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Double Envelopment

The truth, the whole truth and nothing but the truth..

Recently I received a book entitled "Population Exposure to Ionising Radiation in India" produced by the Kalpakkam chapter of the Indian Society for Radiation Physics. The membership of this society consists of professionals from national laboratories, universities and institutions of higher education, industry etc. The society feels that, "In the case of ionising radiations, while its hazard aspects seem to have been overplayed for historical or other reasons, its full potential in the service of mankind does not seem to have drawn the deserved attention of the general public". Dr.D.V.Gopinath, the Director of the Health, Safety and Environment Group at the Bhabha Atomic Research Centre writing the forward to the monograph, enlarges the same theme. "The scientists and technologists who have been working in these areas firmly believe that nuclear energy and ionising radiations can be gainfully harnessed with least harm to the safety of the people or sanctity of the environment. On the other

hand, there is also a growing fear in the minds of the public about the harmful effects of ionising radiation. The fear could be due to incomplete knowledge and may not have any scientific basis. In any case, if the utilisation of atomic energy is to gain public acceptance, it is essential that all information about the subject is made amply available to the common men, in a language he understands. It is necessary that we generate literature which, while retaining the scientific objectivity, is intelligible to the general public"

Apart from the sexist language used, nobody can take any exception to the sentiments expressed by Dr.Gopinath. But after reading such an introduction the least one expects is a book which would try to dispel incomplete knowledge, and in fact be a model of scientific objectivity. So, what does one find?

One finds that nucleocratic scientific objectivity consists of nothing but the same old concoction of disinformation and half-truths. To give just one specific example: in a table entitled "Population Dose

from Indian Nuclear Power Plant due to Gaseous Effluent Releases" they claim that the amount of tritium released from Rawatbhata plant is 900 TBq a year. However, a paper entitled "Environmental Impact of PHWR Type Power Stations—Indian Experience" by another group of BARC scientists states that the tritium release to air from Rawatbhata during 1990 was not 900 TBq but 2562 TBq. What the authors of the first study have done, in their eagerness to project a rosy picture to the public, is that they have averaged out the effluent releases over the entire lifetime of the plant. A new plant emits far less effluents. Rawatbhata used to release just 25 TBq/year- a hundred times less than at present- when it started in 1973.) Averaging is thus a neat trick to make the plant look far less dirty than it actually is at present. One wonders whether the concern for scientific objectivity is in fact a concern for truth? "Scientific objectivity" is one prong of the nuclear counter-attack. The other prong is as old as

the oldest profession—bribery of influential people and opinion makers. Being scientifically objective I suppose one ought to call it "public relations". Showers of nuclear bounty have been more plentiful than monsoon showers in Kakrapar during the last year. The Mandvi school has received Rs.5 lakhs and a promise of Rs.4 lakhs more. School teachers have suddenly found themselves inundated with offers of material help in the form of projectors and other audio-visual equipment from the plant authorities. Even anti-nuclear sympathisers have started receiving invitations to tea...

Double envelopment is a military concept pioneered by Hannibal at the battle of Cannae. Indian nuclearocrats are not Hannibal. They better stick to their double containments. One can only remind them of our national motto: Satyameva Jayate.



Heavy Water Smugglers

Norwegian Daily "*Aftenposten*" disclosed on February 4, 1992 that Roumania acted as an illegal broker to a purchase by India of Norwegian heavy water. (See *Anukukti* Vol 2 No.2, 3, October/December 1988). Heavy water is a vital component of the Indian nuclear programme.

According to *Aftenposten*, Norway sold 12.5 tonnes of heavy water to Roumania in 1986. The heavy water shipment was immediately diverted and sold at a far higher price to India which was on the hunt for heavy water. Had the Norwegian authorities examined the matter properly they would have discovered that the Roumanian reactors were not then ready for test runs, leave alone production. *Aftenposten* claims that the heavy water was delivered to an Indian firm situated at Palton Road in Bombay, which is a participant of the Indian nuclear programme, according to official Indian sources.

From the Editor's Cycle

The creek that separates Nargol from Umbergaon is a breathtakingly beautiful sight. There is the grey water, the dark sand with large seashells of various hues; the cocconut trees rising luxuriantly in the distance, the hills forming a backdrop. But most impressive of all are the boats, festooned with multicoloured flags stacked closely together. The scene was drenched in bright sunlight reminding one of that painting by Vincent van Gogh. Unfortunately, unlike in the painting there was no drawbridge nearby. To go to the other side by road is a roundabout of 25 km.

We (the cycle yatri) had decided to cross the creek by boat and were proceeding towards the embarkation point. I was, as usual, somewhere near the rear when I suddenly saw a person running wildly towards us, shouting and waving his arms. The boat was about to leave so I waved the others to go ahead and I stopped to talk. By the time he reached me he was a bit breathless and anyway his Gujarati accent was unfamiliar to my ears. "Where are you going?" "To Kerala," I replied. "We have come from Kakrapar in Surat district and there is a nuclear power plant being built in our vicinity. And we are going on cycles so that we can meet people and talk to them about our problems and listen to them." "Come and have tea with us," he said pointing to a small row of hutments in the distance. We let the ferry go and walked over to his home. They were migrant labourers from Kathiwar who had come three months ago to this area. The tea they gave us revived us wonderfully, and we decided to sing. None of us sings very well and together we can cause quite a cacophony, but that day we sang from our hearts. Take Gandhi's way. This is the last chance." The very next day, a family thought us to be a gang of dacoits responsible for a spate of dacoities in the area, and were afraid to even talk with us. It takes all kinds.

The response to our appeal in the last issue of *Anumukti* regarding the yatra has been truly overwhelming. So many groups and people have given us help in such large measure through their time and money and organizational skills that one feels humble. At the same time one feels a resolve that we better be strong enough to be worthy of so much love and trust. All of us felt especially gratified and strengthened by the love and enthusiasm of the people living near the Kakrapar Atomic Power Project, who gave us a grand send-off the day before we started out on the yatra. Five young friends from the area have joined in the march. The people of Kakrapar contributed to our morale in a big way by resolving not to allow any plant official to enter their villages for conducting any kind of survey. It is always difficult to organise and properly coordinate an effort which needs the cooperation of many different individuals to succeed. There have been many mistakes and slips on our part. However, the response till now and the many different expressions of support are a very happy augury for the success of the yatra. In fact, I have become so bold that I have decided to attempt this issue of *Anumukti* on the run. The 'dust' has, perhaps, reflected in the colour of this issue, which owes far more to Manoj and Peter than to me. Without their help the idea would have been stillborn..

An outline of the programme:

Commencement from Vedchhi: March 22, 1992

Entering Maharashtra; March 25, 1992

Entering Goa: April 11, 1992

Entering Karnataka: April 15, 1992

Entering Kerala: April 24, 1992

Conclusion in Peringome April 26 1992

Genetic Effects of Radiation

Since 1985, elevated rates of childhood leukaemia have been reported around a number of British nuclear installations, in particular Sellafield, Dounreay, Aldermaston, Burghfield and other pre 1955 built nuclear power stations. However, simple geographical associations don't prove a causal link with these plants. Both the nuclear industry and its regulators have consistently argued that the doses received by the victims would have been too small to account for the observed incidence of leukaemia. Consequently, even though considerable scientific uncertainty was attached to these exposure estimates, the industry argued that it was not responsible for the leukaemias.

This argument was, however, severely weakened in February 1990 with the publication of the Gardner study, which reported an association between paternal pre-conception radiation exposure and children's leukaemia risk⁽¹⁾

What is particularly important about Gardner's study is that a genetic mechanism is implied for the expression of the risk—that is, the father's radiation exposure leads to some form of the damage, or change, in the genetic material transmitted to his children.

This was reported as a completely new and unexpected finding. An excess of childhood cancer amongst the offspring of the Japanese atomic bomb survivors has not been seen.⁽²⁾ In fact, no significant excess of any type of genetic damage has been seen in this population, or in any of the other populations used to provide information on the risks of radiation exposure. The vast majority of our information on the genetic risks is derived from animal studies.

The lack of information is reflected in radiation safety standards which do not take account of the probability of genetic damage occurring in offspring of those ex-

posed. Radiation dose limits are based upon the risk of developing a fatal cancer in the exposed individuals and not in their children. Before the publication of Gardner most authorities considered that genetic risks had been adequately assessed and if anything overestimated. This has not changed with the new ICRP recommendations, despite Gardner's findings. The ICRP, the nuclear industry and its regulatory authorities still consider that genetic risks are small compared to the fatal cancer risks faced by radiation workers or members of the public.

The lack of confirmation for Gardner's findings in the atomic bomb survivors led many commentators to suggest that Gardner, therefore, must be wrong. For instance, one geneticist working with the US Government's Oak Ridge National Laboratory has been quoted as commenting: "It is completely impossible to conclude that the increases in childhood leukaemia resulted from radiation exposure of the fathers."⁽³⁾

Another scientist from the Radiation Effects Research Foundation, the joint US-Japanese funded institute studying the atomic bomb survivors, comments: "the estimated paternal doses to the Sellafield workers are too low to result in the end point being discussed, i.e. childhood leukaemia."

Support for Gardner Study

Two other human studies have also suggested a link between paternal pre-conception exposure and childhood leukaemia. The first, published in 1966, was mainly concerned with maternal exposure. However it also pointed to an association between pre-conception diagnostic paternal and childhood leukaemia that was of "borderline significance".⁽⁴⁾ The second was a case-controlled study in Shanghai published in 1988.⁽⁵⁾

Other scientists have argued that if genetic damage is occurring then an increase in congenital malformations would be more likely than an increase in childhood leukaemia⁽³⁾ However, some experimental work on mice suggests that both type diseases may be induced in offspring. This work, by Nomura, was cited by Gardner as support for his observations. Nomura suggested that paternal exposure induces heritable tumours in first and second generation progeny as well as genetic anomalies. These tumours were mainly of the lung, although lymphocytic leukaemias were also found.⁽⁶⁾

Obviously, Gardner's work has yet to be confirmed at oilier installations with excesses of childhood cancer. Nevertheless, Nomura's experiments pose a further question. Does occupational or environmental exposure to ionising radiation lead to an increase in rates of genetic disease, and if so is this also associated with childhood cancer? The nuclear industry, no doubt, would argue that this would not be the case.

The suggestion, however, is not that unreasonable. Some work conducted in the 1960s by American epidemiologists, suggests that clusters of childhood cancers and congenital malformations may occur together.⁽⁷⁾ It is also known that some people with particular congenital malformations, such as children with Down's Syndrome, are at an increased risk of developing leukaemia. Thirdly, similar biological mechanisms, related to somatic and germinal mutations, may be involved in the etiology of both categories of diseases.

Consequently, as well as of looking for further associations between radiation exposure and childhood leukaemia, it might be profitable to look for evidence of an increased risk of congenital malformations amongst offspring of

radiation workers, or amongst populations living around nuclear installations.

Astonishingly, hardly any work has been done in this area! This might seem incredible seeing as a link between ionising radiation and genetic damage was first demonstrated in 1927, but it is true.

In 1955 a study was published that compared the rates of genetic diseases amongst 3,751 US Radiologists and a similar population of medical specialists who were not exposed to radiation. The information was obtained by questionnaire, with a 74% response rate for the radiologists and 54% for the non-exposed control group. The majority of respondents were male. The study found a consistent trend of higher rates of abnormality in the exposed group. The study, which made no attempt to assess the doses received by the radiologists, concluded: "The differences are not of large magnitude and in themselves would not be viewed with alarm. These abnormalities occur, however, in the first generation of offspring and visible first generation effects represents only small fraction of the total damage that may have been inflicted."(8)

Surprisingly, similar large scale studies of congenital malformation rates amongst other populations of radiologists have not been conducted. In the UK, the Office of Population Census and Surveys collects data on rates of malformations, and regularly publishes reviews of regional trends. In 1985 it also published a survey of rates between different occupations for the years 1980-82. For females radiologists the data was strongly suggestive of an increased incidence for a number of classes of malformations (cleft lip and cleft palate; tracheo-oesophageal fistula, oesophageal atresia and stenosis; and Downs' Syndrome).

The result for one particular class, rectal and anal atresia and stenosis, were statistically significant. This report did not provide a breakdown into classes for male radiologists, but for all malformations together the result also suggested increased incidence.(9)

Anecdotal data

Obviously, data such as this is only anecdotal and should be interpreted with caution, particularly in view of the small time-scale and small number of cases involved. However, this data along with the US radiologists study, does indicate a medical trend which should be investigated. For instance, in the UK there are around 10,000 members of the college of Radiographers, yet no one has ever conducted a study into the rates of congenital malformations amongst their offspring.

A number of other studies have looked at the relationship between Downs' Syndrome and radiation exposure. Most of these are concerned with the effects of medical diagnostic X-irradiation, mainly on women. Again, these studies point towards a correlation, although some of the evidence is contradictory.(10)

Only two studies have ever been conducted of congenital malformation rates amongst nuclear workers and in the surrounding communities. Both of these were published in 1988 and are by the same author, Lowell Sever. They were concerned with the Hanford Site in Washington State, which was built in 1943-44 to produce plutonium for the US atomic weapons programme. Sever founded a statistically significant excess of one type malformations (neural tube defects) amongst local communities. Increased rates were also seen for other malformations including anencephaly and spina bifida.(11) The second study showed a statistically significant association between occupational exposure of fathers and neural tube defects in their children. For all malformations considered together, the study suggested a correlation that approached statistical significance.(12) When these studies were published the author concluded that they represented false positives, ie. a casual relationship was unlikely, as similar findings had not been reported in other populations, particularly the atomic bomb survivors.

Following Gardner's report it seems that Sever may be reconsidering this conclusion. In February this year he wrote that "more attention needs to be paid to the potential effects of paternal exposure to low-level ionising radiation on reproduction and child health."(3)

He is currently conducting a case-controlled study of childhood leukaemia around Hanford in an attempt to replicate Gardner's association. Gardner, in turn, is conducting a study of congenital malformation rates around Sellafield.

At present genetic risk estimates used by ICRP and UNSCEAR take no account of either heritable tumours or congenital malformations. If Gardner and Sever are able to replicate each others findings this will provide powerful evidence that genetic risks, like cancer risks, have been consistently underestimated.

References:

- 1 Gardner et al (1990) Results of a case controlled study of leukaemia and lymphoma among young people near Sellafield nuclear plant in West Cumbria; British Medical Journal 300 432-428.
2. Yoshimoto Y et al (1990) Frequency of malignant tumors during the first two decade of life in the offspring (F1) of atomic bomb survivors Hiroshima: Radiation Effects Research Foundation RERF Technical Report TR 4-90.
3. Sever L E (1991) Low Level ionising radiation paternal exposure and children's health; Health and Environment Digest 5 No 11-3.
4. Graham S et al (1966) Preconception, intrauterine and postnatal irradiation as related to leukaemia; National Cancer Institute Monographs 19 347-371.
5. Shu X O et al (1988) A population-based case-control study of childhood leukaemia in Shanghai; Cancer 62 635-644.
6. Nomura T (1982) Parental exposure to x-rays and chemical induces heritable tumours and anomalies in mice; Nature 296 575-577.

7. Health C.W. et al (1964) Case clusters in the occurrence of leukaemia and congenital malformations; The Lancet, July 1964 136-137.

8. Macht S H and Lawrence P S (1955) National Survey of congenital malformations resulting from exposure to roentgen radiation; American Journal of Roentgenology 73 442-466.

9. McDowell M E (1985) Occupational reproductive epidemiology

the use of routinely collected statistics in England and Wales 1980-82; Studies on Medical and Populations Subjects No 50, London; HNSO.

10. Rose K S B (1988) Epidemiological surveys on the effects of low-level radiation dose: a comparative assessment: Pre-conception irradiation effects; United Kingdom Atomic Energy Authority AERE R 12045 Volume A.

11. Sever L E et al (1988) The prevalence at Birth of congenital malformations in communities near the Hanford site; American Journal of Epidemiology 127 243-254.

12. Sever L E (1988) A case controlled study of congenital malformations and occupational exposure to low-level radiation; American Journal of Epidemiology 127 226-242.

Earth Summit and the Global Death Machine

Un June this year 120 heads of states and some 15,000 representatives of environmental NGOs are meeting at Rio de Janeiro, Brazil to discuss ways and means to save the planet for our common survival: This first Earth Summit, is taking place four years after publication of 'Our Common Future' by the UN Commission on Environment and Development (UNCED), chaired by Ms. Gro Harlem Brundland, the then Prime Minister of Norway. The Commission takes note of the early warning environmental signals and calls for immediate and appropriate responses, globally.

The Centre for Science and Environment, Delhi (CSE) has circulated a draft, statement, which is a position paper for the governments of the South and NGOs supporting the third world causes. CSE Global agenda has been widely accepted by southern governments as well as a cross section of environmental groups abroad.

Part I of this paper summarises the CSE position. The summary reveals that the document, a very important one of course, could have been little more analytical in identifying the causes of the crisis. That is what is attempted in Part II of this paper. The author does not intend to chart out an alternative agenda, for that is left to the imagination and creativity of the reader.

Summary of CSE Draft

The causes of environmental crisis in developing countries is, according to CSE, "over-exploitation of ground water and surface water, land degradation, deforestation", hence, "given the extreme pressure on natural resource base for daily survival on one hand, and economic growth, on the other, only an extremely well thought out holistic strategy of rational resource exploitation will be able to reconcile environmental constraints with development requirements."

The document is critical of the Northern dominated financial institutions for international trade, aid and debt becoming green linked, with the rich in the world demanding that their dollars and yen be spent in the South only in a way that secures our "common future". (There is no evidence of World Bank etc becoming green-sensitive, except in their press briefings.)

Part II of the Statement contains new visions about the future shape of world, with democratic institutions at three levels, ie. community, national and global. They will be based on community's right to manage its immediate environment through open and democratic institutions and the right to a clean and healthy environment. It demanded "a fair world" in which all pay the full cost of their consumption. The draft demands

that "all nations at the Brazil conference must take a pledge that they will develop a new tier of governance within their countries a tier of community level governance through open, participatory institutions with inalienable rights over their immediate environment to care for use and manage."

Since the Summit is global, the main agenda revolves around those global issues which need to be resolved immediately. Part II of the statement—the agenda for Global Environmental Democracy—contains two issues which will be raised at Rio, viz. the Global Right to Survival and Equal Right to the Atmosphere. There are two more issues, Right to Information and appropriate compensation for community biological knowledge.

Global Right to Survival

"Global Right to Survival with a certain modicum of dignity" is the most fundamental of human rights. There can be no discussion of international environmental solidarity as long as the world remains starkly divided between the rich and the poor.

"The vast number of the unemployed in the developing world provide us with an extra ordinary opportunity for undertaking a massive global initiative for ecological regeneration and restoration of the natural resource base on which the poor depend for their survival"

The Scheme

"If an internationally guaranteed Right to Survival was backed up with an appropriate programme which guaranteed jobs in ecological regeneration, albeit at a survival wage, people need not flee their homes when drought or any other adversity strikes.... Everyone will be ensured a survival wage so that they have the purchasing power to eat. Nobody has to sell off their cattle and other assets in acute distress. Nobody has to go to bed hungry."

The global expenditure for this task has been estimated at US \$30 to 40 billion, less than 5% of the global military spending. This money, to be paid by the rich nations "should not be seen as a measure of charity, but more as a measure of the payment that the rich ought to be making for their existing consumption."

According to CSE, over and above the greening of wasteland, this programme will "drastically weaken the forces that engender oppression by freeing people from the clutches of money lenders and landlords." One fails to understand how an employment generation programme, (ensuring just survival wages) will alter the power equation between the landlords and the poor.

Equal Rights to Atmosphere.

The planet is getting hotter because of the increasing concentration of carbon dioxide, methane, nitrous oxides and chloro-flouro-carbons—the so called green house gases, (ghgs). Carbon dioxide from fossil fuel burning accounts for more than two-third of the green house effect. The USA, the USSR and Western Europe with less than 20% the world population account for 58% global carbon emission. This threat can only be eliminated by bringing down the ghgs emission to the pre-industrial level, which is not in the international agenda now. The Intergovernmental Panel on Climatic Change (IPCC) recommends a 60% cut in CO₂ to hold the concentration at its present level. This will necessi-

tate fixing national quotas. The industrial lobby in the North wants national quota to be based on the current emissions.

CSE argues that the "global aggregate should be allocated to each individual equitably, each nation's quota being equal to the sum of its citizens' quotas. Entitlements thus created can be traded. Those not using their share can sell them to those that are exceeding theirs."

Analysis of CSE draft.

The draft puts undue blame on the average consumers in the North and refuses to identify the role of (a) military industrial complex in all countries and (b) rich consumers in the third world who are equally responsible for the green house mess. The draft miserably fails in identifying the contradictions within communities most of which are antagonistic. Every nation in the world today is a battle field with groups of unequal status and power, based on primitive considerations like caste, class, gender and race. It refuses to charge sheet the global Military Industrial Complex (MIC) in dirtying the local and global commons, and of course, increasing the concentration of ghgs. Let us examine these questions in detail in the Indian context

The Modern Sector In India

India today has an indigenously built mining-manufacturing-nuclear complex, with a death machine, the second largest in the Southern countries, which includes plutonium fuelled bomb and an efficient delivery system. The indigenously people's land have been snatched away for mining, the hazardous wastes are eliminated in the easiest way, air in the industrial cities is as polluted as that of Tokyo. A backward technology, lax environmental laws and inadequate/corrupt enforcing machinery, has virtually destroyed large stretches of farms and forests.

Industrialisation did not bring any radical changes in the country as prophesied by Karl Marx. On

the contrary, it has only helped in reinforcing the existing contradictions. At the receiving end of this modern violence are also the traditionally oppressed groups like tribals, the lower castes and women. Urban India does not kill its female infants, instead, they employ the latest in modern medical technology—amniocentesis.

The per capita carbon emission by the an Indian 0.2 tonnes per annum. CSE and some NGOs in the North would like, to consider this as survival emission as against the luxurious emission in the North. Most of the emissions everywhere, is to promote super-consumption and to erect the death machine. If disaggregated emission statistics for the rich and the poor in India is considered, the rich, some 2% of India's total population will be emitting around 2 tonnes of carbon a year.

India's Record of Democracy

The government of India and those in the states have not been very friendly with people who interrupt their development project. The mega disastrous projects like the dams on Narmada and Tehri are literally forced on people, in spite of popular objection. For over a year now, people in Kerala, have been agitating against a proposed nuclear power plant. For over half a decade now, coastal villagers at Baliapal have been protecting their land from the military which wants to build a missile test range. There is an increasing tendency to find military solutions to social and historical problems. Free movement is not possible in around a quarter of India's territory because there are just too many armed men out there.

The Global Death Machine

Peace Researcher Johan Galtung is of the view that USA is a third world country. "While it is certain that the US still has many rich people and possesses awesome military power, the unyielding unemployment, the 24 million

Americans on food stamps and the one child in five that is raised in poverty outstrips the gloomy realities of many Third World countries. Other indications of this tendency are the grave insufficiencies in health insurance and the extent of functional illiteracy."

The American war machine, which also caters for the military ambitions of the third world, is responsible for more than half the global and local pollution. Since the II World War, USA has spent 2.75 trillion dollars on production and delivery of nuclear war heads alone. Clean up of the Weapons' complexes will cost another 100 billion in 1988 dollars. In an in-depth analysis of US MIC and the health of US economy, Seymour Melman observes: "With a combined address to disarmament and economic conversion we can strike at the heart of the single most dangerous political process of our time. That is the antagonistic cooperation whereby the war-making institutions of the US and the USSR have reinforced each other and generated larger budgets, larger military economies, larger stocks of more dangerous weapons, and in so doing we have justified more centralism, and greater authoritarianism in each society. These processes lead, in both societies, to economic exhaustion and political/moral decay. I know no single public issue that is as crucial for the survival of society as disarmament and economic conversion."

Melman compares the ratio of military capital fund with the Cross Domestic Fixed Capital Formation (money value of civilian capita) items - school buildings, factories, machinery, roads, waterworks, libraries etc.). For every 100 \$ spent in civilian sector, MIC amassed 40 dollars in the US. Other major nations - USSR 66, UK 31, France 16, Sweden 12, West Germany 13, Japan 3.3. (Anne H.Ehrlich & John W.Birks

(Ed.) Hidden Dangers, Sierra Club, San Francisco, 1990.)

The following statistics will reveal who is belching out more carbon, whether an average consumer or something else.

The table is revealing. Per capita emission of carbon has little correlation with the people's well being or consumption. America has lot of poverty, inspite of being the largest emitter. The second largest emitter is USSR, which is more than double that of Canada. The USA, the USSR and Western Europe with less than 20% of the global population emitted around 60% of carbon. They also happen to be the biggest producers of nuclear energy (three-fourth of the global generation).

The per capita emission statistics have been often used to blame the entire people of industrialised countries. An average northerner does consume much more than what is needed for a meaningful existence. However, disaggregated statistics will reveal that the Global Military Industrial Complex is by far the bigger culprit.

Implications of the New Carbon Agenda

The present inequality in control over community assets and natural resources at the community, nation state and global level will remain, inspite of Rio summit. How will the new Carbon Agenda, proposed by CSE and supported by third world friendly NGOs abroad affect the poor. This has to be seen in the light of near total surrender of all third world economies to the Northern dominated institutions and the World Bank's recent advice for the hazardous industries to migrate to the developing countries, which are "relatively under-polluted"

It will be in the interest of the third world and the first world elite to set up heavily polluting and energy intensive industries in

India, exploiting its vast coal and mineral reserves. Pollution control laws are lax, control agencies are weak and corrupt, environmental awareness is at a low ebb. A faster rate of economic growth can be expected in the third world. Under the existing laiesex faire mood, when socialism has become a bad word, the future generation of misery will also be much faster.

It seems that while thinking globally, the NGOs have forgotten about the local catastrophes from modern technological marvels. For every tonne of carbon emitted, there will be tens of tonnes of other solid, liquid and gaseous wastes, which will kill the local ecosystem. For instance, mining and burning coal alone will increase the radioactive burden of the land and atmosphere by belching out radon and radium. Among other local hazards are sulfer dioxida and fly ash which contains many trace metals which can cause cancer or genetic disorders.

Rio summit, taking place in the 500th year of Columbus, could either vow to strengthen the colonial values and all that came out of the discovery of the New World. Or it could resolve to take the necessary diversion. Those presiding over the heavily armed death machines, gray men in gray suits with bullet proof vests inside will hardly be able to think about survival - except their own. Nor environmental NGOs who speak for their "nations". Healing the earth needs a little more than militant nationalism.

If the Earths summit ends up with carbon quota and survival wages for the green brigade, without addressing to the basic questions, nothing would be lost either. May be it will remind all of us that nineteenth century institutions and ideas are insufficient to look beyond 20th century.

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Global Energy and Carbon Balance Sheet

Country or Re- gion	% Of Global Population (1986)	% of Global Fos- sil Fuel Con- sumption (1990)	Per Capita Carbon Con- sumption (Tonne)1990	% Global Nu- clear Energy (1989)
USA	4.98	24.80	7.24	31.18
USSR	5.77	17.70	4.47	11.25
Australia	0.52	1.4	3.92	0.0
W e s t e r n Europe	7.86	16.40	3.04	35.23
Middle East	3.58	3.40	1.38	0.00
Latin America	8.37	5.10	0.88	0.49
China	22.16	9.20	0.60	0.00
India	15.84	2.40	0.22	0.43

Chernobyl Revisited—Five Years On

Zhores Medvedev is a super detective of the nuclear age. His book Nuclear Disaster in the Urals is a classic of scientific detective work which exposed the 1957 explosion in nuclear waste stored in the Urals despite the best efforts of the Soviet authorities to cover up the accident, and the deep scepticism of Western nucleocrats, who thought that an accident of the type described by Medvedev was "physically impossible". The following article which was published last year in the nuclear industry journal, Nuclear Engineering International is a fine description of the conditions around the Chernobyl reactor five years after the accident.



pressive. About 250 papers were presented for discussion, about 50 of them from Western scientists. the effect of different levels of radiation on flora and fauna. Although there had been little advance publicity about the conference, when it opened on 10 September 1990, the response from the scientific community was im-

Censorship

By 1990, hundreds of papers had been published in Western academic journals on the environmental, agricultural and medical problems related to the radioactive fallout from Chernobyl. The presence of some twenty Chernobyl radionuclides had been charted for each year after Chernobyl in humans, and in the soil, plants, animals and agricultural produce of different countries from Europe, Asia, America and North Africa. In fact, a whole new branch of radiobiology came into existence, because fission radionuclides from a reactor core had never before fallen out over the whole of the northern hemisphere as a result of a reactor accident.

It seemed curious, therefore; that Soviet academic journals in the fields of radiobiology, radiology, radioecology, environmental studies and genetics had remained si-

ast summer, I was invited by the Institute of General Genetics of the Academy of Sciences of the USSR to participate in the First International Conference on the Biological Effects of the Chernobyl Accident. The letter of invitation proudly announced that I was invited to the "world capital of radiation". The conference was planned in two venues—inside the "exclusion zone" in the town of Chernobyl, and at Zeleny Mys, a small working settlement just outside the exclusion zone built for the shift workers who took part in the cleanup operations after the accident. It was to last for nine days, and apart from the discussion of scientific papers, there were to be excursions to the nuclear plant, to experimental stations inside the exclusion zone, and to the radiological reservation which shows

lent about Chernobyl. For reasons that were not immediately clear, not one academic study had been published in the USSR on Chernobyl related radiobiological problems by 1990. From the outside it

looked as if Soviet scientists were missing opportunities and neglecting their obligations. The conference at Chernobyl proved that this was not the case. The problem was censorship.

Soviet Research

As early as May 1986, more than 30 research institutes of the Academy of Sciences of the USSR, the Ukrainian and Byelorussian Academies, and various other min-

istries had set up research stations inside the heavily contaminated areas. A significant amount of research was carried out on plants, animals and general ecological problems. Most of the resulting reports however, were classified as secret or marked "for internal distribution only". In June 1990, the Supreme Soviet passed a new law on the freedom of the press. It

banned press censorship and also had a beneficial effect on Soviet academic literature. The majority (but not all) of the studies on radiocology relating to Chernobyl have now been declassified. The exceptions, still considered sensitive information, are reports that contain quantitative data on the contamination of agricultural produce in regions close to Chernobyl and those with details about the health impact.

Fallout Maps

The first detailed maps of the pattern of caesium-137 contamination of Soviet land were published in 1990. They showed the distribution of caesium-137 towards the end of 1989, when the levels were well below those of 1986 and 1987. Ukrainian and Byelorussian newspapers also published maps of contamination with the other long-lived radionuclides, strontium-90 and plutonium-239/240

The maps indicate that the initial 30 km radius exclusion zone from which people were evacuated in April and May 1986 was significantly amended later. On the eastern side of the accident site it was reduced, while on the western, north-western and northern sides it was extended and many new villages were evacuated in 1987. In 1989, 325 km² of populated area was still contaminated with caesium-137 levels above 40 Ci/km (1500 kBq/m²). Some spots, situated in Byelorussia and Bryansk region of Russia—some as far as 200-250 km from the accident site—had much higher levels of contamination. About 33,800 people live in rural communities in the areas which are designated "areas of strict radiological control". Because they are now approaching the 35 rem "emergency permissible limit" of whole life absorbed radiation dose introduced by the USSR Ministry of Health, they will be resettled in 1991-1995 and the agricultural land in those areas will be reforested.

There is a much larger area of 715km² outside the exclusion zone where the level of caesium-137 contamination is from 15 to 40

Ci/km². The 234,000 people who live in this area were entitled to receive clean milk and other produce from uncontaminated regions and they received a small amount of financial compensation. Those benefits and periodic medical checks were recently extended to the 545,000 people who live in the 1409 km² area where the caesium-137 is between 5 and 15 Ci/km². Because the distribution of contaminated spots was random, however, and isolines of different levels of radioactivity often divide the fields and pastures of the same collective farm into several parts, it was finally decided in 1990 that all areas with concentrations of caesium-137 above 1 Ci/km² would be considered contaminated. The approximately 3,070,300 people who live in those areas receive modest compensation payments of 30 roubles per month.

By way of comparison it is useful to note that the highest level of caesium-137 contamination in the United Kingdom in May 1986 (in a few small spots in Cumbria and North, Wales) was around 0.5-0.7 Ci/km² and resulted in lamb and mutton being contaminated above the permissible limits for meat sales in the U.K.. The USSR contamination levels were given only for late 1989, they must have been significantly higher in 1986 and 1987.

Hot Fuel Particles

During the conference, a great deal of attention was paid to the problem of "hot particles" (microscopic insoluble fuel fragments of various sizes). These particles can be trapped permanently in the lungs of individuals who inhale them. In addition to the more homogeneously distributed radioactive material, hot particles were present in the Chernobyl fallout in various countries and they were studied quite intensively.

In the Soviet Union, the density of distribution of hot particles and their size was proportional to the distance from the accident site, probably because larger particles had a lower capacity to remain air-

borne. In one study, 50-60 hot particles per square meter were identified on the soil surface at a distance of 50 km from the site in 1988, 5 at a distance of 75 km and 2/m² in Kiev, 130 km away.

Higher concentrations were found west of the reactor than in other directions. In some places the density was 10/cm². It was also

found that larger hot particles were pieces of UO₂ fuel grains which were split and dispersed by the first explosion, whereas smaller particles were released with the graphite fumes in the days after the explosion.

Closer to the Chernobyl reactor site there were not only microscopic fuel fragments that created small "gamma fields", 2-5 metre in diameter. A special team of experts is still searching for these "hot spots". When they are found, they are fenced, marked and later deactivated. Walking in the forest outside the exclusion zone, I saw several such spots. With my personal dosimeter, I could see that the radiation levels of these spots were several orders of magnitude higher than the forest background levels which were not more than 50% higher than the natural background.

Inside the Exclusion Zone

It is expected that some parts of the 30 km radius exclusion zone will be suitable for human activity in the future. But there is a smaller; 10 km radius zone within it which will always remain a radiobiological reservation. It is very heavily contaminated, not only as a result of fallout, but because it contains nearly 800 nuclear waste disposal sites, many of them rather primitive. Contaminated equipment, transport vehicles, clothing, topsoil scrapped from about 100,000 acres, asphalt from the Chernobyl station site and the town of Pripyat, trees from the "red forest" (nearly 1,000 acres of pine forest close to the plant and killed by the first radioactive plume), and many other items classified as nuclear waste were buried here in pits and trenches during the second half of 1986.

These disposal sites have begun to leak and contaminate the ground water. There is, as yet, no programme for cleaning the whole area.

The Sarcophagus

The main concern, however, relates to the sarcophagus itself—the reinforced concrete cover built around the stricken reactor. During the conference, some participants managed to get a copy of a small booklet published in 1990 in Chernobyl by A.A. Borovoi, senior scientist at the Kurchatov Institute of Atomic Energy. Only 250 copies were printed of this summary of a study of the state of the remaining nuclear fuel and the rubble of the destroyed reactor. The aim of the study was to decide what should be done to provide a permanent solution to the problem of the reactor.

The sarcophagus is not expected to last more than 20-30 years. More than 90% of the original nuclear fuel is still inside. The metal structures, particularly those that

hang from the 2000 ton top plate that was shifted into a vertical position by the explosion, are unstable. By using special periscopes, it was found in 1989 that the reactor vessel is now empty. The bottom plate of the reactor pit was also smashed 4m down by the explosion. Melted reactor fuel was dispersed in different rooms and spaces below the reactor pit. However, the melted fuel and radioactive lava which was solid in 1988 is now becoming brittle and softer and changing into dust under the influence of elevated temperatures and radiation.

It was found that the fuel material is subcritical, but its physical instability creates problems because the sarcophagus is not leak-tight. It has nearly 1,000 m² of holes and can "breathe". It contains about 700 kg of plutonium, and about 7 million curies of caesium-137 (81 kg) and 6 million curies of strontium-90 (43 kg).

The Ukrainian government and parliament has passed a resolution demanding that the Ministry of Atomic Energy of the USSR not

only shut down the three reactor units still in operation at Chernobyl, but also dismantle the sarcophagus and decontaminate the site. But it has been calculated that this project, called the "Chernobyl green field concept", is too expensive. Moreover, there is no technology available yet to do the job. The Kurchatov Institute of Atomic energy considers it impossible to remove the sarcophagus. The Institute favours the construction of an extra structure, temporarily known as "sarcophagus-2", which will be hermetically sealed and strong enough to withstand the possible collapse of the metal and concrete structures inside the present sarcophagus. It should have a design life of several hundred years. They expect that in the distant future, when caesium-137 and strontium-90 no longer present radiation problems, our descendants might have invented a better technology to dismantle the reactor.

*Zhores Medvedev
Nuclear Engg. International,
April 1991*

Ban Ionisation Smoke Detectors

Smoke detectors save lives. Unfortunately the radioactive material contained in ionizing detectors may also pose a threat to life. There are two types of smoke detectors available for home use—ionizing and photoelectric. Many people are surprised to discover that ionizing detectors contain a radioactive substance, since manufacturers are not required to put the radiation symbol on the exterior casing or packing carton. The Canadian Atomic Energy Control Board (AECB) has determined that "it would not be appropriate—in fact it would be misleading—to place the radiation warning sign on anything other than the source housing itself [which is inside the detector]". The radioactive substance americium ionizes the air within a chamber of the smoke detector, enabling

the air to actually carry an electrical current between two electrodes. When smoke particles enter the chamber, the current is interrupted, thus triggering the alarm. By contrast, photoelectric detectors contain a light source, and a light-sensitive photocell that is not directly in line with the light. When smoke particles enter the detector, they scatter the light beam, and the photocell detects the reflected light. This process triggers the alarm.

According to tests by consumer groups, photoelectric detectors are more sensitive than the ionization type in their response to smoldering smoky fires which have larger smoke particles. 75% of fires within the home start as smoldering fires and account for most fire deaths. By contrast, ionizing detectors are faster at detecting the

smaller smoke particles of open flame fires.

Ionizing detectors are effective for about ten years. The americium-241 that they contain continues to be radioactive for over 4,000 years. (The radioactive half-life of americium is 458 years). Americium, a bi-product of nuclear fission, is extremely toxic—americium is 53 times more radioactive by weight than plutonium 239. Americium emits alpha particles as well as low levels of gamma radiation. Unlike gamma rays, alpha particles cannot penetrate the skin, but they are highly carcinogenic (cancer causing) if inhaled into the lungs, otherwise ingested or imbedded in the skin. Ionising smoke detectors can contain up to five microcuries of americium-241. It has been estimated that one microcurie of americium-241, if

evenly dispersed and inhaled has the potential to cause 78 lung cancers. The International Commission for Radiological Protection (ICRP) has set a maximum body burden for americium of 0.03 microcuries.

The large majority of the estimated 40-50 million detectors currently in use in North America are of the ionizing type.

Initially, The AECB required that all detectors containing radioactive material be disposed of in controlled waste areas. This is no longer the case. In 1978, an AECB review determined "that domestic smoke detectors thrown out with the regular garbage were not a

concern with respect to the health and safety of the public or waste disposal workers." However, commercial smoke detectors, used in factories, schools and other large institutions, must still be discarded in an 'approved' method, as outlined by the AECB.

According to David Poch, author of Radiation Alert, "the greatest hazard occurs when the americium escapes due to fire, tampering or damage after disposal. If swallowed it accumulates in the liver, bone marrow and endocrine glands, with a corresponding risk of cancer". When we consider that the 40 to 50 million detectors currently in use are starting to accu-

mulate in landfills, it can be seen that disposal is probably the single greatest problem with ionizing detectors. Many of these units may be burned in municipal incinerators, which will further exacerbate the situation.

in this case, for the 4,000 year lifetime of americium. Fortunately however, there is a clear alternative - buy a photoelectric detector instead of the ionizing type. Although it is more expensive, you will get a detector that is better at detecting the most dangerous fires, and you won't be contributing to the radioactive waste problem.

Principles of Ecology

Uproperly speaking, global thinking is not possible. Those who have "thought globally" (and among them the most successful have been imperial governments and multinational corporations) have done so by means of simplifications too extreme and oppressive to merit the name of thought. Global thinkers have been, and will be, dangerous people. National thinkers tend to be dangerous also; we now have national thinkers in the north-eastern United States who look upon Kentucky as a garbage dump. Global thinking can only be statistical. Its shallowness is exposed by the least intention to do something. Unless one is willing to be destructive on a very large scale, one cannot do something except locally, in a small place. Global thinking can only do to the globe what a space satellite does to it: reduce it, make a bauble of it. Look at one of those photographs of half the Earth taken from outer space, and see if you recognize your neighbourhood. If you want to see where you

are, you will have to get out of your space vehicle, out of your car, off your horse, and walk over the

If we could think locally, we would do far better than we are doing now. The right local ques-

Answers will global Amish ques-will this do nunity?" d the right the world. to put lo-roper rela-globe, we by imagi- rity, and e, and by al life as in- and self- s we can — presumptu- tions of ight". it to keep ts and acts ying the we must it we do not ch of the y part of it ire that we too much, arn to live inde-

Ionising radiation as a toxic agent differs fundamentally from toxic substances which can be introduced to a solution slowly and diluted to a lower and lower uniform concentration. By contrast for low energy transfer radiations such as X-rays and beta particles, the minimal unit is the primary ionisation track led by a single high speed electron. The electron cannot be subdivided and it cannot make its delivery of energy more gentle by diluting it evenly throughout the whole cell—it is abrupt and very close to the primary track. For example, just one gamma ray photon of caesium-137 of 662 keV energy results in the delivery of 79.2 millirad of dose to some 91 cells and this energy delivery is typical of that delivered by every microscopic high speed bullet from smoke detectors. The microdose of 0.00001 mSv or 0.001 millirad is delivered to the whole body and this includes many cells not traversed at all by the electron. And the track dose of 79.2 millirad is 79200 times the person dose, and would be the cause of fully competent carcinogenic lesion. There is no dose which would be safe for us from radiation-induced cancer. - Adapted from Goffman J.W. (1990). *Radiation-Induced Cancers from Low Dose Exposure: An Independent Analysis*

Committee for Nuclear Responsibility
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ground. On foot you will find **that** the earth is satisfyingly **large, and full** of beguiling nooks and crannies.

pendently and self-sufficiently as we can. That is the only way we can keep the land we

are using, and its ecological limits, always in sight.

The only sustainable city—and this, to me, is the indispensable ideal and goal—is a city in balance with its countryside: a city, that is, that would live off the net ecological income of its supporting region, paying as it goes all its ecological and human debts.

The cities we now have are living off ecological principal, by economic assumptions that seem certain to destroy them. They do not live at home. They do not have their own supporting regions. They are out of balance with their supports, wherever on the globe their supports are.

The balance between city and countryside is destroyed by industrial machinery, "cheap" productivity in field and forest, and "cheap" transportation. Rome destroyed the balance with slave labour; we have destroyed it with "cheap" fossil-fuel industries.

Since the Second World War, the norms of productivity have been set by the fossil-fuel industries.

Geographically, the sources of the fossil fuel are rural. Technically, however, the production of these fuels is industrial and urban. The facts and integrities of local life, and the principle of community, are considered as little as possible, for to consider them would not be quickly profitable. Fossil fuels have always been produced at the expense of local ecosystems and of local human communities. The fossil-fuel economy is the industrial economy par excellence, and it assigns no value to local life, natural or human.

When the industrial principles exemplified in fossil-fuel production are applied to field and forest, the results are identical: local life, both natural and human, is destroyed.

Industrial procedures have been imposed on the countryside pretty much to the extent that country people have been seduced or forced into dependence on the money economy. By encouraging this dependence, corporations have increased their ability to rob the people of their property and their la-

bour. The result is that a very small number of people now own all the usable property in the country, and workers are increasingly the hostages of their employers.

Our present "leaders"—the people of wealth and power—do not know what it means to take a place seriously: to think it worthy, for its own sake, of love and study and careful work. They cannot take any place seriously because they must be ready at any moment, by the terms of power and wealth in the modern world, to destroy any place.

Ecological good sense will be opposed by all the most powerful economic entities of our time, because ecological good sense requires the reduction or replacement of those entities. If ecological good sense is to prevail, it can do so only through the work and the will of the people and of the local communities.

For this task our currently prevailing assumptions about knowledge, informations, education, money, and political will are inadequate. All our institutions with which I am familiar have adopted the organizational patterns and the quantitative measures of the industrial corporations. Both sides of the ecological debate, perhaps as a consequence, are alarmingly abstract.

But abstraction, of course, is what is wrong. The evil of the industrial economy (capitalist or communist) is the abstractness inherent in its procedures—its inability to distinguish one place or person or creature from another. William Blake saw this two hundred years ago. Anyone can see it now in almost any of our common tools and weapons.

Abstraction is the enemy wherever it is found. The abstractions of sustainability can ruin the world just as surely as the abstractions of industrial economies. Local life may be as much endangered by "saving the planet" as by "conquering the world". Such a project calls for abstract purposes and central powers that cannot know, and so will destroy, the integrity of local nature and local community.

In order to make ecological good sense for the planet, you must make ecological good sense locally. You can't act locally by thinking globally. If you want to keep your local acts from destroying the globe, you must think locally.

No one can make ecological good sense for the planet. Everyone can make ecological good sense locally, if the affection, the scale, the knowledge, the tools, and the skills are right.

The right scale in work gives power to affection. When one works beyond the reach of one's love for the place one is working in, and for the things and creatures one is working with and among, then destruction inevitably results. An adequate local culture, among other things, keeps work within the reach of love.

The question before us, then, is an extremely difficult one: How do we begin to remake, or to make, a local culture that will preserve our part of the world while we use it? We are talking here not just about a kind of knowledge that involves affection but also about a kind of knowledge that comes from or with affection - knowledge that is unavailable to the unaffectionate, and that is unavailable to anyone as what is called information.

What, for a start, might be the economic result of local affection? We don't know. Moreover, we are probably never going to know in any way that would satisfy the average dean or corporate executive. The ways of love tend to be secretve and, even to the lovers themselves, somewhat inscrutable.

The real work of planet-saving will be small, humble, and humbling, and (insofar as it involves love) pleasing and rewarding. Its jobs will be too many to count, too many to report, too many to be publicly noticed or rewarded, too small to make anyone rich or famous.

The great obstacle may be not greed but the modern hankering after glamour. A lot of our smartest, most concerned people want to come up with a big solution to a big problem. I don't think that plantet-

saving, if we take it seriously, can furnish employment to many such people.

Some cities can never be sustainable, because they do not have a countryside around them, or near them, from which they can be sustained. New York City cannot be made sustainable, nor can Phoenix. Some cities in Kentucky or the Midwest, on the other hand, might reasonably hope to become sustainable.

To make a sustainable city, one must begin somehow, and I think the beginning must be small and economic. A beginning could be

made, for example, by increasing the amount of food bought from farmers in the local countryside by consumers in the city. As the food economy became more local, local farming would become more diverse; the farms would become smaller, more complex in structure, more productive; and some city people would be needed to work on the farms. Sooner or later, as a means of reducing expenses both ways, organic wastes from the city would go out to fertilize the farms of the supporting region; thus city people would have to assume an agricultural responsibility

and would be properly motivated to do so both by the wish to have a supply of excellent food and by the fear of contaminating that supply. The increase of economic intimacy between a city and its sources would change minds (assuming, of course, that the minds in question would stay put long enough to be changed). It would improve minds. The locality, by becoming partly sustainable, would produce the thought it would need to become more sustainable.

Another Wicket Down

The Oldest Operating Reactor in US Faces Closure

The Board of Directors of Yankee Atomic has decided to close its Yankee Rowe reactor permanently rather than spend the money to repair or even to fully investigate its embrittled reactor vessel.

The board's decision followed a last ditch, and unsuccessful, utility effort to convince the Nuclear Regulatory Commission (NRC) to allow the reactor to operate for at least one more fuel cycle without modifying the vessel.

The Yankee Rowe reactor had a book value of only \$28 million, and just determining the vessel's condition was expected to cost about \$23 million. If the vessel needed replacement or annealing, the costs could have risen to \$100 million or more—clearly daunting numbers to the utility's board. And with no US precedent in this area, there was no guarantee that replacement of the vessel was either politically (because of potential worker exposures) or technically feasible, while annealing has not been tried in the US either.

The decision shook the nuclear industry, which just a year ago was touting Yankee Rowe as the ideal reactor to initiate the NRC's license renewal process. Its relatively good operating record, particularly given its status as the nation's oldest operating reactor,

would help it lead the way toward a new generation of extended licenses. Like a fine wine, the industry argued last year, Yankee Rowe improved with age.

In this case, however, the fine wine quickly turned to vinegar following an investigation of the plant by the Union of Concerned Scientists (UCS). The organization found that the condition of the reactor's pressure vessel could not be determined, and certainly did not meet NRC regulations. UCS and the New England Coalition on Nuclear Pollution filed a petition to close Yankee Rowe until its vessel clearly met the rules. After several months of hemming and hawing and defending the plant, the NRC finally agreed with UCS last September and the utility "voluntarily" closed the plant rather than face an NRC shutdown order.

Ironically, the US Council for Energy Awareness (USCEA), the nuclear industry's public relations arm, currently has advertisements running in major magazines promoting nuclear power with a photograph of Yankee Rowe in a pastoral forest setting. Perhaps realizing the inevitable outcome, CEA "whited out" the Yankee Rowe nameplate in front of the plant.

Northern States Power's Monticello reactor now becomes the lead industry plant for license renewal. An application for renewal is expected to be submitted sometime this year. As a highly controversial GE Mark 1 design, (the same design as Tarapur-Editor) which many nuclear experts believe never should have been built in the first place, Monticello can expect a thorough examination of its technical condition and basic design. If the Yankee Rowe experience is any indication, Northern States can expect anything but smooth sailing in the renewal process.

In fact, given Yankee Rowe and last month's agreement to close the aging San Onofre-1 reactor rather than spend millions on modifications, it appears that closing older reactors rather than upgrading them makes sense for ratepayers and utilities alike,

A New Pair of Crutches

In a remarkable perversion of the concept of "free enterprise", the US Department of Energy has agreed to pay half the costs of developing non "advanced", non-"meltdown proof" new reactor designs for three of the nation's largest corporations. The designs include General Electric's Advanced Boiling

Water Reactor and Simplified Boiling Water Reactor, Westinghouse's AP 600 Pressurized Water Reactor and ABB- Combustion Engineering's System 80 Pressurized Water Reactor. Actually, the ABB-Combustion Engineering is not even a US design, since primary owner ABB (Asea-Brown-Boveri) is a Swedish company. ABB has also been implicated in the diversion of nuclear technology to Iraq. All of the designs are light-water

reactors, and are merely updates of existing designs. None meet the "meltdown-proof criteria often advanced as a prerequisite for new reactor construction.

The initial phase of the contract is expected to be \$200 million over five years. The DOE decision came about because, according to Assistant Secretary for Nuclear Energy, William Young, "...the industry made it clear that without cooperation with the government, the in-

dustry would not be able to do the development work required to make available the next generation of light water reactors". Apparently the DOE did not consider that if the industry doesn't think it would be profitable to develop these new reactor designs, then perhaps the taxpayers wouldn't think so either.

The Nuclear Monitor
March 9, 1992

Heavy Going For Heavy Water Board

Under the production figures at the end of the financial year flowing into the heavy water board offices at Trombay reveal that with only 273 tonnes of heavy water produced during the last year, the Department of Atomic Energy (DAE) is over two-thirds short of its target.

Coded confidential dispatches to the board from each of the eight heavy water plants scattered around the country also show that, at crores of rupees per tonne of heavy water produced, the DAE must be running one of the world's most expensive heavy water programme.

For example, when the Manuguru heavy water plant at Andhra Pradesh was commissioned in December last year, over Rs 650 crores had been spent on it, and it was already nearly four years behind schedule. Beginning last April, when it generated about 100 kg of heavy water, the Manuguru plant has, until February this year, produced only about 35 tonnes of its full capacity of 185 tonnes per year. Each tonne thus costs about Rs 19 crores.

Yet, speaking to this newspaper yesterday, the secretary of the DAE, and the chairman of the Atomic Energy Commission (AEC), Dr P.K. Iyengar, stated that during the last two weeks, "The plant has been functioning up to 85 percent of its capacity. Of course, this varies depending upon the pressure."

More shocking than Manuguru is the state of the Talcher plant. Ever since it was commissioned in 1984, it has not generated more than about 10 tonnes of heavy water. Its scheduled capacity is stated to be 62 tonnes per year, and even that is derated from the original 67; thus the Talcher plant has generated till February this year, only about 3 per cent of the amount of heavy water it should have produced by now. Not far better is the condition of any other of the heavy water board's plants. The most efficient is Tuticorin, operating at about 84 per cent. During the year from April 1991 to February 1992, this plant generated about 41 tonnes of the precious fluid, as against its capacity of 49 tonnes.

Also among the star performers, with an efficiency factor of 75 per cent, thanks principally to the fact of having been derated over time from a capacity of 14 tonnes annually to one of about 8 tonnes today, is Nangal in Punjab, the country's oldest plant, put up in 1962.

"The country's first drop of heavy water was manufactured there," according to board officials, and making use of the supposedly most expensive "water-hydrogen sulphide" technique, Nangal has produced during the last year, from April to February, just under six tonnes of heavy water.

Next in the league table with an efficiency factor of 67 percent is Kota, which during the year, generated about 57 tonnes, as against

85. Hazira follows, with a 60 per cent efficiency. Next comes Baroda (44 per cent) followed by Thal (43 per cent), with Manuguru next and Talchar last.

Work on Manuguru began in 1982, and was scheduled for completion in five years. Had it been commissioned On schedule, it would have by now produced 740 tonnes of heavy water. Instead it has managed just five per cent of that amount.

At a recent seminar at Trombay, the heavy water board's chief executive, Mr. G.M. Sundaram, bent over to touch Dr. P.K. Iyengar's feet, under the astonished gaze of scores of heavy water board engineers and scientists.

During the last year, the former general manager of the Manuguru plant, Mr Mohinder Singh, pointed out a number of financial irregularities in the functioning of the plant, and recommended an enquiry into them. However, he was simply shifted to the board's office in Bombay, and nothing further was done.

Mr Singh has inferred, in a July 1991 letter to Dr Iyengar, that the executive director in charge of Manuguru, Mr. S. Sharma had taken a decision to order 16 different kinds of tests on the transformer oil being used at Manuguru in the face of advice from juniors that all but a quarter of these tests were of no practical value, and essentially academic.

It further emerged that the company which had been contracted to do the job at nearly Rs 9 lakhs, Esquire Engineers and Consultants of Madras, had no facilities to do it, and was simply farming oil samples out to government-run laboratories for testing. All this in spite of the fact that test facilities existed at Manuguru itself.

"We can save time and money by collecting the samples and sending them to either Bangalore or Hyderabad for test results. Under the circumstances, it is considered that giving oil samples to Esquire

is not at all economical," Mr Mohinder Singh says, in his letter to Mr. Sundaram, a copy of which was sent to Dr Iyengar.

Totally. 11 different kinds of corrupt practices are detailed, and an inquiry recommended into them. Among these is a case of overpayment to a Calcutta firm to the extent of Rs 4 lakhs, which is described as "being not an isolated case".

Speaking to this newspaper, Dr Iyengar said that he was unaware of the specific details of the alleged irregularities. Subsequently he

stated that he had asked the board chief executive, Mr Sundaram, to look into them, and was satisfied that they were baseless.

Dr Iyengar estimates that 250 tonnes of heavy water are needed to run each nuclear reactor. But last year the whole complex heavy water manufacturing structure has generated only enough to run just one nuclear reactor

*Clarence Fernandez
Times of India
March 3, 1992*

Letter Box

The cycle yatra from Gujarat to Kerala to commemorate Chernobyl day is very timely and important,

In spite of efforts like this from people's groups the government is not paying any attention to the fact that nuclear power is dangerous to our nation. When they do not learn from others' experience then maybe they will learn by some terrible blow."

Kantilal Yora, Ahmedabad.

Like the Anumukti issue Vol.5, No.2, you are running around and working hard for analysing the Rawatbhata Survey results. Doctors went to Khetpalia village recently and did a check up and distributed medicines to the sick people. People are awaiting eagerly for Rawatbhata Survey report. Our students learnt a lot during the survey. It was an enriching experience for them."

*Rampratap Gupta
Rampura,*

"We were caught up with helping with the Narmada Bachao Andolan's programme, so I could not reply right away. About 350 people from the valley were here for 2 days along with Medha and other activists. It was a hectic time but worth it. Besides other things, they wanted to draw attention to the eviction notice for Manibeli,

the last date being 31st January. Some of the villagers also returned their "pattas"/papers to the State revenue minister stating that they would join the others in their stand of not vacating their lands under any condition. A dialogue between the government and the Anodlan, and a demand that the project be reviewed was made.

Some of us from Bombay have initiated a restructuring of the Andolan's Bombay support groups working. The process is in full swing right now. We are pushing for a greater participation of people, since there are many potential participants (they just need to feel welcome and be encouraged)

Furthermore, such movements also need to develop a wider orientation considering the problems of sustainability, and the faulty pattern of development -so as to lend and share support to other similar groups like yours in a more active manner-to finally develop ONE united front. What do you think? Your comments would be valuable, because you both *truly* live and understand these concepts.

The Cycle Yatra (Bombay part mainly) may be one of the initial testing grounds to see how this kind of "widening" process can lend support. I must emphasize here that though things are happening, the above thoughts are my personal perceptions coupled with positive thinking. I think others share them too."

Mona Patrao, Bombay

In Goa the last of our beautiful beaches are going to be invaded by big projects.. For example, the Japanese intend to build villages on our soil for their old. Age old settlements of people are going to be deprived of their grazing grounds, free access to the beach, fruit, fuel and foliage of the hill slopes, scarce water resource and huge chunks of precious land. The rapid urbanisation, and influx of people further disrupts the way of life of the people and our unique ecology. All this at tremendous financial cost to us by way of incentives, subsidies, cheap land, water, electricity and cheaper labour.

What do you think we should do as follow up to the Consultation on Tourism in Goa? Is it possible to stall this international juggernaut? Let's have your thoughts."

*Gemma de Sa
Goa*

"Irfan Engineer has been working among Dang tribals for quite sometime. He organised them and fought for their long-standing demands forcing the Government of Gujarat to give a serious thought to tribals' demands. However, the corrupt forest officials were waiting for an opportunity to take revenge.

On 2nd January, 1992 Irfan and Virsingh tribals sat on indefinite fast demanding compensation for Tarabai who was killed when the tribals were agitating for their de-

mands and police opened fire. Also, the fast was undertaken to demand arrest of those forest officers who asked police to fire without any reason.

On 9th January, 1992 the Gujarat police arrested Irfan and Virsingh under NSA and put them in Baroda Central Jail. Undertaking indefinite fast is a perfectly legitimate democratic method. There cannot be a more peaceful protest than this and yet they have been arrested under NSA. One fails to understand how NSA can be applied in such case. It is gross misuse of NSA.

May I, therefore, request you to kindly protest against this high-handed behaviour by sending telegrams to Home Minister Shri. S.B.Chavan and Chief Minister of Gujarat Shri.Chimanbhai Patel. You may also write to Irfan Engineer, C/o.Superintendent of Baroda Central Jail, Baroda, Gujarat."

*Asgharali Engineer
Bombay*

"My suggestion to you during the cycle yatra would be to keep in touch with grassroot groups, so that the movement grows instead of just organising workshops and allowing people like Narayanbhai to come and lecture. The yatra participants' sharing will be much much more effective and give a boost to the movement."

*Nicky Cardoza
Bombay*

"I have gone through the details of Cycle Yatra organised by Sampoorna Kranti Vidyalaya to commemorate the Chernobyl Day. I am sending my good wishes to this programme."

*Babubhai Jasbhai Patel
Gandhinagar.*

I have gone through all the news and articles on health effects of Rawatbhata nuclear power plant on the people of surrounding villages. I am sorry that I can't participate directly but kindly accept the monetary contribution as my support effort."

*Dr.Mihirbhai Joshi
Visnagar*

Unfortunately I am unable to join the Cycle Yatra because of organisational responsibilities. I am sending my suggestions for the Cycle Yatra. (1) Always keep some food with you. (2) Have water bags for everyone (3) Keep addresses of young people you meet on the Yatra for follow up actions (4) Keep materials to write slogans on the walls and road."

*Bhagyadhar Baij
Orissa.*

"I am working with Sarvodaya drought relief committee, Orissa. I would have very much liked to participate but the committee has not given me permission. Would you request them to let me go,"

*Pramod Mudali,
Orissa.*

"We feel that if you had planned

it with some more advance notice, it would have been possible to plan the yatra more effectively and have greater participation. This was based on the experience in the two previous yatras, viz. the Save the Western Ghats March (SWGM) during November 1,1987 to January 30,1988 and the Kanyakumari March during April 2 to April 30, 1989 and both of these were coordinated by the Samaj Parivartana Samudaya at the Karnataka State level with the active cooperation of various other voluntary groups especially the Federation of Voluntary Organisation for Rural Development in Karnataka (FEVORD-K). We have appreciated your open invitation to make yatra our own and help in whatever way possible."

*S.R.Hiremath,
Janvikas Andolan, Karnataka..*

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