ANUMUKTI

A JOURNAL DEVOTED TO NON-NUCLEAR INDIA

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Aradhana Padhye, an avid *Anumukti* reader, is an old student of mine. For the past one year she has been working in a village called Mangrol, near Rajpipla in the Bharuch district of Gujarat. Recently she wrote me a letter seeking help in resolving a problem she faced in her work.

Cans of EEC donated butter-oil have made their way to Mangrol under the Integrated Child Development Scheme (ICDS). The scheme provides dietary supplement to young children. Having read stories ("Utterly Gutterly Butter" - *Anumukti* Vol.1 No. 5) regarding EEC dumping of Chernobyl contaminated food in the Third World, she was loath to give the butter-oil to children in her charge without first knowing how contaminated it was. She wanted to find out if anybody could analyse a sample from the can and tell her the radioactivity of the contents.

The letter left me at a loss. The only people I know who can do this sort of analysis are scientists of the Bhabha Atomic Research Centre. Unfortunately, nobody can believe a word of what they say since their credibility in matters atomic is close to zero. It is sad but nevertheless true that in today's India an ordinary citizen cannot place trust in the veracity of public- supported scientists especially when their own sectarian interest is at stake. And it is a further shame that nuclear overlords have so managed matters that they and they alone have the capacity to provide information. Rely on us, they say - faithfully or unfaithfully as the case might be, but rely on us you must for there is no other alternative.

But cursing this sorry state of affairs does not help Aradhana. A partial, somewhat unsatisfactory solution is at hand. Ironically a 'foreign' hand. A group in Japan has proposed the establishment of a global network of citizens' groups monitoring radioactive contamination. They became interested in the subject following reports of import into Japan of contaminated powdered milk as animal feed. Their research has revealed that highly contaminated non-fat dry milk which cannot be used in food and is therefore dead stock, is being cleverly strewn around the world. Members of the group feel that it is important to deal with the problem not only in Japan but throughout the world. They propose to make their equipment and expertise available to Third World groups lacking monitoring equipment. Anyone worried about the quality of imported milk products can send them samples for analysis.

So far so good. But is it a solution? ICDS probably covers thousands of villages and millions of children. If Japanese fears regarding the scale of dumping by EEC 'aid'-givers are justified, then we in India, the biggest recipient of this largesse are in big trouble. Instead of child development, what ICDS is achieving is integrated destruction of children's health. It is a frightening prospect. The only protection against this atrocity, would be strict and vigorous monitoring. The need for monitoring is obviously great. It needs both government and voluntary effort. Groups of young scientists need to explore ways in which their expertise and equipment can be pooled to give help. The third largest pool of scientific manpower needs to bestir itself and become useful to the people of India

But even a large swadeshi network of scientists independently monitoring food imports is in the final analysis no "solution at aft. The only reat solution is to get out of this heft where millions of our children have to depend for their basic nutritional needs on the tender mercies of foreign aid donors. But doing that would mean standing on our own two feet and that is never easy for people who have become accustomed to crutches.

Goodbye Sanity

Actions speak louder than words. Some actions positively shout. The appointments of Dr. Raja Ramanna and previously of Dr. M.G.K. Menon as ministers in the Central Cabinet are examples of such actions. The Prime Minister has sent a dear signal to all regarding the competance, The openness and the future intentions of the government. One ought indeed to be thankful to him for having so quickly dispelled illusions regarding the shape of things to come.

If one person was to be chosen as a symbol of all that is rotten in Indian Science, one would not have to look farther than Dr. Raja Ramanna. His tenure as the Chairman of the Department of Atomic Energy and the controller of the lion's share of India's research funds was marked by four main features :

* The total divorce of scientific enterprise from addressing the real needs of the people.

* A 'darbari' style of functioning which lead to the proliferation of cliques and quickly turned bright young researchers into masters of sycophancy and intrigue.

* An arrogant contempt for criticism where all critics could only be considered as traitors and fools.

* Above all, mounmental non-performance. The sorry state of India's atomic energy programme is a tribute to his efficiency.

By resurrecting such a person from well deserved super-annuation, the Prime Minister has sent the following messages regarding his own administration.

* The government believes itself to be incapable of the ruling the country and needs 'experts' to do so. At the same it does not have the discrimination to choose the right experts.

* Despite all talk of freedom of information, the right to know, the duty to inform, blah, blah the government intends to continue its secret ways hiding behind acts such as the Atomic Energy Act of 1962 and the Official Secrets Act.

* While reassuring neighbours of its 'peaceful' intentions, the government intends to proceed full speed ahead with developing nuclear bombs, inter-continental missiles, nuclear powered submarines and all such paraphrenalia of a mini-superpower.

The more things change, the more they remain the same.

Surendra Gadekar

Independent Monitoring in France

The government monopoly of information on radiation is at last breaking up in France. One force behind this development is CRII-Rad (the Commission de Recherche d'Information Independante sur Ia Radio-activite), an independent monitoring organization founded in 1986 after it became clear just how unwilling French authorities were to give information on ionizing radiation following the Chernobyl disaster. (Vital information about the accident was given out three months afterwards, long after measures to reduce the amount of radionuclides entering the food chain should have been taken.)

Initially, the two main goals of CRII-Rad were to carry out research on ionizing radiation and its impact on vegetation, soil, water, etc. (this includes using a laboratory for analysis), and making the results of its research accessible. Since starting up, the group's qualities as an alterative source of information has steadily received acknowledgement and its.activities have increased.

An important project of CRII-Rad is the establishment of a monitoring network meant to create the possibility for shared, reliable information on air quality. The idea is to have monitoring facilities financed by local authorities on the municipal and regional levels. CRII-Rad has had some success in this effort. At the request of the Regional Council of the Alsace, a monitoring point and center for evaluation has already been set up and, by 1990, three more monitoring points, including one at Tam-et-Garonne, will be completed. It is further hoped that monitoring centers outside France will extend the network.

Source: *Wise News Communique 322*

High Hazards at Low Levels

Robert Roentgens discovery of the X-rays in 1895 has drastically changed the course of medical diagnosis. Radiology has made the detection of many pathological processes possible, which would have remained undetected by pure clinical examination. But in contrast to the advantages of X-rays, there has also been mounting evidence right from the early years of the 20th century of the hazardous effects of extensive use of radiology on human health.

The effects of high doses of radiation have been observed in a large number of animal studies. The fact that radiation in high doses can cause infertility, pancytopenia and death, has been common knowledge for a long time. But very little was known about the details of the mechanism of interaction of ionizing radiation wih biological tissue. This lack of knowledge coupled with the enthusiasm of the pioneers for the wonders of the new technology, led to careless ways of dealing with radiation. Unfortunately this sorry state of affairs still persists.

Today there is no doubt at all about the damaging effects of radiation at whatever dose and on any type of biological tissue. Various physical, radiochemical and biological aspects of the mechanisms of the interaction of radiation with biological systems have been extensively studied in the last decades.

These mechanisms are the following:

1) Direct interaction of the ionizing particle or track with structures like the cell membrane, or with macromolecules like proteins, lipids or DNA resulting in breakage and loss of function. This type of damage is caused by radiation with high linear energy transfer like a-rays, neutrons and b-rays. This effect is random and strongly dose dependent.

2) Indirect damage caused by the induction offree radicals like OH* and O* which react with biological structures and macromoiecules. Several microenvironmental factors influence the formation of these free radicals. High temperatures and high oxygen partial pressure increases the formation of these radicals whereas the presence of radical "scavengers" like cystein or manitol reduce their formation. The dose response curve for damage caused by radical formation flattens out at high dosage because at high concentrations the radicals begin interacting amongst themselves.

3) Non specific effects:- These result due to changes in the activity of enzymes, shifting of electrolyte balance, changes in pH levels and the general altering of' the micromileau within the cells These changes can trigger the cancer causing oncogenes residing within the nucleus of the cell. Till now these changes could not be quantitatively correlated with radiation dosage since the detection methods were inadequate to determine minimal changes. Till very recently, such effects were not studied since the studies being conducted were survival experiments which determined the point-of-no-return damage. These indirect effects were taking place much below this level and have hence remained undetected.

Investigators in Ohio have found a variety of genetic deformities and abnormal growth patterns around the Fernald nuclear facility. Fernald, a town 18 miles northwest of Cincinnati, Ohio is host to the Feed Materials Production Centre where uranium is converted into metal form for use as fuel in military nuclear reactors. The problems include: low birth rates and slowed growth in birds; significantly fewer species of underwater organisms and genetic differences in fish and invertebrates downstream from Fernald, compared with upstream; and between 32% and 43% fewer plant species than in comparable areas away from the plant.

Now with the availability of new techniques to measure biochemical changes, it is these very non-specific effects of radiation that are considered responsible for changes in the immune system. These changes range from increased susceptibility to infection right up to cancer induction. These effects include growth retardation, mental deficiency as well as infertility. These indirect non-specific effects are caused mainly by X-rays and r-rays and can occur even at the lowest of doses.

Bes
ides finding out about
the mechanism of radiation induced changes, experimentalists have also been concerned with quantitative measurements of dose-response relationships. The information obtained from the survival

studies carried out in the past, has of course very limited validity in the low-dose region and is therefore of no use in estimating hazards in the low dose sphere. Nevertheless, results obtained at higher doses were simply extrapolated to the low dose range, assuming linearity in the dose-response relationships. Below a certain threshold, it was assumed that there would be no damage at all due to the repair mechanism of the living cell.

In fact, the absence of a radiation threhold has been proved many times. There is also no evidence for a threshold in the susceptibility of the repair system. At least for the DNAsingle strand break it was recently shown that while very small amounts of radiation can cause damage, they may not induce repair activities. So, radiation induced breakage remained unrepaired causing chromosome aberrations following mitosis.

Thus, although extrapolation of results from high to low dose regime assuming linearity and a threshold were scientifically not convincing, they were convenient for nuclear industry needs during its early phase. They provided a cloak of scientific respectability and allowed politicians to declare certain radiation doses as harmless.

The main conclusions may be summarised as follows:

1) There is no threshold for radiation damage in humans.
2) Dose response is dependent on the kind of radiation but tends to be higher than expected for smaller doses.
3) The mechanisms involved in the induction of cancer and mutagenesis in the low-dose regime seem to be indirect rather than direct and may be non-specific upto an unknown amount.
4) The human organism is incapable of repairing the low-dose induced damage properly.

To estimate radiation damage at any stage we have to look at different factors such as increased proneness to interoccurring diseases such as anaemia and genetic syndromes like for example Fanconi s syndrome, the young age of patients and others. The highest amount of damage is probably induced in the growing fetus in utero during pregnancy. Let us examine this damage in some detail.

First of all the kind of damage expected to occur in the baby depends on the stage of the pregnancy. Generally it is believed that any chromosomal or whatever damage induced in the first 10- 21 days leads to abortion. However there are some exceptions such as the Trisomy syndromes (e.g. Down's,) though only a very small percentage of them reach term. Actually there are chromosomal aberrations found in some 70% of aborted fetuses. Severe malformations like anencephalis, Cyclopes etc. are induced by damage up to 10 weeks of gestation.

After the stage of organ formation, induced malformations get rare. One would rather expect unspecific damage, leadingeventually to enzyme defects and disorders of the immune system.

Induction of leukemia is also believed to take place in the third trimester. Radiation influences the development of the brain of the fetus/embryo in every stage of pregnancy up to term. The mechanism of this process is the disturbance of mature neuronal cells' migration from the central regions towards the peripheral cortex. While the neuralglia-cells' matrix is nearly organised by some 20 weeks, migration of the neurones goes on until delivery or even later.

According to a study published in Japan in January 1989, workers in nuclear power plants have double the normal level of chromosome abnormalities. The study was conducted by Dr. J. Muramoto of the Environmental Medicine Research Institute.

The 115 workers examined were all men, ages 20 to 61, whose length of employment ranged from four months to 12 years. Cumulative exposure levels as measured by film badges were as follows: less than 1 rem (10%); 1to 5 rems (44%); 5 to 10 rems (33%); more than 10 rems (13%), the highest exposure was 14.3 rems.

A total of 93,505 lymphocyte cells from the blood of these workers were analyzed for chromosome abnormalities. It was found that the incidence of chromosomes with two chromomers and ring - shaped chromosomes was 0.22% compared to 0.12% among local residents. Another finding was that the number of abnormally shaped chromosomes were was proportionate to the level of radiation exposure.

Source: *Nuke Info Tokyo, Mar/Apr 1989*

Glossary of Medical Terms

Anencephalis:- A child born without development of brain.

Chromomers :- One of the serially aligned chromatin granules forming the chromosomes

Chromosomes:- Thread like structures in the cell nuclei, which cany genetic information and are responsible for hereditary characteristics

Cyclopes:- severely malformed child bom with one eye, like the giant in greek mythology.

Cystein :- Aminoacid; guards liver from toxic material

Down syndrome:- A type of mental retardation caused by a chromosonal abnormality, giving rise to certain characteristic physical features, notably an oblique slant of the eyes.

Fanconi s Syndrome :- Complex multiple defects in kidney function caused by genetic disorders in the kidney structure

Leukemia :- cancer of the white blood corpuscles in the blood.

Leukopenia:- Marked reduction in the number of White Blood Cells.

Lipids :- Commonly known as fats and oils

Macromolecules :- Large molecules like fats, proteins etc.

Manitol:- An organic alcohol which guards liver from toxic material.

Mitosis :- A type of cell division in which the number of chromospmes remain the same in daughter cells.

Mutagenesis :- Any heritable alteration of the genes or chromosomes of an organism.

Neuralglia-cells :- Primitive nerve cells

Oncogenes :- cancer producing genes.

Opportunistic infection:- Infection caused by a pathogen that can cause disease only in a host with lowered resistance

Pan-cytopenia :- Reduction in the number of blood cells of all types.

Trisomy :- A genetic disorder where one chromosome is represented three times in an otherwise diploid set.

Epidemilogically investigators have found significantly lowerschool performance from children who were irradiated in utero during atomic bomb testing in Nevada, the Three Mile Island Nuclear accident and at Hiroshima.

Radiation Induced childhood leukemia has been observed in the vicinity of several nuclear plants. First and probably the worst of all is Sellafield (formerly Windscale) in West Cumbria, U.K. Rates there have been ten times higher than the British averages. Other spots are Dounreay in Scotland and Aldermaston and Burghfield. Elevated childhood leukemia rates have also been reported from Yugoslavia and Idaho Fall in U.S.A. as well. Even in Germany, despite claims of running the worlds safest reactors, recently published epidemiological surveys provide evidence of increased childhood leukemia around nuclear installations.

Tragically and somewhat ironically, the nuclear disaster at Chernobyl in April 1986 has provided scientists with an oportunity to study in depth the effects of low dose radiation. The average population dose in Germany was within the range of 150 - 250 mrem during the first year. However, already some acute effects have been observed. The incidence of Down's Syndrome was raised 5 fold above the average in West Berlin in January 1987 correlated to the mothers' estimated date of conception having been during the days of the main fallout in May 1986. To add further proof to the findings, a survey on the incidence of Downs Syndrome was conducted all over Germany. It duplicated the fallout-dose-pattern showing for example the highest increase in Bavaria which received the largest fallout.

In U.S.A. Prof. Sternglass has reported an increase in infant mortality and death from causes such as opportunistic infections and AIDS during May 1986. Discussing the epidemiological data he pointed out that the common cause of death among these groups could have been an acute drop in leukocytes which led to the deterioration of pre-existing diseases. Actually a short-time temporary leukopenia after low-dose irradiation has been reported several times already even in healthy people. This has frightening implications for Europe if one considers that the Chernobyl fallout in the U.S.A. was |ust 1% of the European average amount.

Anyway, Robert Rontgen's and Marie Curie's days of relatively careless handling of radiation are gone. Both died of leukemia. Health professionals need to be especially concerned. They account for some 80% of the man-made radiation exposures.

Wolfgang Hoffmann
Bonn, Germany

The Real Scar is Within

I am Millie Smith. I was born and raised in Pasco, Washington, several miles downstream from the Hanford Plant, residing there from 1947 to 1967. I am one of the 20,000 children that the Center for Disease Control believes have been exposed to the secret radioactive releases of Hanford, which have been reported to be among the world's largest. Not only did our government fail to warn us and take safety precautions, but the releases were kept secret for 40 years.

If the releases hadn't been made public when they were in 1986 through the Freedom of Information Act, I likely wouldn't be alive today. After years of weakness and poor health, going from doctor to doctor getting no answers, I was finally checked for and discovered to have metastasized thyroid cancer only after the knowledge of the releases. That discovery was on December 23, 1986; and the following day, Christmas Eve, I was told that I had less hope. The five hour delicate surgery on January 23rd, 1987 revealed extensive cancer throughout my neck, jugular vein, laryngeal nerve, trachea, along my oesophagus, in between my lungs and throughout my upper right chest. Two of my parathyroids were removed; they regulate calcium and their deficiency can be life threatening, affecting the heart and causing permanent brain damage. I experienced a deficiency temporarily after surgery but that was brought back under control.

My doctor said that I could have had this cancer for 20 years as it is usually slow growing. If thyroid cancer is detected at an early stage it is usually easy to treat - but since mine was extensive, my doctor said that it will be difficult to cure; and I have a high risk of reoccurences and more surgeries. Following surgery, I was bedridden for almost a year and have relied on chore services for the last two years, I experienced severe short term memory loss and lack of concentration. One of my vocal cords was temporarily paralyzed.

In November 1987, a reoccurence of a malignant tumour was discovered in my neck and I was treated with radioactive iodine- 131. I took a smaller dose to avoid isolation in the hospital. I was told that my urine would be radioactive for three days, that I shouldn't kiss anyone and stay away from babies. I was also told that those treatments would increase my risk of leukemia. Following treatment I experienced nausea and for the next few months chunks of my hair fell out and I had skin eruptions

Right now I am better than I was a year ago but still I am waiting to see whether my condition will progress or worsen. I am still very weak and have fluctuating memory trouble and slowness of thought. I have to take thyroid medication for the rest of my life as I'm unable to live without it. I still have no prognosis. I can't but help wonder if I have any more undetected illnesses.

Since my surgery, I have been trying to find as much information as possible about radiation effects and what happened to us. The more I've learned, the stronger my belief has been that my health problems are due to Hanford releases. Last summer I was told by Japanese radiation specialists that my health history since early childhood is almost identical to their radiation victims.

My history includes great susceptibility to infection and illness, lethargy and weakness, low physical capacity, frequent dizzyness, nausea and vomiting, frequent heavy nose bleeds and pains in my arms and legs. I remember especially experiencing nausea and a bad taste after drinking milk. At the age of 9, I was tested to be at high school level academically, yet by the time I was in high school, my mental process slowed down. In 1964 hypothyroidism was discovered and I was placed on thyroid medicine temporarily. Birth defects in my reproductive organs were also discovered, requiring minor surgery and hormonal treatments.

In 1980, mild spinal defects were discovered a mild spina bifida and deformity of vertebrae in my neck. I have had menstrual abnormalities and have suffered three miscarriages.

I have been unable to work. Before my cancer discovery, I felt I was 80 years old. My life has been a struggle of hardships and setbacks that many other Hanford downwinders face. I have a permanent scar that you see around my neck - yet my real scar is invisible. Due to my health problems I have lived in poverty most of my life. There have been times when all I had to eat was rice and popcorn for months. There were many winters of having to go without heat; there were times I was homeless

for although I had money for rent, no one would rent to me as I didn't have a job. Presently I don't have enough money for bills and the needs of my daughter.

We had to go to food banks and the Salvation Army. I don't have money needed for nutrition. Yet, I am just one of the many whose lives have been damaged. My mother told me that almost everyone she knew around Hanford area had at least one person in their family with thyroid cancer. My family doctor has stated that he treats too many thyroid disorders in the area. My mother and many of my old neighbours have severe lung problems. My sister has had skin cancer and birth defects. Two aunts and five cousins have had cancer. I have heard people in the area remark how somebody is either having leukemia, brain tumours or cancer. I remember two close friends and two other classmates who died of cancer while still in high school. After doing a health survey of my former classmates, I learnt of more cancer deaths and multiple health problems. On family land next to Hanford, 24 of the 28 families have been afflicted with cancer, thyroid problems and serious birth defects such as no eyes, no skull, no hips. More and more stories keep emerging. I just recently learnt of a woman who lost ten babies.

There is no doubt in my mind that we have been affected by the Hanfor holocaust. The government denies any effect of the releases and demands proof. We feel that they should prove our illnesses arn't due to radiation. Scientists have estimated that residents near Hanford received ten times more radiation than people at Chernobyl. How can anyone deny that we have been affected?

I believe that we have also been affected in other subtle ways, possibly causing damage to our immune systems. It has been stated that no two persons will experience the same injury from radiation and neither will any molecule or cell. So how can we really know the extent of our damage?

It doesn't take an expert to see that our land and people have been contaminated. The government's failure has been alarming all over the country. Our country, I fear is on a path of suicidal destruction, killing its own people in the name of "defense" and "national security." Yet we have no security, our bodies have no defense. We are as abused children, victims of our own country. We can have all the weapons in the world - yet we cannot be a strong country unless we are strong within.

I came here to tell my story in hopes that with more public knowledge, action will be taken to prevent further contamination and that we will be helped. Not only does the government refuse to acknowledge us and take responsibility for their actions or compensate us - they just keep ignoring us. The claims that we have filed have been denied, and we are not allowed to sue. Many still do not know of the releases.

We from the Hanford area want recognition as the Hanford hibakusha - atomic bomb survivors as are the Japanese. We also want an apology from our government. We want and need a radiation research and medical center and hospital where we can get immediate free health care by radiation specialists as they have in Japan. We also need a toll-free number where downwinders can get accurate information. We want to know the full truth of what happened to us. We want the government to be accountable for its actions. We want justice.

Two years ago, I was fighting for my life; today I am fighting for the life of all of us and for the life of our land. I would like to quote from a great Indian leader who speaks for the heart of the Indian nation on his message to our government over 100 years ago. Unfortunately, his wisdom went unheeded. They too were betrayed by our government and became victims in their own country.

"If we sell you our land you must remember it is sacred. We are part of the earth and it is part of us. If we sell you our land you must remember that he air is precious - that the air shares its spirit with all the life it supports. The wind must also give our children the spirit of life. If we sell you our land you must keep it sacred."

The earth is our mother; whatever befalls the earth befalls the sons of the earth. The earth does not belong to man - man belongs to earth. All are connected. Man did not weave the web of life - he is merely a strand; whatever he does to the web he does to himself. Continue to contaminate your bed and you will one night suffocate in your own waste. If we sell you our land - love it as we have loved it - care for it as we have-preserve it for your children."

I ask you - what legacy do we have for our children? We downwinders have been exposed to the wind of death. I hope our future genertions would have life.

From testimony given before the U.S. Congress

Source : *The Hanford Journal, number 8 spring 1989*

In the Face of Uncertainty

A report on radiation safety standards

Radiation's history teaches us many lessons. Certainly one of the most important onecentres on the humankind's passion for leaping without looking. We have been plunging forward in the name of technological advancement without a great deal of concern for the consequences of 'progress'.

The Promise of Things to Come

It has been said many times and in many ways that those who do not learn the lessons of history are destined to repeat its mistakes. History assists us to understand where we have come from and can shed light on our future directions. In the field of radiation an eagerness to exploit new discoveries has created a myriad of problems. The situation is of course not unique to radiation. Other examples of the same tendency are the use of the tranquilizer thalidomide, the fibrous mineral, asbestos and the refrigerants CFC's.

The advent of X-rays in 1895 was soon followed by the knowledge that radiation can cause injury. By June 1896, X-ray injuries had already been recorded. By 1903 attention was also drawn to the dangers of scattered radiation in radiographic rooms. Despite these early warnings, X-rays continued to be used with wild abandon. Not only were X-rays used as a diagnostic aid, but also as a therapeutic measure for a veritable host of disorders ranging from inflamed tonsils to whooping cough as well as all kinds of cancers.

Unfortunately, in at least some instances, the 'treatments' produced effects more severe than the original complaint. One case in point involved the use of X-rays by a U.S. doctor to remove unwanted hair from his secretary's armpits. His 'treatment' led to burns and eventually to amputation of both the woman's arms.

Whilst many of the gross excesses linked with the use of X-rays occurred in the early part of this century, recent reports indicate that deleterious health effects are still occurring through over-exposure of patients and technicians. A 1983 WHO report states that "throughout the world there is overuse of diagnostic radiology..."

Medical profession also adopted radium as a therapeutic agent in the belief that it possessed healing properties. Until the 1930s thousands of people in the U.S. actually ate and drank preparations containing radium under the ilkisaion that "radium has absolutely no toxic effects, it being accepted as harmoniously by the human system as sunlight is by the plant." The injection with radium of children suffering tuberculosis was only stopped in 1951 when it became obvious that it was completely ineffective. Yet by this time the carcinogenic properties of radium had long been known.

With the advent of the atomic bomb and the subsequent use of atomic energy for electricity generation, the number of radiation deaths multiplied. Rosalie Bertell, in her book *"No Immediate Danger"* estimates that the "global victims of radiation pollution conservatively number 13 million to the year 2000."

Unfortunately, it is impossible to establish with certainty, cause and effect regarding the onset of cancer in any one individual. This is because a person may be exposed to several carcinogenic hazards during her/his lifetime, any one of which could induce cancer. Though what is well established is the fact that the greater the collective dose of radiation the larger the number of resulting cancers in the exposed population. The situation is similar to playing Russian roulette. A single bullet loaded in a revolver barrel will eventually lead to someone being shot - we are simply unable to say who it will be.

In the Face of Uncertainty

One of George Orwell's most significant contributions as a writer was to foresee and demonstrate how the English language could be used in ways which belied common understandings.

It would be convenient and reassuring to understand safety standards as levels of exposure to radiation which cause no harm, danger or risk to human beings. This is however not the case. Perhaps, early in this century, those given the responsibility of establishing radiation standards thought them safe. This is certainly no longer true. The term has persisted but the meaning has changed.

Safety standards are now defined as determining 'acceptable' risk for workers and the general public. Whilst it is possible to quantify risk, it is much more difficult to reach conclusions regarding acceptability of any particular level of risk. Against what benefits do we assess risk? And more importantly, who is to make the value judgement? Those bearing the risk? Those reaping the benefit? An Independent' body ?

Radiation protection standards were first formally issued by the German Roentgen Society in 1913. However, it was only in 1934 that the International X-ray and Radium Protection Commission first adopted the concept of a tolerance dose - believed to be a dose below which no harmful effects would occur. The tolerance dose was fixed to be "about 0.2 roentgens per day. However, at the very time, this limit was adopted by the international committee, the U.S. committee had agreed upon half this dose as the tolerance dose. Many U.S. geneticists then believed that even this lower limit was too high if genetic effects were taken into account. Characteristically, their response was to agree to a change in terminology. Tolerance dose became permissible dose Although it is doubtful if the change was successful in conveying to the radiation worker that a permissible dose was not to be considered entirely harmless.

The move away from a tolerance dose was the first major shift involving the principles of radiation protection. The shift was accelerated after the formation of the International Council for Radiological Protection (ICRP) in 1950. In 1954, ICRP acknowledged that "since no radiation level higher than the background can be regarded as absolutely 'safe', the problem is to choose a practical level that, in the light of present knowledge involves negligible risk."

A further revision was adopted in 1958 and published as *ICRP Publication 1*. In this document a reduced maximum permissible dose of 5 rems/year was recommended for workers (0.5 rem for he general public). This standard has remained unchanged ever since.

The Swedish National Institute for Radiological Protection (SSI) has promulgated new radiation standards that will take effect in 1990. The new standards are the result of a new law which came into effect July 1st, 1988. Earlier Sweden was following the standards recommended by ICRP. The maximum allowed lifetime exposure to a radiation worker will be 700 millisieverts (mSv), which in practice means an annual dose of 15 mSv/year, based on a 45-year working life between 20 and 65 years of age. The present standard is 50 mSv/year with no lifetime dose limit. SSI has also made a rule that at 30 years of age the cumulative exposure must not exceed 180 mSv. The maximum allowed exposure to a pregnant woman will be 5 mSv during the pregnancy period. Further, she now has the right to request temporary transfer to a radiation free environment.

Interestingly, the ICRP assumed responsibility for defining what exposures were to be considered acceptable stating "the permissible dose for an individual is that dose, accumulated over a long period of time or resulting from a single exposure, which in the light of present knowledge, carries a negligible probability of severe somatic or genetic injuries; furthermore, it is such a dose that any effects that ensue more frequently are limited to those of a minor nature that would not be considered unacceptable by the exposed individual and by competent medical authorities."

Having accepted that all exposure to radiation imposes risk on those exposed, the ICRP recommended in 1966 that "any unnecessary exposure be avoided." It also adopted the ALARA principle stating "that all doses be kept as low as readily achievable, economic and social considerations being taken into account. The significance of this move was considerable. The difficulty of defining what was 'readily achievable, economic and social considerations being taken into account' created additional problems.

Whilst authorities concerned with radiation safety have been prepared to follow ICRP's recommendations, it is important not to accept ICRP's pronouncements without question.

The main reason for scepticism is the fact that the data on which ICRP's recommendations are based concern the victims of atomic bombardment of Hiroshima and Nagasaki and this data has been under wholesale review. (See Anumukti Vol.1 No.3 -"Radiating Complacency" and also the box on this page)

Recent reevaluation of the Hiroshima-Nagasaki data indicates that the risk estimates of the ICRP for radiation toxicity are far too low and are indeed grossly misleading.

When Safe's Not Safe Enough

The philosophical foundation underlying nuclear enterprise are the tenets of Utilitarianism propounded by Jeremy Bentham and John Stuart Mill. They posit

"as the moral goal of all human actions, the greatest possible balance of good over bad for mankind as a whole." Somebody has to pay the price for 'progress' but the society as a whole has a net benefit. Let us take a quick look at who has to pay the price and for whose benefit.

Usually, those who bear the most risk are precisely those who receive the least benefit. They include :

The workers - It may perhaps be argued that the workers by their willingness to engage in certain occupations willingly accept the associated risks. This is questionable since the hazards faced by the workers are down-played. The danger of uranium mining had been known for a hundred years before mining in a concerted fashion began in 1945. Yet it took the United States Congress until 1967, with many resultant miner deaths from lung cancer, to legislate for mine ventilation. Workers are reminded that exposures are within 'permissible limits' recommended by international safety authorities which mitigates against any real notion of danger and therefore knowing consent to that danger.

The poor - who cannot exercise the choice of moving far away when nuclear facilities are built without so much as a by-your-leave in their vicinity.

Pregnant women and developing infants - who are particularly vulnerable to radiation. It is estimated that a child is three to six times more likely than an adult when both have received the same dose of radiation.

Indigenous people - whose lands are a special attraction to nucleocrats all over the world. Most nuclear activities, from uranium mining to weapon's testing and eventual waste disposal are carried out in places which are home to indigenous people. Whether in Australia, United States, the Pacific or in India, the same story holds.

Future generations - because radioactive material remains toxic for thousands of years, they will bear the costs without receiving any benefit whatsoever.

The important point to make is that radiation risks are not distributed evenly throughout the population. Neither are the benefits. By adopting a utilitarian perspective there is no need to examine the distribution of the loss and the gain.

The major beneficiaries of nuclear industry are owners of corporations producing and supplying the goods and services involved. (In India the names that stand out are Tata, Larsen & Toubro and the Walchand group.)

Benefits in the form of status and power in addition to remuneration are bestowed upon many scientists and technocrats. The bulk of the population does derive benefit from goods and services produced. But there is an important distinction between the risks borne and the benefits received by this group. The risks are involuntary, whereas the benefits need consent in the sense that they are obtained via monetary payment.

Averaging Syndrome

"By the time we calculate the total loss of radionuclides in an average nuclear plant, average this loss over time to determine the approximate yearly effluence in curies, and then determine average air pollution and deposition on living plants and groundwater, average uptake of radioactive chemicals by plant and animal, average diet and recreational habits of the average person living in the vicinity of the plant, we have a (fictional) estimate of human radiation exposure over the normal plant lifetime. Sometimes the dose is averaged over the whole population of the country rather than the population downwind or downstream from the plant, making the average doses seem smaller. Of course some people receive much higher than the average dose."

Rosalie Bertell *No Immediate Danger.*

The epistemology which underpins the principles of standard setting is positivist. The three main characteristics of this approach are: the rejection of subjective knowledge; a reliance on causal explanations; and the veneration of technical expertise The logical consequence of this kind of thinking is the exclusion or rather non-recognition of value judgements. Atomic energy morality just assumes that nuclear technology raises only technological but not ethical questions.

The reliance on causal explanations allows nucleocrats to implicate carcinogens other than radiation when increased cancer incidence is reported near nuclear facilities. While the nucleocrats demand "absolutely certain proof" of radiation harm they assiduously discourage research which may lead to results contrary to their position.

There are numerous instances where the power over purse strings has been used to scrap prematurely unpalatable research Particularly important areas of study have just been neglected and then claims regarding deleterious effects have been dismissed

due to "insufficient evidence." The strangely curious lack of curiosity regarding the effects of high natural background radiation in monazite sands of Kerala on part of atomic energy authorities in India is an instance of such blind spots.

To lack of data resulting from insufficient research one must add the occasions where information has been deliberately suppressed. Most nuclear establishments have been unwilling to disclose health statistics of workers and people living in the neighbourhood of nuclear sites. The French have kept Polynesian health statistics secret as have the Russians details of the Kyshtym disaster.

Given the above, it is impossible to have confidence in safety standards regardless of the composition of standard setting authorities. Yet, it is interesting to find out who are the judges who decide the question of acceptability of risk.

Patrick Green has conducted a comprehensive analysis of ICRP's membership and has concluded that far from being an independent organisation with members elected on the basis of scientific merit, "the ICRP is a dosed organisation whose membership is open only to a small select group of individuals". The majority of these members have been affiliated to an organisation concerned with the commercial exploitation of nuclear energy.

"The concept that all decisions of the government should be the subject of a public debate. ..is a dangerous heresy... The experts must, in the end, be trusted."

Sir Philip Baxter (Australian nucleocrat)

The fact that a small elite formulates safety standards should cause no surprise. After all, if issues are defined in a technical manner, they require 'technical experts' for their resolution. Under the guise of independence and objectivity, divorced from public opinion, technocrats can comfortably sit in judgement.

The Escape Route

It is only when the 'have not" citizens, are deliberately involved in the decision making process that many of the inequities associated with standard setting, will be overcome. The cardinal principle ought to be that " no individual or community will be forced against his/her/their will to absorb noxious by-products of the activity of others".

If we accept this principle as a moral imperative we have two possible pathways to reach our egalitarian objective. Firstly our aim can be obtained by eliminating human radiation exposure. Secondly the consent of those most likely to be affected could be obtained. Let us consider each in turn.

Standard setting authorities themselves acknowledge that all ionising radiation exposures, no matter how small, carry some risk of cancer induction or genetic damage. Considering the potential for widespread contamination following accidents, the extremely long lifetimes of radiological toxins once formed and the routine releases by nuclear facilities into the environment, it is impossible to eliminate radiation exposure, whilst the nuclear industry remains in operation. To outlaw involuntary exposures we must eliminate the source - nuclear industry in its various facets. Alternately, we can convert involuntary exposure to voluntary exposure through the consent of those affected. Here the most powerful argument is the fact that by far the largest group amongst those affected cannot give their consent since they are yet to be born.

If we are interested in achieving a high degree of radiation protection it is logical that standard setting authorities must also include representatives of the unions and community groups, and that they be provided with necessary information and financial resources to ensure that their participation is effective rather than token. Obviously a standard stetting body consisting of those likely to be affected by radiation will develop alternate protection principles to those developed by organisations using equipment that is the source of radiation. The 'burden of proof needs to be reversed so that those responsible for creating the hazard must show them safe rather than those exposed must show injury.

Finally, if radiation standards are public policy and not public pacifiers, then at a minimum the policy ought to include daily emission monitoring by an independent person. Standards suggest what ought to occur, monitoring will detect what actually occurs. If monitoring detects exposures above established protection levels, people must be compensated for any deleterious effects.

The question of compensation does raise the thorny problem of cause, and effect. One possible mechanism to circumvent this problem would be to award compensation on the basis of risk involved. If a certain level of radiation exposure in a given population will result in a certain percent of that population developing cancer, then everyone within

that population who actually does develop a cancer should receive a minimum compensation at that percentage rate. This procedure would represent a significant improvement on the present situation where to all intents and purposes, no-one receives compensation for injuries suffered.

Glenn Foard
Community Education Publication Association inc.
Australia

Glossary of Technical Terms

activity - The number of disintegrations of a given radioactive nuclide over a given period of time. The modern (SI) unit of activity is becquerel (Bq) defined as one disintegration per second.

curie (Ci) - The old unit of activity. One curie equals 37 billion (3.7 x 1010) disintegrations per second. Originally adopted in 1910 as the radioactivity of one gramme of radium.

free radicals - Entities formed after the breaking of chemical bonds holding molecules together. They are chemically extremely reactive.

Ionising radiation - Radiation which can deliver energy in an amount capable of knocking electrons off atoms turning them into ions.

rad (radiation absorbed dose) - The old unit of dose of ionising radiation replaced in the SI with gray (Gy). One rad is equal to 100 ergs of energy absorbed per gramme of body dose. Roughly the X-ray dose needed to kill a mouse.

rem (roentgen equivalent man) - Different ionising radiations produce different amounts of damage to biological tissue. Rem is a unit which takes into account these differences by multiplying the absorbed dose with a quality factor which differs for different kinds of radiations. This old unit has now been replaced by sievert(Sv). One Sv = 100 rem.

mSv (milli-sievert) - Thousandth of a sievert.

ANUMUKTI STILL NEEDS YOUR SUPPORT

Cobalt Blues

Cochin is to have the dubious distinction of pushing India into the era of commercial food irradiation (see box). We have previously carried reports about the harmful effects of this food preservation technique. Here we present a list of accidents that have taken place in irradiation plants around the world.

India's first commercial food irradiation complex is to be commissioned in Cochin shortly. Initially the unit will irradiate spices and later will be extended to lish, prawns, onions and potatoes mainly for export. The complex is being jointly set up by Bhabha Atomic Research Centre and the Spices Board. Cobalt-60 is the irradiating isotope to be used in the unit.

The Central Government has reportedly accepted the Codex General, a safeguard set up by several international organisations under the U.N. to oversee the quality of the irradiated food.

Irradiation is a hazardous process. Exposure to the unshielded sources can be fatal. Routine exposures to even low levels may cause long-term harm. The radioactive materials have to be transported into the plant and the spent sources (still radioactive) removed and any contaminated material disposed of.

Accidents may happen at any stage, causing exposure of workers, the public and the environment. Often, lack of local expertise means that maintainance teams have to be flown in from overseas to deal with emergencies.

The following accidents all happened in plants built and operated under the internationally agreed system of regulation and control. Trade union members in the food industry have reason to be concerned about the health and safety of their members.

* Radiation Technology Inc (RTI), New Jersey, USA.

In 1986. the US Nuclear Regulatory Commission (NRC) revoked the RTI license for repeated wilful violations of worker and environmental safety. Incidents included by-passing safety interlock systems resulting in exposure of a worker to the unshielded source (1977) and illegally burying contaminated material from a leaking cobalt 60 source (1975).

Martin Welt, the company president, ordered employees to He to NRC investigators. The NRC action resulted in his resignation. The US Department of Energy (DOE) promptly hired him to advise on its food irradiation programme. Welt was eventually convicted of conspiracy in the US courts in 1988. His new company Alpha Omega Technology, has approached the World Bank for funds to build irradiation facilities in South East Asia.

* Isomedix, New Jersey, USA.

A leaking source contaminated the pond water which was then disposed of down the toilets, contaminating the sewerage system, and exposing workers to radiation. Workers reported the cover-up. Radioactive contamination was still detectable five years later.

The NRC has cited the company for allegedly overexposing workers, failing to signpost radiation areas, allowing food and cigarettes in radiation areas, operating without authorised personnel and failing to monitor water disposed to the sewer.

International Nutronics, New Jersey, USA.

The company was fined in 1986 after cover-up of a radioactive spill in 1982. Management ordered employees to dispose of the radioactive water down shower stalls, and move their radiation badges from belt to collar to record a lower dose. The contamination was still detectable outside the building ten months later.

* Hawaii Demonstration Irradiator, USA.

A radioactive leak at an irradiator in Hawaii in 1967 contaminated the pond water, shipping cask, roof, machine room, tools and worker's clothing. The clean-up cost the state $385,000 in 1979. Dangerously high levels of contamination were still detectable outside the building in 1980.

* Radiation Sterilizers Inc, Georgia USA.

A leaking caesium source in June 1988 contaminated the pond water, workers' clothing, cars and home carpets, as well as some of the irradiated products including medical supplies and milk cartons. The clean-up was still going on in 1989 and had already cost several million dollars. The investigating team recommended that new regulations on radiation safety and emergency plans are needed for all US irradiators.

* University of Tennessee, USA.

A worker bypassed the safety system of an irradiation facility at the University of Tennessee in 1971. He survived the high dose of radiation.

* Benton Dickinson, North Canaan, Connecticut, USA.

Aluminium boxes containing products being irradiated, jammed into the source rack in 1981, preventing it from being lowered. Despite this, the control panel indicated that the cobalt source was safely inside its storage pool. It was only the radiation monitors indicating high radiation levels that warned of the problem. Technicians had to be called in from Canada. While lowering the rack they dislodged several cobalt rods which had to be recovered using long handled tools and mirrors.

* Stimos, Pontecico, Italy

A maintenance worker entered the irradiation cell of a corn irradiation facility on the conveyor belt while the source was operational. He received a high radiation dose and died 12 days later.

* Institute for Energy Technology Irradiation Plant, Kjellet, Norway.

Failure of savety devices allowed a maintenance technician to enter the irradiation cell with the source exposed. He died 13 days later.

Delmed plant, San Salvador, El Salvador.

Three workers at the Delmed plant received serious radiation injuries after irradiation equipment malfunctioned in February 1989. Delmed had to call Nordion, the suppliers of the plant, to send a maintenance team from Canada to remove the cobalt from the defective source rack.

* Steritech, Dandenong, Australia.

This plant has to be shut down for five days because a wire cable controlling the Cobalt 60 source rods had jammed, preventing the rods from being lowered into the pool. A maintenance team had to be flown In from Canada to remedy the problem. Technicians and equipment to deal with such emergencies are not available in Australia.

Unthinking the Unthinkable

'Nuclear weapons are machines, and machines, it has been said, are finally ideas.' On the basis of this thought-provoking statement Jeff Smith in *Unthinking the Unthinkable* criticizes the nuclear policies of establishment and its opponents alike.

Unthinking the Unthinkable is not an easy book! This is not so much because of its language for the essay is clear and well- structured. But the author asks the reader to question some of those views which have become so common that they seem to be rather natural : Has human history really entered a fundamentally new age with the invention of the nuclear bomb? What does it mean when the bomb's destructiveness is compared with the omnipotence of God? Does progress in knowledge and sciences create new realities which we cannot escape? How can anybody even think of destroying whole populations in a nuclear war?

Of course, it is not possible to unthink nuclear weapons, to make them disappear by mere thinking. The fact that once invented, harmful technologies remain with us in a mephistoan way has disquieted the more thoughtful spirits in the last centuries. Jeff Smith, however, thinks that 'people have never availed themselves of every technically feasable means of violence.' Here he sees a chance: if we understand the causes of nuclear weapons, we perhaps can attempt to re orient the political thinking which necessitates nuclear arsenals.

In his effort to problematize the common-sense assumptions underlying the nuclear debate on both sides, the author uses a highly relevant, but hitherto neglected method. While admitting their respective value, Smith is discontent with economic and psychological approaches as well as with histories describing the nuclear culture of planners, scientists and strategists. He refers to literary and textual analyses and in his search for the root causes of the nuclear problem he moves back as far as to the early Middle Ages. Much of Western thinking in the backgound to the issue under discussion had been shaped in the times of St. Augustine.

Smith, who anticipates Marxist criticism of his basic assumptions, does not deny the existence of economic interest as a cause for the creation of nuclear arsenals. But he sees weapons, nation states and technologies as results of beliefs generated by discourses and ideologies in historical time. This leaves hope, for 'modern politics is simply discourse, and discourse can always be deciphered. States and their war policies are not mysterious, fixed edifices... They are products of cultural history, and once we see this, the problem of reinventing them appears in a whole new light.'

However, there are some obstacles in the way of realizing this hope. Often the construction and deployment of the nuclear bomb in the first half of the 40ies is regarded the beginning of a fundamentally new age in the history of mankind. Refuting this common theory, Smith quotes Lewis Mumford who regards the invention of the dock as the key Western invention. Other authors have argued that inventions like an improved plough in the seventh century have changed the relation of the West to nature. Looking back in time merely a few decades, perhaps obscures the continuity in cultures and gives a disproportionate emphasis to recent developments. In such a situation we become helpless by inactively looking back at the supposedly *golden days* before the bomb. This is no way out.

In his analysis, Smith uses a wide range of sources from philosophical texts to films like *War Games* and *Dr. Stangelove,* from Shakespeare's *Henry V* to Ronald Reagan's speeches. Shakespeare proves especially useful to demonstrate the developement of the nation-state concept at the beginning of modernity. This concept of a nation-state which monopolizes the means of violence up to extremes like total civilian destruction is necessary for the deployment of nuclear weapons. 'States are simply made singular subjects - metaphorically treated as if they "did" things, acted as wholes', a phenomenen which Smith calls *modem animism.* It leads to a neglect of the individual human being who wants and does things and finally, itlets total destruction appear moral, if it only achieves its ends.

Similarly the author problematizes the supposedly valuelessness of technology, another means to achieve ends. 'Perhaps besides being machines themselves, nuclear weapons are also independent products of the whole modem program that machines represent, along with wars and states: a program that places new value on getting the job done, no

matter how diabolical that job might have seemed to an earlier way of thinking.'

Here, Smith's essay becomes relevant to the ecological movement as well: it reminds of other 'jobs' like energy production and development by large scale deforestation or construction of socially and ecologically destructive super-dams.

Whereas the discussion of the origins of the nation state is nothing new for the political historian, the analysis of Reagan's speeches on SOI shows how much Western history has influenced the concept of deterrence. Both, India and Pakistan are playing with the nuclear option. They are dealing publicly with a concept which was developed by the master players of nuclear deterrence and is a product of an alien cultural history. This concept which, moreover, is now being understood as a problem in its place of origin, has been isolated from context and is being thoughtlessly applied to different circumstances.

Jeff Smith, while challenging the Western reader to re-assess the ideas which created nuclear weapons in the first place, is relevant to South Asia as well. His book is of value to all those who want to critically understand the roots of policy concepts which are offered by the West to other parts of the world as logical and sane ways of solving problems.

Smith's suggestions remind one of discussions in the Gandhian movement While stressing the importance of values of co- operation and community, he feels that creating new belief systems would be historically easier to achieve than a new growth of community. This task is definitely more difficult for the urban Western activist than it is for the critical movement in South Asia. Alternate non-Western systems of thought are available and alive although they do not enjoy as much prestige as their Western counterparts. Besides, they are often interwoven with social structures which allow different approaches to development (as Chipko and Chandi Prasad Bhatt's experiments have shown).

The author's recommendations for a new antinuclear policy can be understood as advice to any social activist. He outlines this policy as :

* reflecting and understanding of the relationship between people's feeling and their political actions
* showing respect for people's personal feelings
* never ruling out any human impulse as ir-redeemably bad
* doing less moralizing and more analyzing
* working to change discourse patterns
* striving to keep the cultural discourses going in **order** to allow new ideas and solutions appear.

Perhaps Smith's suggestions - after an analysis as profound as this book - seem to be rather vague. But, then, what do we expect from an effort to understand the nuclear problem? A research book like this cannot do more than offer a new viewpoint to those actually working in the field. They will enjoy the sharpness of Smith's thought as well as his moral awareness. Hopefully they will also profit from the stimulation that this book provides.

Jelf Smith
UNTHINKING THE **UNTHINKABLE** :
Nuclear Weapons and Western Culture
Indiana University Press (1989)

LETTER BOX

Dr. Shivaram Karanth had offered himself as an independent candidate for the Karwar Loksabha constituency during the recently concluded elections. His campaign was actually a campaign for environmental education of the people. Though he lost he did receive nearly 60,000 votes. The voters of Uttara Kannada district elected for the third time running a most selfish and inactive person.

On the 21st of December, 1989, there was a "human chain" formed around the office of the Assistant Commissioner at Sirs! as part of the agitation to stop the nuclear power plant at Kaiga. Nearly thousand people joined Dr. Karanth in forming the human chain which continued around "Bidki Bail" - which is a ground for public programmes in Sirsi. The human chain was to celebrate 200 days of "Saradi Upavas Dharani" (relay hunger strike) against the Kaiga plant.

A signature campaign against the continued construction of the plant was launched. The first two persons to sign the petition, Shri Bheema and Shri M.L.Hegde, did so with their own blood. Both of them had participated in the Dharani for all the 200 days. Smt. Vasanti Hegde, the president of the Sirsi Parisar Samiti and a member, of the Zilla Parisar Samiti said that if the government did not care for peaceful agitation, it would have to face the consequences of its undemocratic behaviour.

Same evening there was another programme in Ankola town. It was attended by thousands of people. Ankola Parisar Kuta was inaugurated by Dr.

Kusuma and a lamp for the preservation of the environment was lit by Dr. Karanth. This town has a great tradition of struggle during the freedom movement. Dr. Shivaram Karanth recalled the great history of this taluka and asked the people to fight unitedly to protect mother nature for future generations and for innocent plant and animal life who too has equal rights on this earth.

Dr. Kusuma
Snehakunja, Kasarkod, Honnavar Taluka
Uttara Kannada Karnataka 581342

During my visit to Lahore, Pakistan last month I met Dr. Zafar Omer, a consulting physician, who made a strong plea for curbing nuclear arms race in the subcontinent.

Although the occasion was India-Pakistan Environment Conference, there was strong expression of a felt need for peace and amity between the two neighbours so that resources could be saved and put to more constructive, regenerative use. I think you will agree that in this region there is socio-cultural basis and geo- political necessity for ending the cold war and moving towards peace. It may be worth thinking about a two-country Citizens' meet on the issue of nuclearization and its dangers.

Kishore Saint,
Ubeshwar Vikas Mandal,
10-G, Fatehpura, Udaipur 313001

I have been receiving Anumukti and I read every word of it. On the one hand, it makes me sad to see that India is following the same path that the West has followed, without learning anything, not even from their accidents and failures; and on the other hand, I find it encouraging that people like you are fighting this monster and devoting your lives for it.

It is not just Anumukti that we have to fight for (or for that matter we can hope to get); it must be total freedom from the clutches of materialism. After all, nuclear power and nuclear weapons rest on a psychological mindset called materialism - aggrandisement of goods and attachment to goods and therefore denial to others of their rightful share, in other words, selfishness. In my view the only way it can be achieved is Gandhiji's "non-cooperation with evil." In this case the evil is the power company and the government. So, people should simply not use electricity generated in nuclear power plants and also not buy goods produced by using such electricity. But that means, being prepared to live simply and having to take control of their own lives. That's asking big!

Ashok Shimpi
4419 SW 23 St. Topeka,
KS 66614 U.S.A.

There are plans afoot to observe January 19th, 1990 as 'Protest Day' demanding a ban on continuation of nuclear activities. India week of 23rd to 30th December, 1989 has published a detailed account of uranium mining at Jaduguda and the Nuclear Fuel Complex at Hydrabad.

Dr. Dhirendra Sharma
M-120 Greater Kailash-I
New Delhi 110048

Thank you for Anumukti. It will be very helpful for us to know about what is going on in India, because there is virtually no information on the Indian situation. I am especially interested in knowing about antinuclear protest. Is the antinuclear movement very big in India? How many people are there against nuclear power?

I am also involved in the food irradiation issue and if you are interested, I can send you a small booklet on the Japanese situation.

Yurika Ayukawa, Citizen's Nuclear Information Center, 3f Watanabe Building, Higashiueno 2-23-22, Taito-ku Tokyo 110 Japan

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