೇಳೆಗೆ ಬದಲೀ ಶಕ್ತಿಮೂಲಗಳಿಂದ ತೀರ ಅಗ್ಗದರದಲ್ಲಿ ವಿದ್ಯುತ್ ಉತ್ಪಾದನೆ ಸಾಧ್ಯವಾದರೂ ಕೂಡ ಅಣುಸ್ಥಾವರಗಳ ಹೆಣ ಕಾಯುವ ಕೆಲಸಕ್ಕೆಂದು ವಿಜ್ಞಾನಿಗಳನ್ನು ತರಪೇತುಗೊಳಿಸುತ್ತಲೇ ಇರಬೇಕಾಗು

ತ್ತದೆ. ಬಜೆಟ್‌ನಲ್ಲಿ ಭಾರೀ ಮೊತ್ತದ ಹಣವನ್ನು ಅಣು ಇಲಾಖೆಗಾಗಿ ವಿಂಗಡಿಸಲೇಬೇಕಾಗುತ್ತದೆ. ದೇಹ ಸತ್ತರೂ ಹೆಣ್ಣಿನ ಆರೈಕೆ ಮುಂದುವರಿಸಲೇಬೇಕಾಗುತ್ತದೆ. ಇಂದಿನವರ ತಪ್ಪನ್ನೇ ಮುಂದಿನವರೂ ಮಾಡುತ್ತ ಹೋಗಬೇಕಾದ ವಿಪರ್ಯಾಸ ಸಂದರ್ಭ ಎದುರಾಗುತ್ತದೆ.

8. ಅಣುಶಕ್ತಿ, ದುಂದುವೆಚ್ಚವನ್ನು ಪ್ರೋತ್ಸಾಹಿಸುತ್ತದೆ

ರಹಸ್ಯ ರಕ್ಷಣೆಯ ನೆಪದಲ್ಲಿ ಅಣುಶಕ್ತಿ ಇಲಾಖೆಯ ವಿಚ್ಛಿದ್ರವೆಚ್ಚವನ್ನು ಯಾರೂ ಕೇಳುವಂತಿಲ್ಲ. ರಾಷ್ಟ್ರರಕ್ಷಣೆಯ ನೆಪದಲ್ಲಿ ಅದು ಯಾವ ಬಾಬ್ತಿನಲ್ಲಿ ಎಂಥ ಸಂಶೋಧನೆಯಲ್ಲಿ ನಿರತವಾಗಿದೆ, ಎಷ್ಟು ಹಣ ವೆಚ್ಚವಾಗುತ್ತಿದೆ ಎಂಬುದನ್ನು ಯಾರೂ ತಪಶೀಲು ಮಾಡುವಂತಿಲ್ಲ. ತನಗಿಷ್ಟವಾದ ಸಾಧನಗಳನ್ನು ತನಗಿಷ್ಟ ಬಂದ ಕಂಪನಿಗಳಿಂದ ತನಗಿಷ್ಟವಾದ ಬೆಲೆಗೆ ಖರೀದಿಸುವ ಸ್ವಾತಂತ್ರ್ಯ ಈ ಇಲಾಖೆಗಿದೆ. ಭ್ರಷ್ಟಾಚಾರ ತಾಂಡವವಾಡುತ್ತಿರುವ ಈ ದೇಶದಲ್ಲಿ ಮೇಯುವ ಸವಲತ್ತು, ಈ ಇಲಾಖೆಗೆ ಇದ್ದಷ್ಟು ಬೇರೆ ಇಲಾಖೆಯಲ್ಲಿ ಇರುವಂತಿಲ್ಲ. ಇವರಿಂದ ಅಪಾರ ದುಂದುವೆಚ್ಚದ ಪ್ರವೃತ್ತಿ ಬೆಳೆಯುತ್ತದೆ. ಮದ್ರಾಸ್‌ನ ಕಲ್ಪಾಕ್ಕಮ್ ಅಣುಸ್ಥಾವರ ನಿರ್ಮಾಣಕ್ಕೆ 250 ಕೋಟಿ ರೂಪಾಯಿ ಖರ್ಚಾದರೆ, ಅದೇ ಗಾತ್ರದ ಕೈಗಾ ಸ್ಥಾವರಕ್ಕೆ 800 ಕೋಟಿ ರೂಪಾಯಿ ಖರ್ಚಾಗುತ್ತದೆಂದು ಅಂದಾಜು ಮಾಡಲಾಗಿದೆ.

ಹಣವ ದುಂದುವೆಚ್ಚ ಅಷ್ಟೇ ಅಲ್ಲ, ವಿದ್ಯುತ್ ಶಕ್ತಿಯ ದುಂದುವೆಚ್ಚಕ್ಕೂ ಅಣುಸ್ಥಾವರಗಳು ಮೂಲಪ್ರೇರಕಗಳಾಗುತ್ತವೆ. ವಿದ್ಯುತ್ ಸೋರಿಕೆಯನ್ನು ತಡೆಗಟ್ಟುವ ವಿಧಾನ ಹುಡುಕುವ ಬದಲು, ಇನ್ನೊಂದು ಅಣುಸ್ಥಾವರವನ್ನೆ ನಿರ್ಮಿಸುವ ಮನೋವೃತ್ತಿ ನಮ್ಮ ಧುರೀಣರಲ್ಲಿ ಕಾಣಬರುತ್ತಿದೆ. ಅಪಾಯದ ಅಣುಸ್ಥಾವರಗಳನ್ನು ದೂರ ಏಕಾಂತದಲ್ಲಿ ಸ್ಥಾಪಿಸಿ ಅಲ್ಲಿಂದ ನೂರಾರು ಕಿಲೊ ವೋಲ್ಟ್‌ವರೆಗೆ ವಿದ್ಯುತ್ತನ್ನು ಸಾಗಿಸಿ ತರುವಾಗ ಉಂಟಾಗುವ ಸೋರಿಕೆಯೂ ದುಂದುವೆಚ್ಚದ ಬಾಬ್ತಿಗೇ ಸೇರುತ್ತದೆ.

9. ಬದಲೀ ಶಕ್ತಿಯನ್ನು ಬದಿಗೊತ್ತುವ ಅಣು

ಅಣುಶಕ್ತಿಯ ಉತ್ಪಾದನೆಗೆಂದು ಭಾರೀ ಹಣ ವೆಚ್ಚಮಾಡುವ ಸರಕಾರಕ್ಕೆ ಬದಲೀ ವಿದ್ಯುತ್ ಮೂಲಗಳ ಬಗ್ಗೆ ತಾತ್ಸಾರ ಮನೋಭಾವ ಇರುವುದನ್ನು

ನಾವಿಂದು ಎಲ್ಲ ಕಡೆ ಕಾಣಬಹುದಾಗಿದೆ. ಚಿಕ್ಕಪುಟ್ಟ ಅಣೆಕಟ್ಟುಗಳನ್ನು ನಿರ್ಮಿಸುವಲ್ಲಿ ಯಾರಿಗೂ ಆಸಕ್ತಿ ಇಲ್ಲ. ಪರಿಸರದ ದೃಷ್ಟಿಯಿಂದ ಸುರಕ್ಷಿತವಾದ ಸೌರಶಕ್ತಿಯನ್ನೋ, ಚಿಕ್ಕಪುಟ್ಟ ಗಾಳಿಯಂತ್ರಗಳನ್ನೋ, ಸಮುದ್ರದ ಭರತಿಯಿಂದ ವಿದ್ಯುತ್ ಉತ್ಪಾದಿಸುವ ತಂತ್ರವನ್ನೋ ಬಳಕೆಗೆ ತರಲು ಬೇಕಾದಷ್ಟು ಹಣ ಲಭ್ಯವಾಗುತ್ತಿಲ್ಲ. ಅಂಥ ಸಂಶೋಧಕರಿಗೆ ಮಾನ್ಯತೆಯಾಗಲಿ, ಗೌರವವಾಗಲಿ, ವಿದೇಶ ಯಾತ್ರೆಯ ಸೌಲಭ್ಯಗಳಾಗಲಿ ಸಿಗುತ್ತಿಲ್ಲ. ಭಾರತದಂಥ ದೇಶದಲ್ಲಿ ವಿದ್ಯುತ್ ಬಳಕೆ ಪ್ರಮಾಣ ಒಟ್ಟು ಶಕ್ತಿ ಬಳಕೆಯ ಕೇವಲ ಶೇಕಡಾ 20 ರಷ್ಟಿದ್ದರೂ, ಬದಲೀ ಶಕ್ತಿ ಮೂಲಗಳ ಶೋಧನೆಗೆ ಸೂಕ್ತ ಪ್ರಮಾಣದ ಹಣ ಲಭಿಸುತ್ತಿಲ್ಲ. ಒಲೆ ಉರಿಸಲಿಕ್ಕೆ ಸೌದೆ, ಗೊಬ್ಬರ ಅನಿಲ ಸ್ಥಾವರಗಳೆಂದರೆ ತಾತ್ಸಾರ ವ್ಯಕ್ತವಾಗುತ್ತಿದೆ. ವಿದ್ಯುತ್ ಬಳಕೆಯ ತಲಾ ಪ್ರಮಾಣವೇ ದೇಶದ ಪ್ರಗತಿಯ ಲಕ್ಷಣವೆಂದು ಭಾವಿಸಿ, ಫ್ಯಾಕ್ಟರಿಗಳಲ್ಲಿ ನೀರು ಕಾಯಿಸುವಂಥ ಯಃಕಶ್ಚಿತ ಕೆಲಸಕ್ಕೂ ವಿದ್ಯುತ್ತನ್ನೇ ಬಳಸಲಾಗುತ್ತಿದೆ. ಅಂಥ ಬಾರೀ ಬಳಕೆದಾರರೇ ಅಣುಸ್ಥಾವರ ಬೇಕೆಂದು ಬೊಬ್ಬೆ ಇಡುತ್ತಾರೆ; ಅಣು ಸ್ಥಾವರದ ಎಲ್ಲ ಅನಿಷ್ಟಗಳನ್ನೂ ಮುಗ್ಧ ಜನರ ಮೇಲೆ, ಮುಂದಿನ ಪೀಳಿಗೆಯ ಮೇಲೆ ಹೊರಿಸಿ ನಿಶ್ಚಿಂತರಾಗಿ ವಿದ್ಯುತ್ತಿನ ದುಂದು ಬಳಕೆಯಲ್ಲಿ ನಿರತರಾಗಿರುತ್ತಾರೆ.

ಅಣುಶಕ್ತಿ ಇಲಾಖೆಗೆ ಈ ವರೆಗೆ ಸುರಿದ ಅನೇಕ ಸಹಸ್ರ ಕೋಟಿ ರೂಪಾಯಿಗಳನ್ನು ಬೇರೆ ಶಕ್ತಿಮೂಲಗಳಿಗೆ ವಿನಿಯೋಗಿಸಿದ್ದರೆ, ಈಗಿರುವಂಥ ಶಕ್ತಿಕ್ಷಾಮದ ಸಮಸ್ಯೆಯೇ ಎದುರಾಗುತ್ತಿರಲಿಲ್ಲ. ನಮ್ಮಲ್ಲಿ ಇನ್ನೂ 200 ವರ್ಷಗಳಿಗೆ ಸಾಕಾಗುವಷ್ಟು ಕಲ್ಲಿದ್ದಲು ಇದೆ, ಅದರ ಗುಣಮಟ್ಟವನ್ನು ವರ್ಧಿಸಿ, ಮಾಲಿನ್ಯವನ್ನು ಕಡಿಮೆ ಮಾಡುವತ್ತ ಸಂಶೋಧನೆ ನಡೆಸಿದ್ದರೆ ರಾಯಚೂರಿನಲ್ಲಿರುವಂಥ ಅನೇಕ ಶಾಖೋತ್ಪನ್ನ ವಿದ್ಯುದಾಗಾರ ಸ್ಥಾಪಿಸಬಹುದು. ನಮ್ಮಲ್ಲಿ ಈಗಿನ ಜಲವಿದ್ಯುತ್ ಸಾಮರ್ಥ್ಯವನ್ನು ಇನ್ನೂ ಆರುಪಟ್ಟು ಹೆಚ್ಚಿಸಿಕೊಳ್ಳುವ ಸಾಧ್ಯತೆ ಇದೆ. ಚಿಕ್ಕ ಚಿಕ್ಕ ವಿದ್ಯುತ್ ಘಟಕಗಳ ಮೂಲಕ ವಿದ್ಯುತ್ ಉತ್ಪಾದನೆ ಮಾಡಬಹುದು. ವಿದ್ಯುತ್ ಶಕ್ತಿಯನ್ನು ಬಳಸುವ ಯಂತ್ರೋಪಕರಣಗಳನ್ನು ಸುಸ್ಥಿತಿಯಲ್ಲಿಟ್ಟು ಅವುಗಳ ದಕ್ಷತೆ ಹೆಚ್ಚಿಸಿದರೆ ಈಗಿನ ವಿದ್ಯುತ್ ಬಳಕೆಯನ್ನು ಶೇಕಡಾ 30 ರಷ್ಟು ಕಮ್ಮಿ ಮಾಡಬಹುದು. ನಮ್ಮಲ್ಲಿ ವಿದ್ಯುತ್ ತಂತಿಗಳಲ್ಲೇ ಶೇಕಡಾ 25ರಷ್ಟು ಶಕ್ತಿ ಸೋರಿಹೋಗುತ್ತಿದೆ. ಸುಧಾರಿತ ದೇಶಗಳ ಹಾಗೆ ನಾವು ಉತ್ತಮ ಗುಣಮಟ್ಟದ ಟ್ರಾನ್ಸ್‌ಫಾರ್ಮರ್ ಹಾಕಿದರೆ ಈ ಸೋರಿಕೆಯ ಬಹುಭಾಗವನ್ನು ತಡೆಗಟ್ಟಬಹುದು. ನಮ್ಮಲ್ಲಿ ವರ್ಷಕ್ಕೆ 8 ತಿಂಗಳ ಕಾಲ ಹೇರಳ ಸೌರಶಕ್ತಿ ಲಭ್ಯವಿದೆ. ಗಾಳಿ, ಬಿಸಿಲು, ಅಲೆ ಅಬ್ಬರಗಳಲ್ಲಿ ಅಗಾಧ ಶಕ್ತಿಸಂಚಯವಿರುವ

ಸುದೀರ್ಘ ಸಮುದ್ರತೀರವಿದೆ. ಇವೆಲ್ಲವುಗಳ ಬಳಕೆಗೆ ಅಣುಶಕ್ತಿ ಅಡ್ಡಿ ಒಡ್ಡುತ್ತಿದೆ.

10. ಮಿಥ್ಯೆ, ತಥ್ಯ

ಈವರೆಗೆ ಅಣುಶಕ್ತಿಯ 10 ಕರಾಳ ಮುಖಗಳನ್ನು ನೋಡಿದ್ದಾಯಿತು. ತನ್ನ ವೈಫಲ್ಯಗಳನ್ನೂ ಆಜನ್ಮದುರ್ಗುಣಗಳನ್ನೂ ಮುಚ್ಚಿಕೊಳ್ಳಲೆಂದು ಅಣುಶಕ್ತಿ ಇಲಾಖೆ ಆಗಾಗ ಅನೇಕ ವಕ್ರ ಹೇಳಿಕೆಗಳನ್ನು ನೀಡುತ್ತಿರುತ್ತದೆ. ಇಂಥ ಹೇಳಿಕೆಗಳಲ್ಲಿ ಏನೇನೂ ಹುರುಳಿಲ್ಲದಿದ್ದರೂ ಸೋಗಲಾಡಿ ರಾಜಕಾರಣಿಗಳು ಅದನ್ನು ನಿಜವೆಂದೇ ನಂಬುತ್ತಾರೆ, ತಾವೂ ಅಂಥದೇ ಗಿಣಿಪಾಠ ರೂಢಿಸಿಕೊಳ್ಳುತ್ತಾರೆ. ಅಂಥ ಹತ್ತು ಪ್ರಮುಖ ವಕ್ರ ಹೇಳಿಕೆಗಳು ಇಲ್ಲಿವೆ. (ನಿಜಾಂಶ ಏನೆಂಬುದನ್ನು ಆವರಣದಲ್ಲಿ ಕೊಡಲಾಗಿದೆ.)

1. ನಮ್ಮ ಅಣುಸ್ಥಾವರಗಳು ಇತರ ದೇಶಗಳ ಸ್ಥಾವರಗಳಿಗಿಂತ ಹೆಚ್ಚು ಭದ್ರವಾಗಿವೆ. ಇಲ್ಲಿ ಅಪಘಾತ ಆಗದು. ಯಾರೂ ಭಯಪಡುವ ಕಾರಣವಿಲ್ಲ.

(ನಮ್ಮ ಅಣುಸ್ಥಾವರಗಳಲ್ಲೂ ಒಂದಲ್ಲ ಹತ್ತಾರು ಬಾರಿ ಅಪಘಾತ ಆಗಿವೆ. ರಾಜಸ್ಥಾನದ ಘಟಕವನ್ನು ಸರಿಪಡಿಸಲು ಸಾಧ್ಯವೇ ಆಗದೆ, ಐದೇ ವರ್ಷಗಳಲ್ಲಿ ಮುಚ್ಚಲಾಗಿದೆ. ಅಪಘಾತಗಳ ಸುದ್ದಿಯನ್ನು ಮಾತ್ರ ಭದ್ರವಾಗಿ ಬಚ್ಚಿಡಲಾಗುತ್ತಿದೆ.)

2. ನಿಸರ್ಗದಲ್ಲಿ ಸಹಜವಾಗಿಯೇ ವಿಕಿರಣ ಸಾಕಷ್ಟಿದೆ. ಯಾರಿಗೂ ಅಪಾಯ ಆಗಿಲ್ಲ.

(ನೈಸರ್ಗಿಕ ವಿಕಿರಣ ತುಂಬ ದುರ್ಬಲವಾಗಿರುತ್ತದೆ. ಕೇರಳದ ಘೋರಿಯಂ ಮರಳುರಾಶಿಯ ಬಳಿ ಮನೆ ಕಟ್ಟಿಕೊಂಡವರಲ್ಲಿ ಅನೇಕ ಬುದ್ಧಿಮಾಂದ್ಯರೂ ರೋಗಗ್ರಸ್ತರೂ ಇದ್ದಾರೆಂಬುದಕ್ಕೆ ದಾಖಲೆಗಳಿವೆ. ಅಷ್ಟಕ್ಕೂ ನಿಸರ್ಗದಲ್ಲಿ ವಿಕಿರಣ ಇದೆಯೆಂಬ ಮಾತ್ರಕ್ಕೇ ಇನ್ನೂ ಹೆಚ್ಚು ವಿಕಿರಣವನ್ನು ಸೃಷ್ಟಿಸುವ ಅಧಿಕಾರ ನಮಗಿಲ್ಲ. ನಿಸರ್ಗದಲ್ಲಿ ಜ್ವಾಲಾಮುಖಿಗಳಿವೆಯೆಂದ ಮಾತ್ರಕ್ಕೇ ನಾವೂ ಬಾಂಬ್ ಆಸ್ಫೋಟಿಸಿ ಇನ್ನಷ್ಟು ಜ್ವಾಲಾಮುಖಿ ಸೃಷ್ಟಿಸಬಹುದೆ?)

3. ಅಣುಸ್ಥಾವರಗಳಲ್ಲಿನ ಅಪಘಾತಕ್ಕಿಂತ ರಸ್ತೆ ಅಪಘಾತಗಳಲ್ಲೇ ಹೆಚ್ಚು ಜನ ಸಾಯುತ್ತಾರೆ.

(ರಸ್ತೆ ಅಪಘಾತ ಪ್ರತ್ಯಕ್ಷ ಕಾಣುತ್ತದೆ. ಸ್ವಯಂ ಇಚ್ಛೆಯಿಂದ ರಸ್ತೆಗೆ ಇಳಿದವರು ಅಪಾಯ ಎದುರಿಸುತ್ತಾರೆಯೇ ವಿನಾ ದೂರದಲ್ಲಿರುವ ಮುಗ್ಧ ಜನರನ್ನು ದೇಶದ ಗಡಿಯಾಚೆ ಇರುವವರನ್ನು ಪಾಪನಗಳು ಬಲಿತೆಗೆದು ಕೊಳ್ಳುವುದಿಲ್ಲ. ಅಣುಸ್ಫೋಟಗಳ ಅಧ್ಯಾಯಕ್ಕೆ ತಟಸ್ಥರೂ ಬಲಿಯಾಗುತ್ತಾರೆ.)

4. ಶಕ್ತಿಯ ಕ್ಷಾಮ ಹೆಚ್ಚುತ್ತಿದೆ. ಶಕ್ತಿಮೂಲಗಳೆಲ್ಲ ಬತ್ತುತ್ತಿವೆ, ಅಣು ಶಕ್ತಿಯೊಂದೇ ಮುಂದಿನ ಜನಾಂಗಕ್ಕೆ ಬೆಳಕು ತೋರಿಸುವ ಸಾಮರ್ಥ್ಯ ಪಡೆದಿದೆ.

(ಶಕ್ತಿಯ ದುಂದುವೆಚ್ಚ ಹೆಚ್ಚುತ್ತಿದೆ. ಶಕ್ತಿಯ ಬದಲಿ ಮೂಲಗಳನ್ನು ಹುಡುಕುವಲ್ಲಿ ಆಸಕ್ತಿ ಕುಗುರಿಲ್ಲ, ಮುಂದಿನ ಜನಾಂಗಕ್ಕೆ ಅಣುಶಕ್ತಿ ಶಾಪವಾಗಲಿದೆ.)

5. ಕಲ್ಲಿದ್ದಲಿನಿಂದಲೂ ಪರಿಸರ ಮಾಲಿನ್ಯ ಹೆಚ್ಚುತ್ತದೆ. ದೊಡ್ಡ ಅಣೆ ಕಟ್ಟುಗಳಿಗೂ ಪರಿಸರಪ್ರೇಮಿಗಳ ವಿರೋಧ ಹೆಚ್ಚುತ್ತಿದೆ.

(ಕಲ್ಲಿದ್ದಲಾಗಲೀ, ದೊಡ್ಡ ಅಣೆಕಟ್ಟುಗಳಾಗಲೀ ನಪುಂಸಕತ್ವ ಬರಿಸುವುದಿಲ್ಲ. ವಿಕೃತ ಸಂತಾನವನ್ನು ಸೃಷ್ಟಿಸುವುದಿಲ್ಲ.)

6. ಅಣುಶಕ್ತಿ ಅಷ್ಟೇನೂ ವೆಚ್ಚದ್ದಲ್ಲ. ಗಣಿಯ ಬಳಿ ಕಲ್ಲಿದ್ದಲನ್ನು ಉರಿಸಿ ವಿದ್ಯುತ್ ಉತ್ಪಾದಿಸಿದಷ್ಟೇ ವೆಚ್ಚ ತಗಲುತ್ತದೆ.

(ಅಣುಶಕ್ತಿಯ 'ಇತರ' ವೆಚ್ಚಗಳನ್ನು ಮರೆಮಾಚಲಾಗುತ್ತದೆ. ಸ್ಥಾವರ ಸಮಾಧಿಗೆ ತಗಲುವ ವೆಚ್ಚವನ್ನು ಮುಂದಿನ ಜನಾಂಗದವರ ತಲೆಗೆ ಕಟ್ಟಲಾಗುತ್ತಿದೆ.)

7. ಅಣುಶಕ್ತಿಗೆ ಸ್ಥಳೀಯ ಜನರ ವಿರೋಧ ಇಲ್ಲ. ನಗರಗಳ ಕೆಲವೇ ಬುದ್ಧಿಜೀವಿಗಳು ಮುಗ್ಧರ ದಾರಿ ತಪ್ಪಿಸುತ್ತಾರೆ.

(ಸ್ಥಳೀಯ ಜನರಿಗೆ ಅಣುಶಕ್ತಿಯ ನಿಜಸ್ವರೂಪ ಗೊತ್ತಾಗಿಲ್ಲ. ಚೆರ್ನೊಬಿಲ್ ಅಥವಾ ಮುರೂರೊವಾ ದ್ವೀಪಗಳಲ್ಲಿ ಅಣುವಿಕಿರಣ ಹಾವಳಿಯ ಬಗ್ಗೆ ಯಾರೂ ಅವರಿಗೆ ಹೇಳಿಲ್ಲ.)

8. ಅಣುಸ್ಫೋಟದ ಸುತ್ತಮುತ್ತ ಮಾಮೂಲು ದಿನಗಳಲ್ಲಿ ವಿಕಿರಣ ಸೂಸುವುದಿಲ್ಲ.

(ಸೂಸಿದರೂ ಅದನ್ನು ಪತ್ತೆಮಾಡುವ ಸಲಕರಣೆ ಜನಸಾಮಾನ್ಯರಿಗೆ ಲಭ್ಯವಿಲ್ಲ. ಅಷ್ಟಕ್ಕೂ 'ಮಾಮೂಲು' ದಿನಗಳು ತುಂಬ ಕಮ್ಮಿ. ಕಲ್ಪಾಕ್ಕಮ್‌ನಲ್ಲಿ

1984ರ ಇಡೀ ವರ್ಷದಲ್ಲಿ 65 ದಿನಗಳು ಮಾತ್ರ ಮಾಮೂಲು ದಿನಗಳಾಗಿದ್ದವು)

9. ಪರಿಸರ ಪ್ರೇಮಿಗಳೂ ಅಣುವಿದ್ಯುತ್ ವಿರೋಧಿಗಳೂ ಹಳೇ ಸುದ್ದಿ, ತಪ್ಪು ಸುದ್ದಿ ಹಾಗೂ ಸುಳ್ಳು ಸುದ್ದಿಗಳನ್ನು ಸೃಷ್ಟಿಸುತ್ತಾರೆ.

(ಇದು ಹಳೇ ಆಪಾದನೆ, ತಪ್ಪು ಆಪಾದನೆ ಹಾಗೂ ಸುಳ್ಳು ಆಪಾದನೆ.)

10. ಅಣುವಿರೋಧಿಗಳು ಸಿಐಎ ಏಜಂಟರು. ಭಾರತದ ಪ್ರಗತಿಯನ್ನು ಸಹಿಸಲಾರದ ವಿದೇಶಿ ಶಕ್ತಿಗಳ ಕೈಗೊಂಬೆಗಳು.

(ಅಣುಸ್ಥಾವರಗಳ ಸಂಖ್ಯೆ ಹೆಚ್ಚಾದರೇನೇ ವಿದೇಶೀ ಶಕ್ತಿಗಳ ಅಭೀಷ್ಟ ನೆರವೇರುತ್ತದೆ. ಹಣದ ಹೊಳೆ ಹರಿಯುತ್ತದೆ. ಭಯೋತ್ಪಾದಕರಿಗೆ ಅನುಕೂಲ ವಾಗುತ್ತದೆ. ರಾಷ್ಟ್ರದ ಭದ್ರತೆಯನ್ನು ಶಿಥಿಲಗೊಳಿಸುವ ವಿಪುಲ ಅವಕಾಶಗಳು ಲಭಿಸುತ್ತವೆ. ವಿದೇಶೀ ಶಕ್ತಿಯ ಕೈವಾಡ ಇರುವುದೇ ನಿಜವಾದರೆ ಅದು ಆಧಿಕಾರಸ್ಥರ ವಲಯದಲ್ಲಿ ಇರುತ್ತದೆಯೇ ಹೊರತು ಪರಿಸರಪ್ರೇಮಿಗಳ ಬಳಿ ಸುಳಿಯುವುದಿಲ್ಲ.

ಕೈಗಾ ವಿರೋಧಕ್ಕೆ 10 ಕಾರಣಗಳು

1. ಪಶ್ಚಿಮ ಘಟ್ಟದ ಸದಾಹಸಿರಿನ ದಟ್ಟ ಮಳೆಕಾಡಿನ ಸೂಕ್ಷ್ಮಜೀವ ಪರಿಸರದ ಮಧ್ಯೆ ಕೈಗಾ ಸ್ಥಾವರ ತಲೆಯೆತ್ತಲಿದೆ. ಅರಣ್ಯ ಜೀವಜಾಲಕ್ಕೆ ಉಂಟಾಗುವ ನಷ್ಟವನ್ನು ಯಾರೂ ತುಂಬಿಕೊಡಲು ಸಾಧ್ಯವಿಲ್ಲ.

2. ಒಮ್ಮೆ ಅಣುಸ್ಥಾವರದ ಸ್ಥಾಪನೆ ಆಯಿತೆಂದರೆ, ಅಣುಸ್ಥಾವರಗಳ ಸರಮಾಲೆಯೇ ನಿರ್ಮಾಣವಾಗುತ್ತದೆ. ನಾಗರಿಕರ ಯಾವ ನಿಯಂತ್ರಣಕ್ಕೂ ಒಳಪಡದೇ ಒಂದರ ಹಿಂದೊಂದು ಸ್ಥಾವರ ಸೃಷ್ಟಿಯಾಗುತ್ತಲೇ ಇರುತ್ತದೆ. ಸಹಸ್ರಾರು ವರ್ಷಗಳ ಕಾಲ ಕಾಳಿಕಣಿವೆ ಮೃತ ಅಣುಸ್ಥಾವರಗಳ ಗೋರಿಯಾಗಿ ಉಳಿಯುತ್ತದೆ.

3. ಏಳು ದೊಡ್ಡ ಅಣೆಕಟ್ಟುಗಳ ಕೆಳಭಾಗದಲ್ಲಿ ಅಣುಸ್ಥಾವರದ ನಿರ್ಮಾಣ ಆಗಲಿದೆ. ಭೂಕಂಪ, ಶಿಲಾಸ್ತರ ಭಂಗದಂಥ ಯಾವ ನೈಸರ್ಗಿಕ ಪ್ರಕೋಪ

ದಿಂದಲೂ ಅಪಾಯ ಉಂಟಾಗದಂತೆ ಸಹಸ್ರಾರು ವರ್ಷಗಳ ಕಾಲ ಅಣುಸ್ಥಾವರಗಳನ್ನು ಕಾಪಾಡುವ ಹೊಣೆ ಮುಂದಿನ ಜನಾಂಗದವರ ಮೇಲೆ ಬೀಳುತ್ತದೆ.

4. ಕಾಳಿಯಿಂದ ಹರಿದು ಬರುವ ಅಣುವಿಕಿರಣಮಿಶ್ರಿತ ನೀರಿನಿಂದಾಗಿ ಅಳಿವೆಯ ಬೆಸ್ತರಿಗಷ್ಟೇ ಅಲ್ಲ, ಗೋವಾದಿಂದ ಭಟ್ಕಳ-ಮಂಗಳೂರಿನವರೆಗೂ ಕಡಲ ತೀರಕ್ಕೆ ಅಪಾಯ ಎದುರಾಗಲಿದೆ.

5. ಸ್ಥಳೀಯ ಬಡವರನ್ನು ನಿರಾಶ್ರಿತರನ್ನಾಗಿ ಇನ್ನಷ್ಟು ಬಡವರನ್ನಾಗಿ ಮಾಡಿ, ದೂರದ ಧನಿಕರನ್ನು ಮತ್ತಷ್ಟು ಧನಾಢ್ಯರನ್ನಾಗಿ ಮಾಡುವ ಯೋಜನೆ ಇದು.

6. ನಿರ್ಮಾಣ ಹಂತದ ಮೊದಲ 15 ವರ್ಷಗಳಲ್ಲಿ ಇದು ಕರ್ನಾಟಕದಿಂದ ಭಾರೀ ಪ್ರಮಾಣದ ವಿದ್ಯುತ್ತನ್ನು ಕಬಳಿಸುತ್ತದೆ.

7. ನಿರ್ಮಾಣ ಪೂರ್ತಿಗೊಂಡಮೇಲೆ ಇದರಿಂದ ಲಭ್ಯವಾಗುವ ವಿದ್ಯುತ್ತಿಗೆ ನೆರೆಯ ಎಲ್ಲ ರಾಜ್ಯಗಳೂ ಪಾಲುದಾರರಾಗುತ್ತವೆ. ಕರ್ನಾಟಕದ ವಿದ್ಯುತ್ ಬಳಕೆ ಕೇಂದ್ರಗಳೆಲ್ಲ ಅತಿ ದೂರದಲ್ಲಿದ್ದು ಸಾಗಾಣಿಕೆಯಲ್ಲೇ ಬಹುಪಾಲು ವಿದ್ಯುತ್ ಸೋರಿಕೆಯಾಗುತ್ತದೆ.

8. ಉತ್ತರ ಕನ್ನಡ ಜಿಲ್ಲೆಯ ರಾಜಮಾರ್ಗಗಳಲ್ಲಿ ಅಣು ಇಂಧನ, ಅಣು ಕಚಡಾ ಪದಾರ್ಥಗಳ ಸಾಗಾಟ ಹೆಚ್ಚಾಗಿ ಅಪಘಾತಗಳ ಸಂಭವ ವ್ಯಾಪಕವಾಗುತ್ತದೆ. ಜನರ ವೈಯಕ್ತಿಕ ಸ್ವಾತಂತ್ರ್ಯಕ್ಕೆ ಧಕ್ಕೆ ತಗಲುತ್ತದೆ.

9. ಅಣುಸ್ಥಾವರಗಳಿಂದ ಸದಾ ಹೊರಸೂಸುವ ಹಾಗೂ ಅಪಘಾತ ಸಂದರ್ಭದಲ್ಲಿ ಭುಗಿಲೇಳುವ ವಿಕಿರಣ ಮೋಡಗಳಿಂದಾಗಿ ಇಡೀ ಜಿಲ್ಲೆಯ ತೋಟದ ಬೆಳೆಗಳು ನಿರುಪಯುಕ್ತವಾಗುತ್ತವೆ. ಅಪಘಾತದ ಸುಳ್ಳು ಪದಂತಿಯಿಂದಲೂ ಅಡಿಕೆ, ಮೆಣಸು, ಏಲಕ್ಕಿ ಧಾರಣೆ ಕುಸಿಯುತ್ತದೆ.

10. ವೈರಿದೇಶಗಳ ಹಾಗೂ ಭಯೋತ್ಪಾದಕರ ದೃಷ್ಟಿಯೆಲ್ಲ ಈ ಜಿಲ್ಲೆಯ ಕಡೆ ಹರಿಯುತ್ತದೆ. ಅಣೆಕಟ್ಟುಗಳ ಸರಮಾಲೆ, ಅಣುಸ್ಥಾವರ ಹಾಗೂ ನೌಕಾ

ನೆಲೆಗಳಂಥ ಗಂಡಾಂತರಕಾರೀ ಯೋಜನೆಗಳು ಒಂದೇ ಕಡೆ ಕೇಂದ್ರೀಕೃತವಾದರೆ ಯಾರಿಗೂ ಕ್ಷೇಮವಲ್ಲ.

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ಜಗತ್ತಿನಾದ್ಯಂತ ಇಂದು ಮಳೆಕಾಡುಗಳು ತೀವ್ರಗತಿಯಲ್ಲಿ ನಾಶವಾಗುತ್ತಿವೆ. ಇಲ್ಲಿನ ಕೋಟ್ಯಾನುಕೋಟಿ ಜೀವ ಜಂತುಗಳು ಮಾನವನ ಅತಿಕ್ರಮಣದಿಂದಾಗಿ ಕಣ್ಮರೆಯಾಗುತ್ತಿವೆ. 'ಜೀವವಿಕಾಸದ ತೊಟ್ಟಿಲು' ಎಂದೇ ಹೆಸರುಗೊಂಡ ಈ ಸದಾಹಸಿರಿನ ಅರಣ್ಯಗಳಲ್ಲಿ ಜೀವವೈವಿಧ್ಯ ಕಮ್ಮಿಯಾಗುತ್ತ ಬಂದರೆ ಎಂಥ ಪ್ರಯತ್ನದಿಂದಲೂ ಜೀವಿಗಳನ್ನು ಮತ್ತೆ ಸೃಷ್ಟಿಸಲು ಸಾಧ್ಯವಿಲ್ಲ. ಜೀವಜಾಲದ ನಾಶದಿಂದ ನಾಳಿನ ಪರಿಸರದ ಮೇಲಾಗುವ ಪರಿಣಾಮಗಳನ್ನು ಊಹಿಸಲು ಸಾಧ್ಯವಿಲ್ಲ.

ಅದಕ್ಕೇ ಇಂದು ಉಳಿದುಳಿದ ಈ ಮಳೆಕಾಡುಗಳನ್ನು ಹೇಗಾದರೂ ರಕ್ಷಿಸಿ ಕೊಳ್ಳಬೇಕೆಂದು ಎಲ್ಲ ದೇಶಗಳ ಜೀವತಜ್ಞರೂ ಕರೆ ನೀಡುತ್ತಿದ್ದಾರೆ. ಕೋಟಿಗಟ್ಟಲೆ ವರ್ಷಗಳಿಂದ ತಾನೇತಾನಾಗಿ ವಿಕಾಸಗೊಂಡಿರುವ ಈ ಕಾಡುಗಳಲ್ಲಿ ಮಾನವನ ಹಸ್ತಕ್ಷೇಪ ನಿಲ್ಲಬೇಕು; ಯಾವುದೇ ಬಗೆಯ 'ಅಭಿವೃದ್ಧಿ' ಕಾರ್ಯಗಳನ್ನೂ ಇಲ್ಲಿ ಪ್ರಾರಂಭಿಸಬಾರದು—ಎಂಬುದಾಗಿ ವಿಶ್ವಸಂಸ್ಥೆಯ ತಜ್ಞರು ಎಲ್ಲ ದೇಶಗಳಿಗೆ ಏನಂತಿಸಿಕೊಂಡಿದ್ದಾರೆ.

ಕೈಗಾ ಹಳ್ಳಿಯ ಸುತ್ತಮುತ್ತ ಇಂಥ ಸದಾಹಸಿರಿನ ದಟ್ಟ ಮಳೆಕಾಡು ಇದೆ. ಸೂರ್ಯರಶ್ಮಿಯೂ ನೆಲತಲುಪದಂಥ ಈ ಗೋಂಡಾರಣ್ಯದಲ್ಲಿ ಎಂತೆಂಥ ಸಸ್ಯ ರಾಶಿ ಜೀವಜಂತು ಇವೆಯೆಂಬುದನ್ನು ಸರ್ವೆ ಮಾಡುವ ಮೊದಲೇ ಅಣುಸ್ಥಾವರ ಕ್ಕೆಂದು, ಅಣೆಕಟ್ಟಿಗೆಂದು ಅರಣ್ಯ ಕಡಿಯುವ ಕೆಲಸ ಪ್ರಾರಂಭವಾಗಿದೆ. ಅಣು ಸ್ಥಾವರಕ್ಕೆಂದು ಕೇವಲ 4 ಸಾವಿರ ಹೆಕ್ಟೇರ್ ಭೂಮಿಯನ್ನು ಬಳಸುತ್ತೇವೆಂದು ಅಣುಶಕ್ತಿ ಇಲಾಖೆಯ ಅಧಿಕಾರಿ ಹೇಳಿದ್ದನ್ನು ನಂಬುವಂತಿಲ್ಲ. ಏಕೆಂದರೆ ಅಣು ಸ್ಥಾವರ ನಿರ್ಮಾಣದ ಹಂತದಲ್ಲಿ ಕಾರ್ಮಿಕರ ವಸತಿಗೆಂದು, ನೀರು-ರಸ್ತೆ-ವಿದ್ಯುತ್ ಪೂರೈಕೆಗೆಂದು ಇನ್ನೂ ಎಷ್ಟೋ ಪಟ್ಟು ಹೆಚ್ಚು ಅರಣ್ಯ ನಾಶವಾಗುತ್ತದೆ. ಅಣು ಸ್ಥಾವರ ನಿರ್ಮಾಣ ಆದಮೇಲೆಯೂ ತಂತ್ರಜ್ಞರ ಕಾಲೋನಿಗೆಂದು, ವಿದ್ಯುತ್ ಸಾಗಾಟಕ್ಕೆಂದು, ಕಚಡಾ ವಸ್ತುಗಳ ಸಂಗ್ರಹಕ್ಕೆಂದೂ, ಮಿಲಿಟರಿ ತುಕಡಿಗಳ ವಸಾಹತಿಗೆಂದು ಅರಣ್ಯ ಇನ್ನಷ್ಟು ಮತ್ತಷ್ಟು ನಾಶವಾಗುತ್ತಲೇ ಹೋಗುತ್ತದೆ. ಅಣುಸ್ಥಾವರಗಳ ಸಮಾಧಿ ಆದನಂತರವೂ ಭಗ್ನ ಸ್ಥಾವರಗಳ ರಕ್ಷಣೆಗೆಂದು ಇನ್ನಷ್ಟು

ಹೊಸ ಸ್ಥಾವರಗಳನ್ನು ನಿರ್ಮಿಸಬೇಕಾಗುತ್ತದೆ. ಈ ಸರಪಳಿಕ್ರಿಯೆ ನಿರಂತರ ನಡೆಯುತ್ತ ಹೋಗಿ ಅರಣ್ಯಗಳ ಕಬಳಿಕೆಯೂ ಎಗ್ಗಿಲ್ಲದೆ ಸಾಗುತ್ತದೆ.

ಕೃತಕವಾಗಿ ಅರಣ್ಯ ಬೆಳೆಸುತ್ತೇವೆಂದು ಅಣುತಜ್ಞರು ಹೇಳುತ್ತಾರಾದರೂ ಅದು ಎಂದಿಗೂ ನೈಸರ್ಗಿಕ ಅರಣ್ಯಕ್ಕೆ ಸರಿಸಾಟಿಯಾಗಲಾರದು. ಕೋಟ್ಯಂತರ ವರ್ಷಗಳಿಂದ ತಂತಾನೇ ವಿಕಾಸಗೊಂಡ ಸಂಕೀರ್ಣ ಜೀವರಾಶಿಯನ್ನು ಮತ್ತೆ ನಿರ್ಮಿಸಲು ಮಾನವನಿಂದ ಸಾಧ್ಯವಿಲ್ಲ.

ಜಗತ್ತಿನಲ್ಲಿ ಈವರೆಗೆ ಯಾವ ಮಳೆಕಾಡಿನಲ್ಲೂ ಅಣುಸ್ಥಾವರ ಸ್ಥಾಪಿಸಿದ ದಾಖಲೆ ಇಲ್ಲ. ಅಣುವಿಕಿರಣದಿಂದಾಗಿ ವಿಕೃತರೂಪದ ಮಾನವ ಶಿಶುಗಳು ಜನಿಸಿದ್ದು ನಮಗೆ ಗೊತ್ತು. ಪ್ರಯೋಗಶಾಲೆಯಲ್ಲಿ ನೊಣಗಳು ಅಣುವಿಕಿರಣದ ಪರಿಣಾಮದಿಂದ ತಲೆಯ ಮೇಲೆ ಕಾಲುಗಳನ್ನು ಬೆಳೆಸಿಕೊಂಡಿದ್ದು ನಮಗೆ ಗೊತ್ತು. ಕಾಡಿನ ಕೋಟ್ಯಂತರ ಜೀವಿಗಳು ಎಂತೆಂಥ ವಿಕೃತ ರೂಪ ಪಡೆಯುತ್ತವೋ ಗೊತ್ತಿಲ್ಲ. ಅಲಿವೆ ನೀರಿನ ಜಲಚರಗಳು ಯಾವ ಬಗೆಯ ವಿಕಾರ ಸಂತತಿಗೆ ಜನ್ಮ ಕೊಡುತ್ತವೋ ಗೊತ್ತಿಲ್ಲ. ಅಂಥ ಯಾವ ಪರೀಕ್ಷೆಯನ್ನೂ ನಡೆಸದೆಯೇ ಏಕಾ ಏಕಿಯಾಗಿ ಅಣು ಸ್ಥಾವರ ನಿರ್ಮಿಸುವ ಯೋಜನೆ ಹಾಕಲಾಗಿದೆ. ಇದು ಸಾಧುವಲ್ಲ. ಜೀವ ಕೋಟಿಯ ನಾಶ ಅಥವಾ ವಿಕೃತ ಜೀವಕೋಟಿಯ ಸೃಷ್ಟಿ ಎರಡೂ ಭವಿಷ್ಯಕ್ಕೆ ಗಂಡಾಂತರ ಒಡ್ಡುವ ಯೋಜನೆಯೇ ಆಗುತ್ತದೆ.

ಅಣುಸ್ಥಾವರಗಳ ಸರಮಾಲೆ ಹಾಗೂ ಅಪಾಯಗಳ ಸರಮಾಲೆ ಎರಡೂ ಪ್ರಾರಂಭವಾಗುವ ತುಂಬ ಮುಖ್ಯ ನಿರ್ಧಾರ ಕೈಗೊಳ್ಳುವ ಈ ಸಂದರ್ಭದಲ್ಲಿ ಕಣ್ಣುಮುಚ್ಚಿ ಮೌನ ಸಮ್ಮತಿ ನೀಡುವಂತಾದರೆ ನಾಳಿನ ಪೀಳಿಗೆಯ ದುರದೃಷ್ಟ ಜೀವಿಗಳು ನಮ್ಮನ್ನು ಪ್ರಶ್ನಿಸುತ್ತಾರೆ. ನೀವೇಕೆ ಸುಮ್ಮನಿದ್ದಿರೆಂದು ಕೇಳುತ್ತಾರೆ. ಕೈಗಾ ಯೋಜನೆಯ ಸ್ಥಾಪನೆ ಸುಸೂತ್ರವಾಯಿತೆಂದರೆ, ಅಣುಶಕ್ತಿ ಇಲಾಖೆಯವರು ದೇಶದ ಇನ್ನೂ 21 ಕಡೆಗಳಲ್ಲಿ ಹೊಸ ಸ್ಥಾವರಗಳನ್ನು ನಿರ್ಮಿಸುವವರಿದ್ದಾರೆ. ಇಷ್ಟೇ ನಿರ್ಲಕ್ಷ್ಯತನದಿಂದ, ಇಷ್ಟೇ ಹೊಣಗೇಡಿ ನಿರ್ಧಾರವನ್ನು ಒರಿಸ್ಸಾ, ಬಿಹಾರ್, ಆಂಧ್ರಪ್ರದೇಶ, ಮತ್ತಿತರ ರಾಜ್ಯಗಳ ಬಡ ಪ್ರಜೆಗಳ ಮೇಲೂ ಹೇರಲಾಗುತ್ತದೆ. ಅವೆಲ್ಲ ದುರಂತಗಳಿಗೆ ಪ್ರಾರಂಭದಲ್ಲೇ ತಡೆಯೊಡ್ಡುವ ನೈತಿಕ ಹೊಣೆಗಾರಿಕೆ ನಮ್ಮ ಮೇಲಿದೆ.

ಕಾಳಿನದಿ ಪ್ರದೇಶದಲ್ಲಿ ಭೂಕಂಪಗಳಾಗುವ ಸಾಧ್ಯತೆ ಇದೆ. ಇಡೀ ನದಿಯೇ ಪುರಾತನ ಬಿರುಕಿನ ಮೇಲೆ ಹರಿಯುತ್ತಿದೆ. ಈ ಪ್ರದೇಶದಲ್ಲಿ ಕೇವಲ 25 ಕಿಲೋಮೀಟರ್ ತ್ರಿಜ್ಯದ ಕ್ಷೇತ್ರದಲ್ಲಿ ದೊಡ್ಡಗಾತ್ರದ ಏಳು ಅಣೆಕಟ್ಟುಗಳ ನಿರ್ಮಾಣ ಆಗಲಿಕ್ಕಿದೆ. ಒಟ್ಟೂ 13 ಜಲಾಶಯಗಳ ನಿರ್ಮಾಣ ಆಗಲಿಕ್ಕಿದೆ. ಅಷ್ಟೆಲ್ಲ ನೀರಿನ ಭಾರದಿಂದಾಗಿ ಭೂಕಂಪವಾಗಬಹುದು. ಬೇರೆಲ್ಲೋ ದೂರದಲ್ಲಿ-ಕೊಯ್ನಾ ಪ್ರದೇಶದಲ್ಲಿ–ಭೂಕಂಪವಾದರೂ ಅದರ ಪರಿಣಾಮ ಈ ಕ್ಷೇತ್ರಕ್ಕೆ ತೀವ್ರವಾಗಿ ತಟ್ಟುತ್ತದೆ. ಕಾಳಿನದಿಗೆ ನಿರ್ಮಿಸಲಾಗುತ್ತಿರುವ ಅನೇಕ ಅಣೆಕಟ್ಟುಗಳಿಗೆ ಭದ್ರಬುನಾದಿ ಇಲ್ಲ. ಶಿಲಾಸ್ತರಗಳು ಅನೇಕ ಕಡೆ ಬಿರುಕು ಬಿಟ್ಟಿವೆ. ಭೂಕಂಪದಿಂದಾಗಿ ಸ್ವತಃ ಕೈಗಾ ಅಣುಸ್ಥಾವರ ಭಗ್ನವಾಗಿ ಆಸ್ಫೋಟಿಸಬಹುದು; ಅಥವಾ ಮೇಲ್ಗಡೆಯ ಅಣೆಕಟ್ಟುಗಳು ಒಡೆದು ಜಲಪ್ರವಾಹದಲ್ಲಿ ಅಣುಸ್ಥಾವರ ಸಿಕ್ಕಿಕೊಳ್ಳಬಹುದು. ಅದರೊಳಗಿನ ವಿಕಿರಣ ಇಂಧನವೆಲ್ಲ ನೀರುಪಾಲಾಗಿ ಕರಾವಳಿಯುದ್ದಕ್ಕೂ ಅಪಾಯ ಉಂಟಾಗಬಹುದು. ಈಗೊಂದೇ ಅಲ್ಲ, ಮುಂದಿನ ಹತ್ತುಸಾವಿರ ವರ್ಷಗಳವರೆಗೂ ಈ ಅಣುಸ್ಥಾವರಗಳ ಗೋರಿಗಳೂ, ಭಗ್ನ ಅವಶೇಷಗಳೂ, ಪಳೆಯುಳಿಕೆಗಳೂ ಕಾಳಿ ತೀರದಲ್ಲಿ ಅಪಾಯಕಾರಿ ವಿಕಿರಣಗಳನ್ನು ಸೂಸುತ್ತಲೇ ಇರುತ್ತವೆ. ಅಷ್ಟು ದೀರ್ಘ ಅವಧಿಯಲ್ಲಿ ಅಣೆಕಟ್ಟುಗಳು ಹೂಳಿನ ಒತ್ತಡಕ್ಕೆ ಎಂದೋ ಕುಸಿದಿರುತ್ತವೆ. ನದಿಯ ಪಾತ್ರ ಬದಲಾಗಿರುತ್ತದೆ, ಸಮುದ್ರ ಪಾತಳಿ ಮೇಲೇರಿರುತ್ತದೆ. ಭೂಕಂಪ ಆಗದಿರುತ್ತದೆಯೆ? ಅಷ್ಟು ದೀರ್ಘ ಅವಧಿಯವರೆಗೆ ಈ ಎಲ್ಲ ನೈಸರ್ಗಿಕ ಪ್ರಕೋಪಗಳಿಂದ ಅಣುಸ್ಥಾವರಗಳನ್ನು ರಕ್ಷಿಸಿಡಬೇಕು. ಬದಲೀ ವಿಧಾನಗಳಿಂದ ಪುಕ್ಕಟೆ ವಿದ್ಯುತ್ ಸಿಗುವಂತಾದರೂ ಕೂಡ, ಈ ಅಣುಸ್ಥಾವರಗಳನ್ನು ದಾನವ ಮಂದಿರಗಳಂತೆ (ದೇವಮಂದಿರಗಳಲ್ಲ) ಕಣ್ಣಲ್ಲಿ ಕಣ್ಣಟ್ಟು ಕಾಪಾಡಿಕೊಂಡಿರಬೇಕು. ನಾವು ಇಂದು ಮಾಡುವ ದುಷ್ಕೃತ್ಯಕ್ಕೆ, ಪಡೆದ 'ಲಾಭ'ಕ್ಕೆ ಮುಂದಿನ ಪೀಳಿಗೆಯವರು ದಂಡ ತೆರುತ್ತಲೇ ಇರಬೇಕು.

ಕಾಳಿನದಿ ಸಮುದ್ರಕ್ಕೆ ಕೊಡುವ ಅಳಿವೆಯಲ್ಲಿ ಅಪರೂಪದ ಜಲಚರಗಳು ಜೀವಿಸುತ್ತವೆ. ಉಪ್ಪುನೀರು-ಸಿಹಿನೀರಿನ ವಿಶ್ರಣದಲ್ಲಿ ಮಾತ್ರ ಸಂತಾನೋತ್ಪತ್ತಿ ಮಾಡುವ ಶೀಗಡಿ ಮೀನುಗಳೂ, ಏಷ್ಯದಲ್ಲೇ ಅತ್ಯಂತ ರುಚಿಕರವೆನ್ನುವ ಮ್ಯಾಕರೆಲ್ ಮೀನುಗಳೂ ಇಲ್ಲಿನ ಸಹಸ್ರಾರು ಬೆಸ್ತರ ಕುಟುಂಬಗಳಿಗೆ ಜೀವನಾಧಾರ ಒದಗಿಸಿವೆ. ಅಳಿವೆಯ ಈ ಹದ ನೀರಿಗೆ ಅಣುಸ್ಥಾವರದಿಂದ ಹೊರಬರುವ ನಂಜುಮಿಶ್ರಿತ ಬಿಸಿನೀರು ಸೇರಿದಾಗ ಜಲಚರಗಳ ಸ್ಥಿತಿಗತಿ ಹೇಗಾಗುತ್ತದೆಂದು ಯಾರೂ ಅಧ್ಯಯನ ಮಾಡಿಲ್ಲ. ಮೀನುಗಳ ಸಂತಾನೋತ್ಪತ್ತಿ ಸಾಮರ್ಥ್ಯ ಏರುಪೇರಾಗ

ಬಹುದು. ಅಣೆಕಟ್ಟುಗಳಿಂದಾಗಿ ಸಿಹಿನೀರಿನ ಆಭಾವ ಉಂಟಾಗಿ ಮೊನುಗಳ ತತ್ತಿ ಇಡುವ ಪರಿಸರ ಅಧ್ವಾನವಾಗುತ್ತದೆ. ಅದಕ್ಕೆ ಬಿಸಿನೀರಿನ ಸೇಚನವಾದರೆ ಹೇಗಿರುತ್ತದೆ? ಒಂದೊಂದು ಬಾರಿ ಅಣುಸ್ಥಾವರ ಕೆಟ್ಟು ಸ್ಥಗಿತವಾದಾಗಲೂ ಅಣುವಿಕಿರಣ ಮಿಶ್ರಿತ ಕೊಳಚೆ ಜಲ ಸೇರಿಹೋಗಿ ನೀರನ್ನು ಕಲುಷಿತ ಮಾಡುತ್ತದೆ. ತಾರಾಪುರದಲ್ಲಿ ನೂರಾರು ಬಾರಿ ಹೀಗಾಗಿದೆ. ಕಲ್ಪಾಕ್ಕಮ್ ಸ್ಥಾವರದಲ್ಲಿ ವಿಷಾಕ್ತ ಭಾರಜಲ ಸೇರಿಹೋಗಿ ಅನೇಕಬಾರಿ ಸಮುದ್ರಕ್ಕೆ ವಿಕಿರಣ ಸೇರಿದೆ. ಹೀಗಾದರೆ ಮೊನುಗಳು ಮನುಷ್ಯರ ಬಳಕೆಗೆ ಅಯೋಗ್ಯವಾಗುತ್ತವೆ. ಮೊನು ಸಂಕುಲ ಹೇರಳವಾಗಿದ್ದರೂ, ಅದಕ್ಕೆ ಗಿರಾಕಿ ಇಲ್ಲದೇ ಬೆಸ್ತರು ಕಷ್ಟ ಎದುರಿಸಬೇಕಾಗುತ್ತದೆ. ಕಾಲಕ್ರಮೇಣ ಬೆಸ್ತರು ಒಬ್ಬೊಬ್ಬರಾಗಿ ತಮ್ಮ ಜೀವಾಶ್ರಯವನ್ನು ತೊರೆದು ಗುಳೆ ಹೋಗಬೇಕಾಗುತ್ತದೆ. ಅವರಿಗಾದ ನಷ್ಟಕ್ಕೆ ಯಾರೂ ಪರಿಹಾರ ನೀಡುವುದಿಲ್ಲ.

ಅಣುಶಕ್ತಿಯಿಂದಾಗಲೀ, ಅಣೆಕಟ್ಟುಗಳಿಂದಾಗಲೀ ಸ್ಥಳೀಯರಿಗೆ ಕಷ್ಟ ಕಾರ್ಪಣ್ಯಗಳ ಹೊರತು ಬೇರೇನೂ ಲಭಿಸುವುದಿಲ್ಲ. ರೈತರಿಗೆ ಜಮೀನಿಗೆ ಬದಲಾಗಿ ನಗದು ರೂಪದಲ್ಲಿ ಪರಿಹಾರ ಸಿಕ್ಕರೂ ವಕೀಲರು, ಮಧ್ಯವರ್ತಿಗಳು ತಮ್ಮ ಪಾಲನ್ನು ಪಡೆದ ಮೇಲೆ ಉಳಿದ ಹಣ ನೋಡ ನೋಡುತ್ತ ಕರಗಿರುತ್ತದೆ. ಅಣುಸ್ಥಾವರ ನಿರ್ಮಾಣಕ್ಕೆಂದು ದೂರದಿಂದ ಬಂದ ಅನೇಕ ಸಹಸ್ರ ಕಾರ್ಮಿಕರು ಕ್ರಮೇಣ ಸುತ್ತಮುತ್ತ ಲಭ್ಯವಿದ್ದ ಸ್ಥಳಾವಕಾಶ ಹಾಗೂ ಉದ್ಯೋಗಾವಕಾಶಕ್ಕೆ ಪೈಪೋಟಿ ನಡೆಸುತ್ತಾರೆ. ಸ್ಥಳೀಯರು ತಮ್ಮ ನೆಲದಲ್ಲೇ ಪರಕೀಯರಾಗುತ್ತಾರೆ. ಅಣುಸ್ಥಾವರವೇಕೆ, ಶಕ್ತಿ ಉತ್ಪಾದನೆಯ ಯಾವ ಯೋಜನೆಯಲ್ಲಾದರೂ ಉದ್ಯೋಗಾವಕಾಶ ತುಂಬಾ ಕಡಿಮೆ ಎಂಬುದನ್ನು ತಜ್ಞರು ಒಪ್ಪಿಕೊಂಡರೂ, ವಿದ್ಯುತ್ತಿನ ಒಳಕೆಯಾಗುವಲ್ಲಿ ಉದ್ಯೋಗಾವಕಾಶ ಹೆಚ್ಚುತ್ತದೆ ಎನ್ನುತ್ತಾರೆ. ಕೈಗಾದಲ್ಲಿ ಉತ್ಪಾದನೆಯಾಗುವ ವಿದ್ಯುತ್ತು ಬಳಕೆಯಾಗುವುದು ಮಾತ್ರ ದೂರದ ಬೆಳಗಾವಿ, ಪಣಜಿ, ದಾವಣಗೆರೆಗಳಲ್ಲಿ. ಗ್ರಾಮೀಣ ಜನರನ್ನು ನಿರಾಶ್ರಿತರನ್ನಾಗಿ ಮಾಡಿ ಅವರನ್ನು ನಗರದ ಕೊಳೆಗೇರಿಗೆ ವಲಸೆಗೆ ಪ್ರೇರೇಪಿಸಿ, ಇತ್ತ ಹಳ್ಳಿ ಪರಿಸರವನ್ನೂ ಅತ್ತ ನಗರ ಪರಿಸರವನ್ನೂ ಏಕಕಾಲಕ್ಕೇ ಅಧ್ವಾನ ಮಾಡುವ ಯೋಜನೆ ಇದಾಗುತ್ತದೆ.

ಕೈಗಾದಿಂದ ಲಭ್ಯವಾಗುವ ವಿದ್ಯುತ್ತೆಲ್ಲ ಕರ್ನಾಟಕಕ್ಕೇ ಸಿಗುತ್ತದೆಂಬ ಯಾವ ಗ್ಯಾರಂಟಿಯೂ ಇಲ್ಲ; ಏಕೆಂದರೆ ಆ ವೇಳೆಗಾಗಲೇ ವಿದ್ಯುತ್ತಿನ ರಾಷ್ಟ್ರೀಯ ಜಾಲ ನಿರ್ಮಾಣವಾಗಿ, ಎಲ್ಲ ರಾಜ್ಯಗಳಿಗೆ ವಿದ್ಯುತ್ತಿನ ವಿಕರೂಪ ಹಂಚಿಕೆ

ವ್ಯವಸ್ಥೆ ಜಾರಿಗೆ ಬಂದಿರುತ್ತದೆ. ಗೋವಾ, ಮಹಾರಾಷ್ಟ್ರ, ಆಂಧ್ರಪ್ರದೇಶ ಹಾಗೂ ಕೇರಳ ರಾಜ್ಯಗಳಿಗಿಂತ ತುಸು ಹೆಚ್ಚಿನ ಪ್ರಮಾಣದಲ್ಲಿ ಕೈಗಾ ವಿದ್ಯುತ್ ಕರ್ನಾಟಕಕ್ಕೆ ಲಭಿಸಿದರೂ, ಅದನ್ನು ಬಳಸುವ ಘಟಕಗಳೆಲ್ಲ ಕೈಗಾದಿಂದ 200-300 ಕಿಲೋಮೀಟರ್ ದೂರದಲ್ಲಿವೆ. ಮಾರ್ಗದಲ್ಲೇ ಶೇಕಡಾ 25 ರಷ್ಟು ವಿದ್ಯುತ್ ಸೋರಿ ಹೋಗುವುದರಿಂದ ಒಟ್ಟಿನ ಮೇಲೆ ರಾಜ್ಯಕ್ಕೆ ಈ ಯೋಜನೆಯಿಂದಾಗಿ ನಷ್ಟವೇ ಹೊರತು ಲಾಭವಿಲ್ಲ.

ಕೈಗಾ ಸುತ್ತಮುತ್ತಲ ಹಳ್ಳಿಗಳ ರೈತರು ಹಾಗೂ ಕಾಳಿ ಅಳಿವೆಯ ಬೆಸ್ತರು ಮಾತ್ರ ನಷ್ಟಕ್ಕೆ ಗುರಿಯಾಗುತ್ತಾರೆ ಎಂದೂ ಭಾವಿಸಬಾರದು. ಜಿಲ್ಲೆಯ ಇತರ ಜನ ಸ್ತೋಮವೂ ವಿಧವಿಧದ ಕಿರುಕುಳಕ್ಕೆ ಬಲಿಯಾಗಬೇಕಾಗುತ್ತದೆ. ಮೊದಲನೆಯ ದಾಗಿ, ಅಣುಸ್ಥಾವರದ ಕ್ಷೇತ್ರ ಕ್ರಮೇಣ ವಿಸ್ತೀರ್ಣವಾದಂತೇ ಅದರ ದಿಗ್ಬಂಧನ ಕ್ಷೇತ್ರವೂ ವಿಸ್ತಾರವಾಗುತ್ತ, ಜನಸಾಮಾನ್ಯರ ಮುಕ್ತ ಸಂಚಾರಕ್ಕೆ ಅಡೆತಡೆ ಉಂಟಾ ಗುತ್ತದೆ. ಅಣುಸ್ಥಾವರದ ಯಾವುದೇ ಚಿಕ್ಕಪುಟ್ಟ ಚೌರ್ಯ ದುಷ್ಕೃತ್ಯಗಳಿಗೂ ಅಮಾಯಕ ಪ್ರಜೆಗಳ ಶೋಧನೆ ನಡೆಯುತ್ತದೆ. ವಿಶೇಷವಾಗಿ ಅರಣ್ಯವಾಸಿಗಳಾ ಗಿರುವ ಹಾಲಕ್ಕಿ, ಸಿದ್ದಿ ಹಾಗೂ ಗೌಳಿಗರಂಥ ಬಡ ಜನಾಂಗ ಇನ್ನಷ್ಟು ಶೋಷಣೆಗೆ ಒಳಗಾಗುತ್ತದೆ. ಅಕಸ್ಮಾತ್ ಅಣುಸ್ಥಾವರದಲ್ಲಿ ಸ್ಫೋಟವಾಗಲೀ, ವಿಸ್ಫೋಟಕ ಅವಘಡವಾಗಲೀ ಸಂಭವಿಸಿದಾಗ, ಅಲ್ಲಿ ಸಂಚಯವಾದ ಅಣುಶಾಖ ಹಾಗೂ ಅಣು ವಿಕಿರಣವನ್ನು ಮೆಲ್ಲಗೆ ವಾತಾವರಣಕ್ಕೆ ಹರಿಬಿಡುತ್ತಾರೆ. ಗಾಳಿ ಮೋಡಗಳ ಮೂಲಕ ಗುಡ್ಡಕಣಿವೆಗಳಲ್ಲಿ ಪಸರಿಸುವ ವಿಕಿರಣ ಧೂಮದಿಂದಾಗಿ ತೆಂಗು, ಅಡಿಕೆ, ಮೆಣಸು, ಏಲಕ್ಕಿ, ಬಾಳೆಯಂಥ ತೋಟದ ಬೆಳೆಗಳೆಲ್ಲ ಬಳಕೆಗೆ ಅನರ್ಹವಾಗುತ್ತವೆ. ಕಣ್ಣಿಗೆ ಕಾಣದ ಈ ಅಪಾಯ ಸಂಭವಿಸದೇ ಇದ್ದರೂ, ಗಾಳಿ ವರ್ತಮಾನ ಪಬ್ಲಿ ದರೂ ಸಾಕು. ಮುಂಬೈನ ಮಾರುಕಟ್ಟೆಗಳಲ್ಲಿ ಉತ್ತರ ಕನ್ನಡ ಜಿಲ್ಲೆಯ ವಾಣಿಜ್ಯ ಬೆಳೆಗಳಿಗೆ ಬಹಿಷ್ಕಾರ ಹಾಕಲಾಗುತ್ತದೆ. ಇಡೀ ಜಿಲ್ಲೆಯ ವಾಣಿಜ್ಯ ವ್ಯವಹಾರ ಅಧ್ವಾನವಾಗುತ್ತದೆ. ಅಣುಸ್ಥಾವರದ ಒಳ ಬಿಸಾಕಿದ ಲೋಹದ, ಪ್ಲಾಸ್ಟಿಕ್ಕಿನ ವಸ್ತುಗಳು ಜನ ಬಳಕೆಗೆ ಬಂತೆಂದರೆ ಸಹಸ್ರಾರು ಜನ ತಮಗರಿವಿಲ್ಲದೆಯೇ ನಪುಂಸಕ ರಾಗಬಹುದು. ಕ್ಯಾನ್ಸರ್ ರೋಗಕ್ಕೆ ತುತ್ತಾಗಬಹುದು.

ಅಣುಸ್ಥಾವರ ಇದ್ದಲ್ಲೆಲ್ಲ ವೈರಿ ದೇಶಗಳ ದಾಳಿಯ ಸಂಭವ ಇದ್ದೇ ಇರುತ್ತದೆ. ಭಯೋತ್ಪಾದಕರೂ, ಗೂಢಚಾರರೂ, ದೇಶದ ಅಭದ್ರತೆಗೆ ಹೊಂಚು ಹಾಕಿ ಅರಾಜ ಕತೆ ಉಂಟುಮಾಡಬಯಸುವ ವಿಧ್ವಂಸಕ ಮನೋವೃತ್ತಿಯವರೂ ಅಣುಸ್ಥಾವರದ

ಸುತ್ತ ಕಾರ್ಯಾಚರಣೆ ಪ್ರಾರಂಭಿಸುತ್ತಾರೆ. ಅದನ್ನು ತಡೆಗಟ್ಟಲೆಂದು ಸಹಜವಾಗಿಯೇ ಸರಕಾರೀ ರಕ್ಷಕದಳ ಹಾಗೂ ಮಿಲಿಟರಿ ತುಕಡಿಗಳು ಜಿಲ್ಲೆಯ ಬಹು ಭಾಗದಲ್ಲಿ ಸದಾಕಾಲ ಸಂಚರಿಸುತ್ತಿರಬೇಕಾಗುತ್ತದೆ. ಪ್ರಜಾಪ್ರಭುತ್ವದ ಮೌಲ್ಯಗಳಾದ ವಾಕ್‌ಸ್ವಾತಂತ್ರ್ಯ, ಸಂಚಾರ ಸ್ವಾತಂತ್ರ್ಯ, ಆಸ್ತಿ ಸ್ವಾತಂತ್ರ್ಯಗಳೆಲ್ಲ ಕ್ರಮೇಣ ಮೊಟಕಾಗುತ್ತಾ ಹೋಗುತ್ತವೆ. ಜಿಲ್ಲೆಯ ಭಾವೀ ಜನಾಂಗದ ಪಾಲಿಗೆ ಸದಾ ತೂಗಾಡುವ ಅಪಾಯದ ಕತ್ತಿಯಾಗುತ್ತದೆ. ಕತ್ತಿಯನ್ನು ತೂಗುಹಾಕಿದ ಹಗ್ಗ ಶಿಥಿಲವಾಗುತ್ತ ಹೋಗುತ್ತದೆ.

ಹೇಳಿ - ಯಾರಿಗಾಗಿ ಈ ಅಣುಸ್ಥಾವರ ?

"ಗ್ರಾಮೀಣ ಬಡಜನತೆಗೋಸ್ಕರವೆಂದೇ ಎಷ್ಟೋ ಯೋಜನೆಗಳು ರೂಪಿತವಾಗಿವೆ. ಆದರೆ ವಾಸ್ತವ ಆಚರಣೆಯಲ್ಲಿ ಅಪ್ಪ ಜನರನ್ನು ಮುತ್ತಷ್ಟು ಬಡತನದತ್ತ ತಳ್ಳುತ್ತಿವೆ ; ತಾತ್ಕಾಲಿಕ ಅಮಿಷ ಗಳಿಂದ ಹಳ್ಳಿಗರನ್ನು ತಪ್ಪುದಾರಿಗೆಳೆಯುತ್ತಿವೆ. ಬಡವರ ಹೆಸರಿನಲ್ಲಿ ಖರ್ಚಾಗುವ ಸಾವಿರಾರು ಕೋಟಿ ರೂಪಾಯಿ ತೆರಿಗೆದಾರರ ಹಣದ ಪ್ರಯೋಜನ ಬೆರಳೆಣಿಕೆಯಷ್ಟು ಉದ್ದಿಮೆಪತಿಗಳಿಗಷ್ಟೇ ದೊರೆಯುವಂತಾಗಿದೆ."

"ಜನರ ಆಪನತಿಗೆ ಕಾರಣವಾಗಿರುವಂತೆ ಪ್ರಕೃತಿ ಸಂಪನ್ಮೂಲಗಳ ಶೀಘ್ರವಿನಾಶಕ್ಕೂ ಈ ಯೋಜನೆಗಳು ದಾರಿಮಾಡಿವೆ. ಅರಣ್ಯನಾಶ, ನದೀಮಾಲಿನ್ಯ ಮೊದಲಾದವುಗಳ ದುಷ್ಪರಿಣಾಮ ಎಲ್ಲರನ್ನೂ ಆವರಿಸುತ್ತದಾದರೂ ಬಡಜನರ ಜೀವನದ ಮೇಲೆ ಅವುಗಳ ಪರಿಣಾಮ ಮತ್ತಷ್ಟು ಉಗ್ರ.

"ಇದು ಯಾವುದೊ ಒಂದು ಜನವರ್ಗಕ್ಕಷ್ಟೆ ಸಂಬಂಧಿಸಿದ ಸಮಸ್ಯೆಯಲ್ಲ. ನಮ್ಮ, ನಿಮ್ಮ, ಎಲ್ಲರ ನಾಳಿನ ಅಳಿವು-ಉಳಿವಿನ ಪ್ರಶ್ನೆ. ಜನ ಸುಮ್ಮನೆ ಕುಳಿತಂತೆಲ್ಲ ಸ್ಥಿತಿ ಮತ್ತಷ್ಟು ಉಲ್ಬಣ ಗೊಂಡೀತೇ ಹೊರತು ಸುಧಾರಿಸಲಾರದು. ಈಗಾಗಲೆ ಕಾಡುಗಳಿಗೆಲ್ಲ ಕೊಡಲಿ ಹಾಕಿ ಮುಗಿಸಿರುವ ರಾಕ್ಷಸ ಕೈಗಳು ಈಗ ಬೇಸಾಯದ ಭೂಮಿಯನ್ನೂ ಆಲಿಂಗಿಸಲು ಕಾತರಗೊಂಡಿವೆ.

"ಆದ್ದರಿಂದ ಈಗಲೇ ಜಾಗೃತಗೊಳ್ಳೋಣ. ಪರಿಸರವನ್ನು ಉಳಿಸೋಣ ; ಪರಿಸರವರ್ಧನೆಯ ಮೂಲಕ ಜೀವನವನ್ನು ಸಮೃದ್ಧಗೊಳಿಸೋಣ."

—ಮಣ್ಣು ರಕ್ಷಣಾ ಕೂಟ

ಪ್ರತಿಗಳು ದೊರೆಯುವ ಸ್ಥಳ :

1) ಮಣ್ಣು ರಕ್ಷಣಾ ಕೂಟ
ದ್ವಾರಾ : ಕರ್ನಾಟಕ ಗಾಂಧಿ ಸ್ಮಾರಕ ನಿಧಿ
ಗಾಂಧಿ ಭವನ, ಕುಮಾರ ಪಾರ್ಕ್ ಪೂರ್ವ
ಬೆಂಗಳೂರು-560 001

2) ಸಮಾಜ ಪರಿವರ್ತನ ಸಮುದಾಯ
ಜಯನಗರ ಕ್ರಾಸ್, ಸಪ್ತಾಪುರ
ಧಾರವಾಡ-580 001

NUCLEAR POWER – HAZARDS

'Nuclear power, the great blunder'

NEW YORK, July 10.

The future decline of nuclear power, projected by scientists who are consultants to business firms in the United States, is supported by evidence that peak levels have been reached.

The next 15 years will see an inexorable working out of a chain of dismal events embodied in three decades of massive commitments to a flawed technology.

That nuclear power can no longer be regarded as an economically viable alternative to other sources of energy may be inferred from the low ratings share market operators on Wall Street, New York, assign to nuclear power stocks and bonds.

This view is held by Mr. Jay Gould, an economic consultant specialising in the study of the impact of scientific advance on business.

Mr. Gould says in *Monthly Review*, published from here, that the bleak prospects for nuclear power today stand in sharp contrast to the euphoria of the atoms for peace programme launched by the Eisenhower administration in the early 1958 with its promise of nuclear energy too cheap to be metered and therefore available to users as a gift.

Rapid expansion: In conditions of wartime secrecy huge public and private funds were invested, particularly between 1950 and 1970, in speeding up the design of an American nuclear reactor that would dominate the non-socialist world.

In this period the rated capacity of successive reactor designs rose fifty-fold without any operational experience to justify such rapid expansion. As later evidence proved, the safety requirements of this new and dangerous technology were badly served.

The economic death of the nuclear power industry has been definitively foreshadowed by Mr. Charles Kommanoff, an American economist who has demonstrated that the capital costs and operating expenses of nuclear power plants do now and will increasingly exceed the corresponding costs of building and operating coal-fired plants

Disasters: Mr. Kommanoff's data base enables observers to quantify the economic consequences of several nuclear scenarios. The worse contingency is that of an accident involving the meltdown of a core of the kind narrowly averted at Three Mile Island in the United States about five years ago.

Some observers of the nuclear power industry believe there is a 50 per cent probability of such an occurrence in the next 10 years.

In a new book entitled *Nuclear Inc: The Men and Money Behind Nuclear Energy*, Mark Hertsgaard reports general agreement even among the elite corps of nuclear executives in the U.S. Government and in private industry that such a disaster would result in the immediate shutdown of every nuclear plant in the U.S., aside from the immediate direct damage the Atomic Energy Commission of the U.S. estimates to exceed $7 billions on an average.

Gradual phasing out: A more hopeful scenario envisages a gradual premature phasing out of the 73 operating reactors over the next 20 years as the result of an increasing number of shutdowns required by the cost of increasingly stringent safety regulations.

Difficulties would multiply as the reactors encounter new and unforeseen problems of corrosion and embrittlement in the later stages of their 25-year life span.

At the end of a reactor's useful life, the irradiated fuel must be removed and the reactor closed down for 10 to 30 years before it is safe to dismantle. So far attempts to dismantle dead reactors have proved prohibitively expensive.

Transportation: So it is probable that in the future all dead reactors, along with the accumulated low-level waste, will be permanently interred as modern pyramids, construction of which by the turn of the century will constitute a high-growth activity.

Any attempt to project the grim prospects for nuclear power must take into consideration the gigantic problem of transportation and disposal of high-level nuclear waste.

A typical pressurised light-water reactor uses 60 fuel assemblies, or 30 tonnes of fuel, yearly. About 360,000 metric tonnes of commercial and military high-level nuclear waste has been accumulated at some 100 locations, and it must be moved to an offsite burial ground.

Countless deaths: Mr. Ernest Sternglass, a former member of the Nuclear priesthood of the U.S., has demonstrated, that low-level radiation from the fallout from testing atom bombs and emissions from reactor accidents have caused, and will cause, countless deaths.

He has measured the sharp increase in foetal deaths and infant mortality in regions subject to heavy windborne and radioactive fallout extending even to the Scholastic Aptitude Test (SAT) carried out in schools 18 years after exposure. He correctly predicted the rise in infant mortality in those countries in the State of Pennsylvania affected by the fallout of the Three Mile Island accident.

Mr. Sternglass forecasts in *Secret Fallout: Low Level Radiation*: "Our reliance on nuclear power, as on nuclear weapons, may eventually be seen, if there are any of us left to see, as one of the greatest blunders in human history." — UNI.

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DH 23/7/84

High leukaemia rate near nuclear plant

LONDON, July 22. — A Government inquiry has confirmed that the leukaemia rate around a nuclear complex in northern England is about 10 times the national average, official sources have said.

The sources said the inquiry, conducted by leading physician Sir Douglas Black, indicated that there could be a link between the Sellafield nuclear reprocessing plant and deaths of local children from leukaemia.

The Government set up the inquiry after a commercial television station reported a high incidence of leukaemia and other cancers in children living near the plant.

The report by Yorkshire Television, said the village of Seascale near the nuclear complex had 11 cases of childhood cancers over the past 30 years, 10 times the national rate.

UP adds: The Sellafield complex contains the Windscale reprocessing plant, one of two such commercial operations in the world. The other is in France.

The plant turns spent magnox reactor fuel into reusable uranium, plutonium and high level waste that must be stored indefinitely. Other depleted fuel from thermal oxide reactors in Britain and Japan is stored on the site pending the building of a new plant.

Since reprocessing began in 1952, the plant has been discharging radioactive waste into the Irish sea, including particles of plutonium.

Some of this radioactive waste has washed back onto the beaches surrounding the plant, although a spokesman for British Nuclear Fuels Limited, the State-owned operator of the facility, said the discharges are within safe limits.

A newly discovered protein produced by a suspected cancer-causing gene apparently helps trigger one type of leukaemia, according to a recent study.

The findings were praised by cancer experts as "very important" and a "breakthrough" in understanding how cancer may be spurred by genes.

"Diseases may go down a certain path," said Dr. Owen Witte, head of the research team. "What we've done is to pull together certain parts of a pathway so that we better understand the path that leads to one form of human leukaemia."

HINDU July 23

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Windscale was the site in 1957 of one of the world's worst nuclear accidents when a fire in a plutonium-producing reactor caused the release of a cloud of radioactive iodine gas. — Reuter, UPI.

British secret service 'deeply compromised'

LONDON, July 22.

The British secret service has been "deeply compromised" by Soviet penetration and has lost its way, a former spy-catcher claimed in an interview on Sunday.

Mr. Peter Wright, who last week said it was "99 per cent certain" that former spy chief Sir Roger Hollis had been a Soviet agent, told the *Observer* newspaper he had a highly sensitive dossier about Soviet penetration of British intelligence services.

Mr. Wright, who for seven years led a committee probing the extent of Soviet spies in the civil service and in intelligence, accused senior figures in the M15 counter-espionage service of covering up chronic weaknesses to avoid political embarrassment.

The dossier, which was seen by the paper, argued that M15's attempts to detect and trap spies were repeatedly swept a side by leaks to the Russians.

Mr. Wright, (69), lives in Australia, retired from the service in 1976. He believes M15 is still not secure today. — Reuter.

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THE HINDU, Wednesday, July 11, 1984. 5

'Nuclear power, the great blunder'

1/12/84

NEW YORK, July 10.

The future decline of nuclear power, projected by scientists who are consultants to business firms in the United States, is supported by evidence that peak levels have been reached.

The next 15 years will see an inexorable working out of a chain of dismal events embodied in three decades of massive commitments to a flawed technology.

That nuclear power can no longer be regarded as an economically viable alternative to other sources of energy may be inferred from the low ratings share market operators on Wall Street, New York, assign to nuclear power stocks and bonds.

This view is held by Mr. Jay Gould, an economic consultant specialising in the study of the impact of scientific advance on business.

Mr. Gould says in *Monthly Review*, pubiished from here, that the bleak prospects for nuclear power today stand in sharp contrast to the euphoria of the atoms for peace programme launched by the Eisenhower administration in the early 1958 with its promise of nuclear energy too cheap to be metered and therefore available to users as a gift.

Rapid expansion: In conditions of wartime secrecy huge public and private funds were invested, particularly between 1950 and 1970, in speeding up the design of an American nuclear reactor that would dominate the non-socialist world.

In this period the rated capacity of successive reactor designs rose fifty-fold without any operational experience to justify such rapid expansion. As later evidence proved, the safety requirements of this new and dangerous technology were badly served.

The economic death of the nuclear power industry has been definitively foreshadowed by Mr. Charles Kommanoff, an American economist who has demonstrated that the capital costs and operating expenses of nuclear power plants do now and will increasingly exceed the corresponding costs of building and operating coal-fired plants

Disasters: Mr. Kommanoff's data base enables observers to quantify the economic consequences of several nuclear scenarios. The worse contingency is that of an accident involving the meltdown of a core of the kind narrowly averted at Three Mile Island in the United States about five years ago.

Some observers of the nuclear power industry believe there is a 50 per cent probability of such an occurrence in the next 10 years.

In a new book entitled *Nuclear Inc: The Men and Money Behind Nuclear Energy*, Mark Hertsgaard reports general agreement even among the elite corps of nuclear executives in the U.S. Government and in private industry that such a disaster would result in the immediate shutdown of every nuclear plant in the U.S., aside from the Immediate direct damage the Atomic Energy Commission of the U.S. estimates to exceed $7 billions on an average.

Gradual phasing out: A more hopeful scenario envisages a gradual premature phasing out of the 73 operating reactors over the next 20 years as the result of an increasing number of shutdowns required by the cost of increasingly stringent safety regulations.

Difficulties would multiply as the reactors encounter new and unforeseen problems of corrosion and embrittlement in the later stages of their 25-year life span.

At the end of a reactor's useful life, the irradiated fuel must be removed and the reactor closed down for 10 to 30 years before it is safe to dismantle. So far attempts to dismantle dead reactors have proved prohibitively expensive.

Transportation: So it is probable that in the future all dead reactors, along with the accumulated low-level waste, will be permanently interred as modern pyramids, construction of which by the turn of the century will constitute a high-growth activity.

Any attempt to project the grim prospects for nuclear power must take into consideration the gigantic problem of transportation and disposal of high-level nuclear waste.

A typical pressurised light-water reactor uses 60 fuel assemblies, or 30 tonnes of fuel, yearly. About 360,000 metric tonnes of commercial and military high-level nuclear waste has been accumulated at some 100 locations, and it must be moved to an offsite burial ground.

Countless deaths: Mr. Ernest Sternglass, a former member of the Nuclear priesthood of the U.S., has demonstrated that low-level radiation from the fallout from testing atom bombs and emissions from reactor accidents have caused, and will cause, countless deaths.

He has measured the sharp increase in foetal deaths and infant mortality in regions subject to heavy windborne and radioactive fallout extending even to the Scholastic Aptitude Test (SAT) carried out in schools 18 years after exposure. He correctly predicted the rise in infant mortality in those countries in the State of Pennsylvania affected by the fallout of the Three Mile Island accident.

Mr. Sternglass forecasts in *Secret Fallout: Low Level Radiation*: "Our reliance on nuclear power, as on nuclear weapons, may eventually be seen, if there are any of us left to see, as one of the greatest blunders in human history." — UNI.

India

DH 23/7/84

High leukaemia rate near nuclear plant

LONDON, July 22. — A Government inquiry has confirmed that the leukaemia rate around a nuclear complex in northern England is about 10 times the national average, official sources have said.

The sources said the inquiry, conducted by leading physician Sir Douglas Black, indicated that there could be a link between the Sellafield nuclear reprocessing plant and deaths of local children from leukaemia.

The Government set up the inquiry after a commercial television station reported a high incidence of leukaemia and other cancers in children living near the plant.

The report by Yorkshire Television, said the village of Seascale near the nuclear complex had 11 cases of childhood cancers over the past 30 years, 10 times the national rate.

UP adds: The Sellafield complex contains the Windscale reprocessing plant, one of two such commercial operations in the world. The other is in France.

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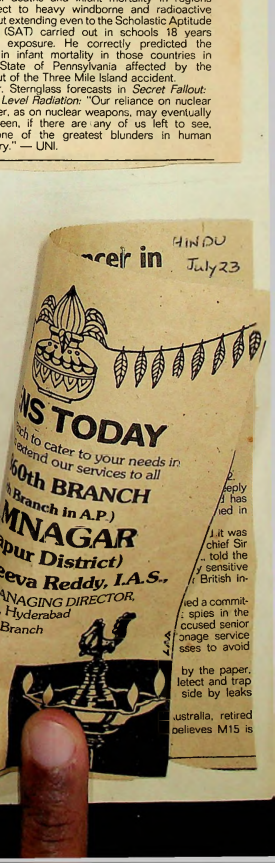
A newly discovered protein produced by a suspected cancer-causing gene apparently helps trigger one type of leukaemia, according to a recent study.

The findings were praised by cancer experts as "very important" and a "breakthrough" in understanding how cancer may be spurred by genes.

"Diseases may go down a certain path," said Dr. Owen Witte, head of the research team. "What we've done is to pull together certain parts of a pathway so that we better understand the path that leads to one form of human leukaemia."



NUCLEAR POWER – HAZARDS

11-29

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1/2 9

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11-30

ATOMIC POWER:
Myths & Reality :

CRITIQUE OF NUCLEAR POLICY

(CONTENTS)

THE COMMITTEE FOR A SANE NUCLEAR POLICY

(C O S N U P)

NEW DELHI 1984

Rs. 3.00

This collection of articles and documents issued in the public interest, by the Committee for a Sane Nuclear Policy.

Abbreviations

AEC	Atomic Energy Commission (of India)
BARC	Bhabha Atomic Research Centre (Bombay).
BARCOA	BARC Officers' Association
CANDU-PHW	Canadian Deuterium-Uranium Pressurised Heavy Water Reactor
DAE	Department of Atomic Energy (of India)
DST	Department of Science & Technology (of India)
IAEA	International Atomic Energy Agency
MAPP	Madras Atomic Power Project (Kapakkam)
NAPP	Narora Atomic Power Project (U.P.)
PPED	Power Projects Engineering Division (DAE)
SACC	Science Advisory Committee to the Cabinet (Government of India)
RAPE	Rajasthan Atomic Power Station (Kota)
TAPS	Tarapur Atomic Power Station (Bombay)
TIFR	Tata Institute of Fundamental Research (Bombay)

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NUCLEAR POWER UNSAFE AT ANY COST

Science Policy / DHIRENDRA SHARMA

Dhirendra Sharma has always been a staunch critic of the country's nuclear policy. There is his controversial book, *India's Nuclear Estate*. And various articles by him criticising India's official Science and Technology Policy have appeared here and abroad.

Recently, he was unceremoniously transferred from Jawaharlal Nehru University's Science Policy Centre (a post he had held for 10 years) to the School of Languages, under pressure from the Department of Atomic Energy, which felt that Sharma's views had damaged the country's reputation abroad.

In a scathing attack on India's nuclear policy, Sharma, who is Convener of the Committee for a Sane Nuclear Policy, urges the nation to pause and take a fresh look at its nuclear strategy. In the light of the catastrophic environmental consequences which would result out of radiation.

He questions the right of our democratic process to invest India's meagre resources in an energy system which can even damage our central rights and liberties.

What he suggests is that we should develop an alternative energy technology. Which is efficient, renewable and safe. And at a reasonable price.

In the meantime, he emphasises the need for a moratorium on all nuclear power projects in order to save our future generations from the serious repercussions of a nuclear fallout.

India has demonstrated its nuclear capability by a successful 'Peaceful Implosion' at Pokharan in the Rajasthan desert on May 18, 1974. But to construct and operate a nuclear power generation system safely and efficiently is another story. As early as 1965, Dr Homi J. Bhahha had claimed that "one new atomic power reactor of 200 MWe will be set up every year from 1968 onwards". It was also claimed that, by 1970, "100 per cent indigenous atomic power plants would be produced" in India. For whatever reasons, none of these targets could be achieved.

The pattern of energy determines the choice of selection of technology, which can vary according to the demands of industry and agriculture. But imperatives of appropriateness in an energy system cannot ignore futuristic demands for protection of social and natural environment.

India's major research and development [R & D] efforts in science and technology have been diverted to nuclear and space programmes, which together take away almost an open-ended budget of Rs 1,000 crores [R & D only]; the highest scientific budget, Rs 600 crores, goes to nuclear energy. But, if economic and industrial considerations were necessary for deciding a power generation strategy, it may sound odd, but no comprehensive study/report about environmental effects or cost-benefit analysis of atmoic power has been made public by the Department of Atomic Energy [DAE] or by the Planning Commission or even by the Ministry of Energy.

Nuclear fission as a source of power generation has little appropriateness in India, where abundant renewable resources are available. India can still pause and take a fresh look at its nuclear strategy. Is there absolutely no alternative to nuclear power? Is it desirable to invest our meagre resources on such an energy system whose returns are not certain and whose environmental consequences for posterity are infinitely catastrophic?

The Government of India has, in the Sixth Five-Year Plan, approved construction of 10 to 12 atomic power stations in addition to the 4 already constructed. And Dr Raja Ramanna, Chairman of the Atomic Energy Commission [AEC], has claimed that the country's DAE and the nuclear industry "is now poised to undertake the projected programme for installing a power generation capaeity of 10,000 MWe by the year 2000 AD". But no details of the 'projected programme have been disclosed, so, in the light of past performance, grave doubts persist about the seriousness of nuclear plans.

Instead of making a fresh assessment of the whole nuclear issue, the new chairman has launched a massive public relations campaign. Press parties have been taken around the DAE's establishments and announcements are made periodically that a few uranium deposits have been discovered to meet the high demands of N-power. A few films on the peaceful application of nuclear energy have also been released for general public showings.

Some necessary moral boosting for the DAE notwithstanding, the claims to such an ambitious target are at best unrealistic. We do not question the sincerity of the past and present Chairman of the Atomic Energy Commission, but their tall claims just cannot be substantiated.

The country and the Prime Minister seem to have been misled into believing that the DAE could really execute such an ambitious N-power programme. Moreover, a rough calculation of industrial and technological capability would confirm our doubts. A nuclear reactor unit of 230-MWe capacity of the Canadian Deuterium Oxide Uranium [CANDU]-type reactor system—which has been adopted for the Rajasthan 'Atomic Power Station [RAPS] the Madras Atomic Power Station [MAPS] and the Narora Atomic Power Project (NAPP)—requires roughly 85 tonnes of natural uranium fuel per year. Assuming the life of a unit to be 30 years, a single reactor would require around 1,800 tonnes of uranium at 70 per cent utility factor. For a total of 10,000 MWe, a total of 44 units of 230-MWe capacity at an annual rate of 2,640 tonnes, the total uranium requirement would be around 79,200 tonnes. But going by estimates prepared by the International Atomic Energy Agency [IAEA] on the World Uranium Resources, India's "attainable production capabilities" of uranium tonnage are not going to be more than 200 tonnes by 1990. And there are no industrial and financial resources to stretch this capability to 2,000 tonnes by 2000 AD.

The cost of one tonne of uranium fuel is roughly Rs 900,000 (or £ 60,000) at the present rate of inflation CANDU's unique feature is that, in it, Deuterium Oxide (D_2O) or heavy water is used as a coolant and a moderator. One kg of heavy water is produced by the breaking of about 7,000 kgs of hydrogen atoms and, therefore, the production cost of D_2O is roughly Rs 5,000 a kg or Rs 500,000 a tonne. A reactor of 230-MWe capacity requires an initial charge of 200 tonnes of heavy water, with an annual replenishment of about 15-20 tonnes, depending upon the efficiency and the maintenance of the plant.

Thus a single reacter unit, in its lifetime of 30 years, would require a total of (30+15+200) tonnes of heavy water. In order to run a total of 44 units of 230 MWe for a maximum possible life of 30 years, 28,600 tonnes of heavy water would be required.

Thus, to generate 10,000 MWe, the country would need a minimum of 1,000 tonnes of heavy water per year, whereas there exists no industrial infrastructure within the country capable of sustaining such a high-capital, energy-intensive and commercially non-viable enterprise.

To overcome the problem of heavy water, a switch to the enriched uranium-fuelled Light Water Reactor (LWR) system has been suggested as an alternative to the heavy-water CANDU reactor. If we have not been able to assimilate the PHWR system of CANDU acquired from the Canadians more than 20 years ago, there exists no know-how with the DAE/BARC to produce a prototype of its own LWR. However, if it is necessary to revive the nuclear power programme, reliance on technologically advanced nations would become essential. But in the present international situation, only the Soviet Union appears to be willing to extend the necessary assistance, but not without conditions.

Pro-nuclear argument rests on two claims—that nuclear power is cheap and clean. The fact is that it is neither cheap nor clean. In truth, nuclear power is the most unclean or dirtiest source of energy ever known to humankind.

The Soviets have about a dozen 1,000-MWe LWRs of an earlier design which is no more economical to their advanced nuclear power system and cannot be installed within their country due to improved safety and regulatory rules. But a 1,000-MWe reactor is beyond our technological capability, since there is no city or industrial area in the country which can absorb more than a 300-400-MWe grid.

However, perhaps the Soviets can also supply LWRs of 440-MWe capacity of an earlier design produced in the past, which they had supplied to some East European States. But the DAE must have learnt its lesson at Tarapur, where we failed to judge the technology. Assessment of the Russian LWR system, at this stage, is beyond our ken and, even if the Soviets agree to offer the reactors on acceptable terms, the gestation period is going to be long and painful, as we have to start from scratch. New textbooks will have to be prepared for our scientists and engineers.

The Atomic Energy Act 1962 has granted absolute powers to the Indian Atomic Energy Commission (IAEC) to initiate, execute, propagate and control exploration, planning and manufacturing of atomic material and its hardware. The commission is responsible for all research and developmental activities pertaining to the atom in this country, where there exists no other scientific body to ask relevant questions. Under the Act, the IAEC has powers to declare any information as 'restricted' and is authorised to frame its own rules and procedures to govern its facilities and nuclear power projects. The Chairman of the IAEC is answerable only to the Prime Minister who is the sole authority on atomic issues in this country. The chairmen, on several occasions, have simply not replied to enquiries made by the Parliamentary Sub-Committes. Often, it is considered sufficient to reply to the parliamentary enquiries by stating that "the matter has been explained to the Prime Minister".

Such freedom from regulatory constraints was perhaps justifiable in the early years, as the atom was a new field of technology. But the autonomy thus acquired by Homi Bhabha for the IAEC-DAE, along with the permissiveness and the indulgence with which the government has treated the nuclear programme, has become a curse for the DAE. Secrecy and non-accountability have led to problems of mismanagement, corruption, nepotism and inefficiency.

After 30 years of commercial operation in advanced countries, viability of nuclear power has now been questioned on the grounds of safety and environment. In terms of cost analysis, nuclear power is neither competitive with other energy sources nor can it be considered economical. But, in India, our policy-makers—politicians and technocrats—are indifferent, if not ignorant, of the economic and environmental consequences of nucear energy. Alas, our country's leading research institutions and scientific bodies have not raised critical

questions, nor have the problems been debated before the Indian National Science Congress.

No critical assessment of nuclear energy has so far been undertaken by any 'autonomous research council' : ICMR, ICSSR, TIFR, ICAR or DST. In 1962, however, there was one scientist at the TIFR, the late Prof D.D. Kosambi, who had urged a review of the nuclear power programme. Dr Homi J. Bhabha, then Founder-Chairman of IAEC, was outraged and Kosambi's fellowship was terminated.

However, the argument against the fission process has now been well established to be rejected as emerging from an 'anti-science' perspective. N-power suffers from inherent problems of operational safety and waste management. For this reason, exploitation of the fission for electricity generation has become a matter of serious controversy. Grave doubts persist whether nuclear technology can serve as a viable source of energy for the 21st century and beyond :

The Indian experience with the atom is too short to come up with any certainty about safety measures and their effectiveness upon workers and miners handling uranium ore and spent fuel. Admittedly, the Canadian design of the CANDU reactor adopted for our country's power programme is the safest in the world and it is practically impossible for the Pressurised Heavy Water Reactor (PHWR) to explode in a bomb like fashion like the China Syndrome. But the safety measures of CANDU do not cover radioactive waste, an essential residue of burning atomic fuel. The reactor fuel-cycle begins with the mining of uranium ore and continues with its subsequent processing, manufacturing of uranium oxide pellets, assembly of fuel bundles and the means of its transportation. Each of these steps requires a whole industrial set-up of its own with special internal safety measures.

The reactor waste produces intensely radioactive elements which remain hazardous to life for a long time. If the reactor structure is damaged either by an earthquake or by a direct hit of a powerful missile, highly radioactive liquid material and solids will pollute streams and the natural environment.

The fission process produces intense beams of radiation and even if only trace amounts should escape into our environment—air and water—there exists a serious risk of their finding their way into our food-chain by getting into the water-flow and green vegetation through cattle's milk and agricultural products. There is no all-safe system against leakage of such pollutants once they are allowed somehow to contaminate the air and water surrounding the nuclear facilities.

A nuclear reactor system, in the process of thermal generation, also produces 'spent fuel', which is really a misnomer, as it is not really spent. It contains a mixture of isotopes whos deadly pollutant potency remains dangerously active from just a few days to thousands of years. Tritium or strontium takes a few years to decay, but Plutonium 239 remains deadly for 24,300 years and Plutonium 242 for as many as 379,000 years.

Since radiation penetrates our bones and lungs and remains invisible—without smell or colour, causing no pain during exposure—it catches its victim unawares. But it has now been established that radiation damages chromosomes which are made up of genes that carry the genetic information determining the character of the offspring. Damage due to radiation exposure can thus take the form of gene mutuations of chromosome aberrations resulting in abnormal and disabled children. Sir Brian Flowers, Chairman of the UK Royal Commission on Nuclear Power and the Environment, has rightly stated that the genetic damage will not necessarily appear in the first generation of descendants exposed to radiation. It may be recessive or sex-linked. A recessive mutation will only appear in a later generation —and then only if it is paired with a similarly mutated gene.

Thus the absence of genetic abnormalities in the first generation of workers, or citizens, exposed to radiation at nuclear power plants and/or at other nuclear utilities is no guarantee that they will not occur in subsequent generations.

There is no way to predict the ill-effects of radiation upon the future generations—say, children to be born 50 years hence. Thus the danger of radiation is not the result of an

antiscience' perspective or due to lack of a 'scientific temper'. It is a high probability threatening our biological existence.

Pro-nuclear argument rests on two claims—that nuclear power is cheap and clean. The fact is that it is neither cheap nor clean. In truth, nuclear power is the most unclean or dirtiest source of energy ever known to humankind.

Still it is a matter of policy with all nuclear establishments around the world to suppress the information about its adverse effects upon life and environment. Sir Brian Flowers' report has concluded that many workers at Windscale and other nuclear plants, where plutonium was extracted or fabricated, had developed leukaemia. But the British Nuclear Fuel Authorities denied that any deaths attributed to plutonium had occurred. The commission, however, observed that the nuclear authorities had submitted the data about the workers who were *actually employed* with the nuclear facilities, but had omitted at least 50 per cent of the deaths from cancer of those who would have been traced, had the men continued to be kept under observation after they had left employment with the nuclear agency.

There exists no environmental protection agency in India which could examine the record of DAE performance; and there is no legal provision to maintain health records of its former employees. Since the effects of low radiation take time to reach the marrow of the bone and kill life over a period of 10 to 20 years, the DAE does not consider itself responsible for the deaths which occurred to the workers after they left nuclear employment.

INDIA'S NUCLEAR POWER PROJECTS

ESTIMATED COST & COMPLETION DATES

Project	*Original Cost Estimate*	*Revised & Re-revised*	*Completion date*
Taps : I & III	Rs 48.t0 crores (1962)	68.00 (1970)	1969
		97.12 (1981)	
Raps : Unit I & II	Rs 33.95 crores (1964)	73.27 (1973)	Indefinitely
	Rs 58.16 crores (1972)	92.26 (1980)	shut down, March 1982
Mapp : Unit I & II	Rs 61.78 crores (1973)	107.87 (1980)	Uncertain (1984?)
	Rs 70.63 crores (1975)	103.02 (1980)	Uncertain (1986?)
Napp : Unit I &II	Rs 209.89 crores (1975)	327.40 (1980)	Uncertain. Not before 1990
4 Heavy Water Plants	Rs 94.56 crores (1975)	189.00 (1980)	Uncertain progress
Rare Earths Ltd	Rs 32.30 crores (1975)	85.67 (1980)	Uncertain progress
Ball-bearing Steel Tube Plant	Rs 23.76 crores (1975)	51.72 (1980)	Some progress
R-5 (Research Reactor)	Rs 49.88 crores (1974)	76.30 (1980)	Not before 1985
*Fast Breeder Test Reactor (FBTR)	Rs 35.00 crores (1974)	69.12 (1982)	Not before 1990

* Estimated cost does not include three major support facilities : Radio Metallurgy Laboratory, Radio Chemistry Laboratory and Computer Unit at RRC, Kalpakkam

(Source : *India's Nuclear Estate, 1983*)

The AE Act 1962 is silent on the question of safety and environmental protection. School-children are taught about the advantage of nuclear energy, but are not warned against the radiation hazards. Citizens and the local administration around our nuclear facilities have been provided with no scientific literature about the invisible danger of radiation. And the IAEC maintains no health record on workers who have been exposed to radiation but are no more in the service of the DAE.

India can still pause and take a fresh look at its nuclear strategy. Is there absolutely no alternative to nuclear power? Is it desirable to invest our meagre resources on such an energy system whose returns are not certain and whose environmental consequences for posterity are infiitely catastrophic?

There exists no contingency plans or inter-agency arrangements to protect citizens from a plausible nuclear accident. Since there is no all-safe system in this complex technology, the nuclear scientists and engineers at best can reduce the probability of accidents at nuclear sites.

According to a recent study on potential consequences of accidents at atomic power plants, released by the US Government, the worst case of casualties could exceed 100,000 and the damage could exceed $300 billion at certain locations. This report, released subsequent to the Three Mile Island (TMI) incident, has invalidated earlier estimates of Rasmussen 1975 or WASH-1400, which had erroneously claimed a figure as low as 3,300 early deaths and property damage at barely $14 billion. The cost of the clean-up operation at TMI alone is estimated to be around $1.1 billion, spread over 20 years to accomplish the task.

Tony Benn, the Energy Minister of UK, said during his tenure (1974-79): "In the beginning, we shape our technology but, if we are not careful, in the end it will shape us. It is for the democratic process to operate to see that it does not do so in a way that damages our central rights and liberties. There is no issue more urgent than the democratic control of nuclear power."

Officials of the IAEC lay claim on the great *potential* benefits of nuclear energy and describe how cheap and safe nuclear fission can be. But the most serious question of the impact of the nuclear fission system on social behaviour and political institutions of the country has not received due attention from our social scientists.

The present Chairman of the AEC has been a keen advocate of the Fast Breede technology and the government is under presure to restructure the whole nuclear power programme. It is now proposed to scrap the Pressurised Heavy Water system of CANDU and go for all-out efforts to import the Soviet breeder reactors. Having spent an estimated 3,000 crores on the CANDU system, now shifting to the FBR system will cost the nation many more millions and the gestation period cannot be less than 20 years even if we assume that we can obtain the essential fuel-cycle and the Soviets generously agree to supply the hardware and place no restriction on our acquisition of weapons-grade plutonium.

However, introduction of the breeder and plutonium industrial economy is likely to lead to large-scale bureaucratic centralisation. If we are to encourage greater reliance on nuclear power from the FBR, necessary safeguards should be there. That would call for an increase in numbers and provide greater authority to the secret police and intelligence agencies, thus adversely affecting the country's open democratic system.

Those days are gone when science was conducted in small rooms and its involvement with public policy affairs was minimal. Since atomic energy gets the highest share of the developmental budget and its decisions and performance are directly involved with national planning and public welfare, the question must be asked as to who decides the nuclear policy. Who really speaks for nuclear power? And whose interests are represented by the AEC-DAE? Who benefits with this scientific and secret enterprise of the country? Does the

Chairman of the AEC-cum-Director of the BARC speak for the scientific community of the country? Do the directors of nuclear establishments properly constitute representativeness of the working scientists and engineers of the country?

These are important though largely neglected issues. But, since the nuclear policy decisions directly affect the internal and external affairs of the country and since the consequences are far-reaching for the people of India [and for the generations to come], they cannot, and must not, be allowed to be governed by an undemocratic organisational set-up. If responsibility entails accountability, then the government must so amend the Atomic Energy Act of 1962 as to see that the decision-taking process can be made more open and greater democratic control can be exercised on the country's nuclear power programme.

The official briefings are indicative that the DAE intends to meet its nuclear power target by introducing the FBR (Fast Breeder Reactor) which, as its name indicates, 'breeds' plutonium more than it consumes. And, in the breeder reactor, thorium can be used as a blanket. We are admittedly rich in thorium resources. And, by burning thorium, we can further breed plutonium. But the commercial exploitation of thorium is uneconomical and there is no evidence to support official claims that the country's plutonium capability has attained the level of its utilisation with thorium concentrates in the FBR.

Besides, even if the DAE can come up with a test breeder reactor by the end of this century, in order to fuel a commercial FBR a minimum of 1,000 kgs of plutonium per annum would be required. There is no way the DAE can meet this high demand of plutonium in the next 20 years, when our first-generation PHWRs are not yet operational, even at 40 per cent capacity factor. To buy it in the international market would involve political compromises and it would be an extremely expensive proposition for generating economically 'inexpensive' electricity.

On safety grounds also, the FBR poses serious technological challenges. Since sodium is used as a coolant, the reactor stability, safety and radiation damage to its inner structure creates formidable technical problems. There is a real possibility of an FBR exploding like an atom bomb in a Three Mile Island situation. But the economic implications of the FBR are also prohibitive: an estimated Rs. 15,000 crores ($15 billion) over the next 15 years will have to be spent as capital investment at the present rate of inflation.

The life of a nuclear reactor is less than 30 years, but seldom, if ever, has a nuclear power plant run without serious mishaps in its full lifespan. The contracted life of the Tarapur Atomic Power Station, for example, is to come to an end in 1993. Whereas sufficient data has

SIXTH FIVE-YEAR PLAN 1980-85

SCIENCE & TECHNOLOGY (R & D) BUDGET

Dept/Agencies/Ministries	*(Total Plan & Non-Plan Outlays)*
1. Atomic Energy (R & D only)	Rs 533.57 crores
2. Space (S & T only)	Rs 392.72 crores
3. *DST	Rs 324.42 crores
4. CSIR	Rs 388.24 crores
5. ICAR (agriculture)	Rs 530.00 crores
6. Health—ICMR	Rs 66.00 crores
7. Universities (UGC) (including fellowships, equipment purchase, computers etc)	Rs 142.00 crores
8. Social Welfare (Family Planning)	Rs 2.00 crores
9. Labour	Rs 1.06 crores
10. Rural Reconstruction	Rs 10.05 crores
11. Housing	Rs 5.80 crores
12. Railways	Rs 36.00 crores

*DST's allocation for renewable energy (R & D) is Rs 7.6 crores

(Source : *India's Nuclear Estate, 1983)*

SOME OF THE ISOTOPES PRESENT IN SPENT FUEL

Element	*Symbol*	*Time to Decay to Half-Strength*	*Biological Implication*
Tritum	$_{3}H$	12 years	Absorbed internally, it emits beta rays
Krypton	$_{85}Kr$	44 hours	An inert gas, it radiates beta rays
Strontium	$_{89}Sr$	53 days	Easily absorbed into the bones
	$_{90}Sr$	28 years	and lungs, it is retained and emits beta rays
Iodine	$_{131}I$	8 days	Absorbed into the thyroid where it emits beta rays
Xenon	$_{133}Xe$	5 days	An inert radioactive gas
Cesium	$_{137}Ce$	30 year	Absorbed internally where it irradiates the body
Uranium	$_{237}U$	2 days	Radioactive substance that can
	$_{239}U$	23 minutes	also be absorbed internally
Plutonium	$_{238}Pu$	86 years	
	$_{239}Pu$	24,300 years	
	$_{240}Pu$	6,580 years	A considerable hazard to health,
	$_{241}Pu$	13 years	absorbed into the body organs
	$_{242}Pu$	379,000 years	
	$_{243}Pu$	5 years	

(Source : *India's Nuclear Estate, 1983*)

been obtained about potential biological hazards (including potential genetic effects of radiation), there exists little information about the socio-political and financial implications of decommissioning dead reactors. We do not know what kind of social and political institutions would be required for maintenance of the entombed reactors. Nor do we know for certain about the measures to be taken if, under some natural forces, these decommissioned reactors disintegrate in the distant future.

In order to keep safe the large amount of waste material—hundreds and thousands of tonnes of radioactive steel and concrete—we would require a specially trained force to guard the entombed reactors along with their waste-burial sites (grounds) for as long as 25,000 years. No one had guarded the Buddhist stupas for more than a few decades even when they had spiritual significance for the people. But successive governments shall have to divert millions in funds for the protection of useless but dangerous nuclear reactors in perpetuity. Otherwise, unguarded, they would endanger the environment and threaten the very existence of future generations, who might not be aware of this man-made anti-life radiation emitting out of unsuspected silent structures.

Do men of 'scientific temper' of our age have a moral right to endanger the life of oncoming generations that might inhabit this planet? If we cannot leave behind a better world inherited from our forefathers, we have no right to leave a more pollutant planet to we?

These are some of the philosophical questions which the people of India must ponder before they commit the nation to a more ambitious nuclear power programme. The Government of India, the Atomic Energy Commission and the Department of Atomic Energy have not discussed these potential hazards either with the people or in Parliament. The DAE has published no report on environ-

mental effects of nuclear power. The citizens and the administrators of areas adjoining nuclear facilities have not been warned against the potential danger from radiation. Therefore, every state and politician clamours for a nuclear power station in his constituency. The country's scientific community has shown little interet in the investigation of interdisciplinary problems of the social and biological consequences of nuclear fission.

We do not doubt the high calibre of our scientists and engineers engaged in the nuclear energy programme. But the fission process suffers from genuine technological problems and there is no foolproof reactor system to guarantee absolute safety to our environment. The hazards of nuclear power have been vividly made clear by the accident at Three Mile Island. That this technology is not so advanced as was assumed, not so clean as was believed, not as cheap as was claimed by its propagators is a fact we will have to accept.

According to a report in the *Time* magazine of February 13, 1984, more than 103 orders for nuclear power reactors have been cancelled in the US; in many states there, the construction of new nuclear power plants have been banned for 15 years. In Europe, an already completed power reactor in Zwentendorf, Austria, has not been allowed to be functional since 1978. Thus, in many advanced countries, a *de-facto moratorium* exists on the construction of new nuclear power stations until the problems of waste management can be resolved satisfactorily.

In India, we are not lacking in energy resources. What we need is an appropriate energy technology which can lead us to an efficient, renewable and safe source of energy at a reasonable price.

Decisions relating to safety and environment protection are important enough not to be left to the IAEC-DAE alone. The decision to site a nuclear power plant in a high seismic zone at Narora (on the bank of Ganga near Moradabad) and the construction of a fast breeder reactor, for example, are likely to have serious repercussions for the generations to come. Therefore, this cannot be left to the judgment of the DAE and its own 'experts'. For they are inherently committed to nuclear development. But there are prospects of more plentiful, reliable and environmentally safe energy technologies promising inexhaustible energy.

In the meantime, we should urge a *moratorium* on the nuclear power programme until an independent interdisciplinary committee of scientists, economists and public policy analysts can examine the technological and institutional malfunctioning of nuclear energy.

(*Reprinted with permission from : The Illustrated Weekly of India, April 22, 1984*)

ATOMIC FACTS

Department of Atomic Energy, Govt. of India, claims to generate 10,000 MWe by 2000 A.D. at a cost of Rs. 80,000 crores.

A rough breakdown of resource demands indicates that the DAE has no realistic plan for power generation.

TOTAL REQUIREMENT FOR 10,000 MWe

Reactor Units ;	44	CANDU type 230 MWe capacity each.
Uranium Fuel :	79, 000 tonnes	at the rate of 60 tonnes each unit per year approx. 2,640 tonnes per year to run 44 units. Our assured resources are less than 50,000 tonnes.

Heavy Water	28,600 tonnes	at the rate of 200 tonnes initial input for each unit and 20 tonnes annual replenishment. Approx. 1,000 tonnes heavy water will be required per year to run 44 units. But our industrial capacity is nowhere near 500 tonnes per year.
Trained Manpower :	50,000 personnel	to man 44 units and keep in constant rotation to take in normal operational radiation exposure. Our training capacity is less than 100 personnel per year.
COST : 1) Heavy Water :		Rs. 5,000 per kg., Rs. 50,00,000 (50 lakhs) per tonne, approximately Rs. 10.00 crores per reactor unit per year to replenish 20 tonnes heavy water per annum. Rs. 440 crores for 44 units per year.
2) Uranium fuel :		At present rate of world market £60,000 or about 1 million rupees (10 lakhs) per tonne. Approx. Rs. 60 million (or 6 crores) per reactor per year for 60 tonnes uranium fuel. Roughly Rs. 2,640 million (or 264 crores) to run 44 units.
3) Manpower :		Sufficient data is *not* available.
4) Construction :		Approximately Rs. 4500 million (460 crores) per reactor unit. But by 1990 cost is likely to go up to +800 crores.

Hidden Cost : Gestation period—for a reactor varies anywhere between 8 to 16 years seriously affecting the cost of construction. Total life of an atomic reactor is merely 20 years with present safety regulations. Tarapur, e.g., will be out of commission by 1993. There is no structural arrangement/system/experience to de-commission a dead but still highly radioactive reactor. Dismantling the reactor and safe disposal of radio active parts and waste material will cost, in time and money, as much as the original construction cost.

We Call Therefore for a Moratorium on Atomic Power Programme and Propose Reassessment of Atomic Technology by an Independent Group of Economists and the Public Policy Analysts.

(*Issued in public interest by :* The Committee for a Sane Nuclear Policy (COSNUP), M-120, Greater Kailash-1, New Delhi-110 048).

THE ATOM BOMB IS NOT THE ANSWER

We view reports of imminent nuclear explosion by India and Pakistan with deep concern and alarm. For, the Indian subcontinent is presently facing a very grave situation where two superpowers are confronting each other on our borders. Internally our democratic forces are desparately trying to survive against heavy odds. At such a juncture any attempt to stir up a parochial frenzy in support of the nuclear bomb would benefit no one except the authoritarian forces and the big arms dealers. We call, therefore, for restraint and caution.

India, due to its geopolitical status, sets social and political pace among the South Asian nations. It is for this reason that we believe the onus rests with us whether to go for nuclear bombs or not. Possibility of a desparate dictator holding sophisticated arms against us is always there. We, therefore, rightly oppose all efforts of arming Pakistan by the United States. But we cannot ignore the fact that the armed forces of the USSR, after having occupied Afghanistan, have arrived at its doorsteps. It would be unthinkable for Islamabad now to open up a new front against us. Therefore, the narrow nationalist propaganda calling for 'the defence of India's honour' intends to arouse strong enough public opinion to justify any nuclear weapons programme which our politicians have been egging on for so many years. But before this nation takes the fateful decision, it is necessary to seriously consider its likely impact on this hemisphere. The N-bomb would divert our meagre resources to war-oriented nuclear and space programmes. Big military-industrial groups will secure huge funds in close alliance with the political vested interests. Soon the bomb will be identified with the country's prestige and industrial progress and the bomb will establish its own patriotic ferver. Reversal of the nuclear weapons race would become practically impossible. That is the lesson of SALT where no superpower is willing to take the first step towards deescalation of its military-industrial advancement (sic.). Once you have begun the race it picks up its own momentum and the fate of humanity hangs with the nuclear bombs. For us, therefore, still there is time and it is within the power of New Delhi not to fall victim of the cold-war games.

Although armed we are, our real conflict with Pakistan is not of bombs and weapons. It is a fight between two ideals : Secularism and Theocratic Backwardness. We are opposed to their political set-up but we are not against the people of Pakistan who belong to our common linguistic and cultural heritage. Our real enemy is not humanity but poverty and backwardness in the region. To speak of nuclear bombs in face of starving millions in India and Pakistan where even drinking water is not easy to get for millions is a sheer madness and simple jingoism.

It is presumptuous to claim that India—the superpower in this sub-continent—is being forced to go for nuclear bombs by Pakistan. Where does our responsibility lie in directing the course of history on this unfortunate subcontinent ? How can we Indians abdicate our share of responsibility in directing the destiny of the South Asian peoples?

Two-thirds of our manpower remains unemployed or underemployed. Our industries suffer from shortage of raw material and frequent power shut-downs. Any rash decision in favour of the nuclear bomb will simply divert our resources from more essential services. It will starve our social and welfare programmes of necessary funds and badly cripple our upcoming industry, for it is easier to make a few big bangs than to run socio-economic institutions efficiently and provide the millions with basic daily needs. The Government that has failed in its mandate of removal of poverty (garibi hatao) wants to cling to power by the nuclear gimmicks.

The nuclear hysteria will take us further away from our cherished goals of building a just and equitable society. The nuclear race and militarism will increase our external dependency and the world's arms dealers would be waiting to add fuel to the discontentment in our region. Because the cold-war is the best guarantee against their economic recession and it is the peace that they feared the most. In the interest of the people of the Indian sub-continent we call upon the Government of India to take initiative to open a fresh dialogue with Pakistan and perceive the problem of defence from a wider South Asian security perspective, in which today or tomorrow Pakistan will have to play an important role along with India. We believe there are diplomatic methods open to us. But the bomb is not the answer.

Signed.

Dr. Aqueil Ahmad (Centre for Science Policy, Administrative Staff College of India, Hyderabad.)

Swami Agnivesh (Political activist)

Dr. Andre Beteille (Social Scientist : Delhi University)

M r. Devdutta (Writer)

Dr. Karunakar Gupta (China Specialist)

Mr. Kamalesh (Writer)

Dr. B. M. Kaushik (Institute for Defence Studies & Analyses)

Dr. Harish Khare (Assistant Editor, the Hindustan Times)

Dr. T.N. Madan (Institute of Economic Growth)

Mr. Gobinda Mukhoty (People's Union for Democratic Rights)

Dr. Ashis Nandy (Centre for the Study of Developing Societies)

Mr. N.A. Palkhivala (former Ambassador to the United States)

Mrs. Vijayalakshmi Pandit. (Senior Statesperson and former President, U.N. General Assembly)

Dr. Ishwari Prasad (Jawaharlal Nehru University)

Mr. Balraj Puri (Institute of J & K Affairs)

Mr. Radhakrishna (Gandhi Peace Foundation)

Ms. Nayantara Sahgal (Writer)

Mr. Sarveshwar Dayal Saxena (Writer)

Dr. Dhirendra Sharma (Convener of the Committee)

Ms. Krishna Sobti (Writer)

Mr. Soli J. Sorabjee (Senior Advocate, Supreme Court)

Mr. Justice V.M. Tarkunde (People's Union for Civil Liberties)

Dr. J.P.S. Uberoi (Social Scientist : Delhi University)

Mr. B.G. Verghese (Journalist)

Mr. Nirmal Verma (Writer)

Mr. O.V. Vijayan (Writer/Cartoonist)

New Delhi, May 1, 1981

On "Nuclear Weapons Policy"

An Appeal to the Commonwealth Heads of Government Meet (CHOGM)

New Delhi 23 - 30 November 1983

WE, the citizens of India and the Commonwealth, express our deep concern at MAD (Mutual Assured Destruction) Nuclear weapons race which can result in annihilation of any life on our planet.

Whereas the global military expenditure is approaching an alarming level of dollars 800 billion a year;

Whereas the world's stockpile of Nuclear weapons is equivalent to 16,000 million tonnes of TNT with the present number of 50,000 Nuclear warheads and another 17,000 are under production;

Whereas the present stockpile of weapons carry an explosive force equal to 3.5 tonnes of TNT for every child, woman and man in the world;

Whereas the present stockpile of N-weapons capacity amounts to destruction of this earth ten times over;

Whereas the Radiation does not discriminate between friends and foes, nor between those living and those not yet born, and will deform genetically successive generations, if there are any,

We believe that there is absolutely no necessity to add a single Nuclear weapon to the already existing stockpile of 50,000 warheads, and that safety and security of the world cannot be brought closer by Nuclear weapons.

We, therefore, call upon CHOGM to affirm a Commonwealth Nuclear Weapons Policy which collectively renounces :

a) the testing, production and use of Nuclear weapons by the Commonwealth countries;

b) to ban installation and stationing of Nuclear weapons from all Commonwealth territories;

c) to assure to never use or support threat of deployment of Nuclear weapons to resolve international conflicts.

We further urge the CHOGM to assert that no Commonwealth state would enter into agreement with any other N-weapons government for possession or production of such warhead.

We believe that CHOGM can provide the necessary moral courage and leadership to the present strife-ridden world by taking the first step towards collective Nuclear Disarmament.

We appeal to you, please, give PEACE a chance for the survival of human race and civilization.

SIGNATORIES :

Swami Agnivesh	(Convener : Mass Action Committee, Janata Party)
Mr. Sumanta Banerjee	(Author/journalist)
Dr. (Mrs) Krishna Bharadwaj	(School of Social Sciences, J.N.U.)

Mr. Mohan Bhatia	(Centre for Studies in Science Policy, J.N.U.)
Prof. Madhu Dandavate	(Member of Parliament)
Dr. J.M. Dave	(School of Environmental Sciences, J.N.U.)
Mr. S.K. De	(Quaker Programme in South Asia)
Dr. Giri Deshingkar	(Centre for the Study of Developing Societies)
Ms. Janet Ganguly	(Social Worker)
Dr. Indradev	(Jt. Adviser, CSIR)
Dr. K.S. Jayaraman	(Science editor/journalist, Press Trust of India)
Dr. Jayashekar	(Editor, "Problems of Non-Alignment", International Studies, J.N.U.)
Dr. Georgie T. Jose	(All India Institute of Medical Sciences)
Mr. Bharat Karnad	(Assistant Editor, The Hindustan Times)
Dr. Harish Khare	(Assistant Editor, The Hindustan Times)
Dr. B.M. Kaushik	(Institute of Defence Studies and Analyses)
Dr. R.K. Khosala	(Physician)
Mr. Satish Khurana	(Editor, DETENTE)
Dr. B. Krishna Kohli	(Physician)
Dr. Narendra Kohli	(Hindi novelist Delhi University)
Professor T.N. Madan	(Institute of Economic Grawth, Delhi University)
Mr. Mohan Lal	(Architect)
Mr. K.S.R. Menon	(Journalist)
Professor K.P. Misra	(School of International Studies, J.N.U.)
Mr. Surendra Mohan	(Member of Parliament)
Mr. Gobinda Mukhoty	(President, People's Union for Democratic Rights)
Dr. Ashis Nandy	(Centre for the Study of Developing Societies)
Dr. K.C. Nayar	(Retd. Army Officer)
Mr. K.K. Panda	(Lecturer, Delhi University)
Dr. Ishwari Prasad	(Centre for the Study of Regional Development, J.N.U.)
Mr. Radhakrishna	(Chairman, Gandhi Peace Foundation)
Mr. Syed Shahabuddin	(Member of Parliament)
Dr. Dhirendra Sharma	(Centre for Studies in Science Policy, J.N.U.)
Mr. P.C. Sondhi	(Industrialist, Jalandhar, Punjab)
Mr. Soli Sorabjee	(Advocate, Supreme Court)
Justice V.M. Tarkunde	(President, People's Union for Civil Liberties)
(Ms.) S. Varadarajan	(Student, Delhi University)
Professor Anil Vidyalankar	(National Council of Educational Research & Training)
Mr. O.V. Vijayan	(Cartoonist/author)
Professor J.P.S. Uberoi	(Delhi School of Economics)
Dr. Bharat Wariwalla	(Indian Council for Research on International Economic Relations)

The Appeal is sponsored by the Committee For A Sane Nuclear Policy (COSNUP).

17 November, 1983

New Delhi