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Where the clear stream of reason has not lost its way in the
dreary desert sand of dead habit;
Into that heaven of freedom, my Father, let my country' awake.

Rabindranath Tagore

Anumukti Cycle Yatra

Nuclear power as an idea that can change the world has long been dead. There are no visionaries like Homi Bhabha or Vikram Sarabhai around: people who believed in what they were doing; who saw atomic energy as an instrument that would lead us out of poverty, ignorance and disease—that would lead to a tetter tommorow. Today, for most within the establishment, it is just a job. The stream of reason has indeed lost its way into the sands of habit.

Chernobyl did not kill nuclear power. It is a symptom of death rather than a cause. What killed the nuclear idea, is the fact that whatever power it does deliver, (and compared to its tall claims, it produces peanuts), it delivers to too few hands. Power corrupts. In a world striving for freedom and democracy, the dead weight of this corrupting source is too much for any society to carry.

But then, why is *Anumukti* flogging a dead horse? Why not let it fell down of its own contradictions? The reason is that though the idea is dead, the habit is not. Thus, we have the Indian nuclear establishment blithely continuing its disastrous course. Instead of taking the golden opportunity provided by the Soviet withdrawal from Koodankulam for some introspection and rethinking, we have them all set to build there the as yet undesigned 500 MW CANDUs. Despite the mounting evidence of unacceptable health effects, we have them propose a new nuclear plant in the densely populated state of Kerala. Truly, it is difficult for those who have once tasted power, to give up that power and the associated perks without a fight. And people will be ready and willing to fight only when they understand the issues throughly.

It is for this reason that *Anumukti* and the Sampoorna Kranti Vidyalaya propose to embark on a cycle yatra from Kakrapar to Peringome to raise people's awareness of the perils of nuclear power generation and to bring to their notice the latest horrific information about the health effects being suffered by the people living in villages around Rawatbhata. But the purpose of the yatra is not just to warn the people against the nuclear dangers but also to form close links with various people who are the victims of 'development', so that an alternative model of real development can emerge.

The cycle march would begin around the 20th of March from Vedchhi and proceed via Vansda and Valsad to Tarapur and from there on to Bombay. From Bombay it would go down the coastal highway to Goa, into Uttar Kannada near Kaiga and from thereon to Manglore, reaching Peringome around the 24th of April. The dates are still tentative and a final timetable will be decided after all the arrangements are complete. This route would bring us in proximity of many existing and proposed nuclear installations Kakrapar, Tarapur, BARC at

Chembur-Bombay, Jaitapur, Kaiga and Peringome. One of the purposes of the yatra is to form close links of friendship amongst people who are all suffering or are being threatened by the nuclear menace.

Obviously, the yatra would not succeed in its objectives unless it was able to draw upon the willing cooperation of large number of different activist groups along the route and elsewhere. We want you to join the yatra. You can do this in various ways:

- Coming yourself or sending some person to join the group of cyclists for the whole distance or some previously defined parts thereof

- Sponsoring a cycle or making monetory contributions towards the cost of the yatra

- Arranging for the stay and boarding of the yatra at destinations along the way

- Translating and publishing written material about the yatra and about nuclear power

- Help in arranging public meetings and slide-shows, press conferences and meetings with local media personalities

There is a proposal to limit the number of volunteer yatrees to twenty, since otherwise it may become too big and perhaps an unwelcome burden on the local hosts. We would like to invite participants from all over the country and especially from the states which lie on the route of the yatra to join in for the whole duration. Therefore, all those who might be interested in joining the march should write to us at Vedchhi as early as possible.

The antinuclear forum at Peringome plans to hold a convention to commemorate Chernobyl Day on April 26 and the yatra would conclude there.

The yatra would need a lot of preparatory work. This would involve not only establishing contact with groups and individuals on the way but also

- Design and preparation of a transportable poster exhibition in all the local languages

- Preparation and printing of pamphlets and written materials explaining the menace of nuclear energy and the purposes and the programme of the yatra in all the local languages.

- Preparation of songs, a drama and some short skits and street plays depicting the threat of nuclear energy

To do justice to all this we will be holding a ten day preparatory camp at Vedchhi starting on 10th of March, 1992. All those who can donate their talent and time during this period, are most welcome to come to Vedchhi.

Most of all, we would like *Anumukti* readers to join us by making this yatra your own, keeping in touch and by letting us know what all we ought to do to make this a success and by suggesting names of contact persons along the route whom you might know and we don't but ought to.

From The Editor's Desk

"Anumukti has lost its balance," a regular reader, Girish Sant from Pune recently told me. "It is just full of accounts regarding the health effects of radiation but it does not carry anything on energy planning and alternatives." Unfortunately, there is a lot of merit in this criticism. *Anumukti* does need to present a comprehensive view, and there are many facets to the nuclear question. The problem of health effects has dominated most recent issues of *Anumukti*, because I think that it is only the irrefutable and mounting evidence of unacceptable health effects that would put a final finish to the nuclear madness. I have sometimes tried to get around this problem of comprehensive coverage by having separate numbers highlighting a specific issue each time, and in fact, Vol.2 No.4 did deal at length with the issue of energy planning and conservation. However, this arrangement is not very satisfactory since it actually is an arrangement which makes for an 'unbalanced' *Anumukti* every time. I would like to hear more (or more accurately in most cases, hear for the first time) from you regarding your views on how to adequately tackle this problem of balance.

An article which might surprise regular readers of *Anumukti* is the announcement, SUN DAY 1992: A Campaign for a Sustainable Energy Future. At first sight this campaign seems to be a purely American programme, having nothing much to do with us. It has been included in such detail because I feel that we urgently need something similar—a strong citizen initiative to highlight the true nature of our energy and environment crises so that an attempt can be made towards solution. These problems are too vital to be left for the political leadership to blunder along

One individual initiative which we plan to carry out in full earnest is the Anumukti Cycle yatra from Vedchhi to Peringome in Kerala. We plan to reach Peringome in time to commemorate Chernobyl Day on 26th April. The antinuclear movement against the proposed Peringome nuclear power plant is going to hold a convention and they want groups from all over the country to come there to express solidarity. If other groups especially from the southern states could also come to Peringome in large numbers simultaneously it would be a very fine expression of people's will.

CANDU Won't Do

CANDU nuclear reactors are inherently unsafe. Their operating record in Canada shows that they present a serious risk of a major accident. This is the conclusion of a Greenpeace review that examined the operating records of three CANDU stations in Ontario province of Canada from 1989-1991: Pickering, Bruce and Darlington. Authored by Stan Gray, study found incidents that could have triggered a meltdown scenario. It also found that the safety systems that would protect against this were impaired and unavailable a good part of the time.

The study looked at the record from the years 1989 and 1990, and the available records from 1991. These records are on file at the Toronto head office of Ontario Hydro. (The utility company which owns and operates all the nuclear reactors in Ontario.) One should note that this Greenpeace report is based on facts as reported by senior Ontario Hydro management in public documents. As a result it probably errs on the side of underestimating rather than overestimating the risks and dangers. One can reasonably assume that officials tend to underreport or downplay incidents that might put the public safety in jeopardy because they want to reassure a concerned public.

The facts outlined in the study indicate that

- 1. A major accident is possible
- 2. In the past, the CANDU reactors have sometimes come very close to such a scenario
- 3. These problems will continue into the future

An Appaling Record of Unavailability

Shut Down Systems

The two shut down systems used in CANDUs need to be extremely fast acting and automatic since an emergency may develop in seconds, too quickly for operators to respond in time.

Since the reactors came on service, there have been numerous emergency shut-downs—some necessary and other "spurious" or accidental ones. To Ontario Hydro management this is proof that the system works - major accidents were avoided by the shut-off mechanisms. This history is, however, double-edged in its implications. A large number of shut-downs means that there were a large number of situations calling for emergency response. The implication is that should the shut-off system not function when called for, we would indeed be in a serious trouble.

The fact is that the shut-down systems have been often impaired and unavailable. Should an emergency develop at a time when the systems are unavailable, the automatic shut-down won't kick in. At that point we might edge right into a major nuclear accident.

The Significant Event Reports (SER) filed by Ontario Hydro detail many incidents at all stations over the last two years. At Bruce B for example, it was found out that the safety systems at some units would not shut the reactor down when the fission became abnormally high ("neutron overpower"). Investigation showed that the systems would only respond to a higher than designed level and that this condition had existed for 8 months in one unit and 17 months in another.

Emergency Cooling System

Should the core begin to overheat, the Emergency Cooling Injection system (ECI) is supposed to kick in and flood the core with cooling water. The problem here is that the system is often not triggered on time and may not work when triggered.

An examination of these ECI systems by the official Nuclear Integrity Review Committee found that the licensing safety requirements were violated on a frequent basis. In 1990, for example the ECI was unavailable 146 times in excess of the safety margin at Pickering A. Bruce A exceeded its margin by a factor of 331.6 in 1989.

Containment

The nuclear industry has touted the CANDU containment system as the public's last line of defence against a nuclear accident. It is supposedly a fool proof system. Had the Chernobyl reactors had a containment building, we have been told, that tragedy would have been averted.

The record for 1990, prepared by the officially appointed Nuclear Integrity Review Committoe, shows both Pickering and Bruce stations grossly exceeded (by factors ranging from 43 times to 341 times) the licensing safety margins for availability of containment. All of this represents an appalling level of malfunction in the basic safety system of the reactors. Put very simply, for much of the time, the publics safety net has not been there. It is therefore, misleading for senior Ontario Hydro officials to repeatedly refer the public to the containment protection when their own reports indicate that it is defective for substantial periods of time.

The nuclear authorities have continually told a worried Canadian public that a Chernobyl-type accident couldn't happen in Canada. Their soothing reassuarances have been based upon the supposedly superior safety design of the CANDU reactors/The operating record, however, shows that the system has never functioned according to the ideal model described by industry spokespersons. The public statements have not matched the information contained in their own technical reports. Their description of the nuclear plant operations have been more fantasy than fact. The record shows that the accident risks stem both from design faults as well as from equipment failures. The documented record of flaws, breakdowns and unavailability is staggering. (See Box page 3.)

Loss of Electrical Power

Electrical power is the key to all the systems in the generating stations. Loss of power means loss of control. It is for this reason that CANDU stations have a number of redundant electrical systems, standby generators, and emergency power supplies that can kick in if a major failure occurs.

On September 16,1990, the main output transformer at the Darlington nuclear power station exploded, spilling 59,000 litres of oil. This was the second such main output transformer explosion at the Darlington station in two years. The explosion led to the loss of operating power to the plant (so-called "Class IV Power"). The electrical systems are built so that if the main transformer blows, operating power to the plant will be automatically switched to other sources. However, the Significant Event Report states that the connectors that would provide this supply happened to be de-energized at the time...with the consequent loss of Class IV power, an unanticipated event. The report states that Class IV power was eventually restored, with no unit shutdown indicated. However, this was an accident that should not have happened at all! All this is more worrisome when we look at how often the various emergency power systems were unavailable. A month after the explosion, for example, a routine inspection at Darlington found that Standby Generator #1 could not be safely run. At Pickering, there are twelve reports of standby generators failing to start during the period 1989-91. There are also reports of other emergency power systems failing as well as several instances where the whole station lost its required safety margins with its electrical systems.

"Hot Particles: Danger to Worker's Health

Workers have complained for years about excess exposure to radiation inside CANDU nuclear plants. The event reports document instances of spills, leakages and other hazards from radioactive materials. In March of 1990, workers walked off the job at Pickering to protest Ontario Hydro's inadequate monitoring of radiation exposure. They said that they had been complaining about the problem for fourteen years.

One of the biggest concern of workers has been regarding excess radiation from so-called "hot particles". These consists of tiny specs of spent uranium fuel or cobalt-60 particles which have escaped from holes in the fuel cladding, or from fuel debris released from damaged fuel bundles.

Ontario Hydro has acknowledged and documented the problem several years ago at the Bruce plant. The source of these leakages is the fuelling machine that loads the uranium bundles into the core. This is significant, because "on-line" fuelling machines are an unique feature of the CANDU reactor. According to a management memo

"Hot particles are found in the heat transport system and the primary method of these particles escaping out of the heat transport system is through the fuelling machine."

Pickering-2
September 26,1990

"... the potential for flux oscillations is a fundamental, albeit undesirable, characteristic of CALNDU reactors, which must be addressed both in the design phase and during operation." Ontario Hydro Report Feb. 1991)

On September 26, 1990, unit 2 at Pickering experienced a severe runaway fission reaction. Parts of the reactor core began to act independently and went out of control, fissioning at a rate beyond acceptable limits. The patterns were erratic and unexpected. The operators were u liable to bring the fission under control for about 50 hours. During this time more than 11,000 alarm messages were received. (This is referred to as a 'severe fiux tilt' or 'flux oscillation'. The term 'flux' is an indication of the density of free neutrons in the core.)

A number of alarming things happened during this major loss of regulation accident. Fission ought to be dampened by the use of coolants in various sectors of the reactor core ("liquid zone control"). However, these proved ineffective at the time. Unable to control runaway fission for several shifts, the unit was manually shut down.

The subsequent high-level investigation revealed that this problem was endemic to CANDU reactors. The malfunction was inherent in the system's basic design: no adequate methods were available to identify or control such severe flux tilts. The reason for this flaw lies in the fact that with a large core, geographical segments of the core start acting independently of each

other like a number of small cores. In some cases, segments may develop runaway fission reactions of their own. The system has no way to either avoid these runaway reactions or of controling them subsequently. Its "spatial" or "zone control" is fundamentally flawed. The Nuclear Integrity Review Committee viewed this incident as an especially serious one. It listed the main causes for the event as:

- A lack of operating procedures for the identification and handling of severe flux tilts
- Insufficient emphasis on the importance of conservative decision-making
- An incomplete transfer of experience from previous similar events
- Impaired spatial control capabilities of he reactor regulating system...

Another of the alarming things that happened during this flux tilt was the breakdown of devices used to measure the rate of nuclear fission - the flux detectors. These began to produce very high readings indicating excessive fission. However, one of the computerized control system that used them was discarded either because the station operators believed the readings were erroneous or because they had to disregard the high level alarms in order to try and bring the runaway fission under control. But once that happened, the operators lacked reliable monitors indicating the fission activity in the reactor core. The situation can be compared to driving on a highway with the windshield blacked out.

The flux-detectors are a key part of the emergency shut-down mechanisms. Yet when many of them gave critically high readings and alarmed, automatic shut-down did not occur. It is unclear exactly what happened here—was the shut down system ineffective in reading and responding to major fission overpower? Or, was the safety system somehow over-ridden and rendered ineffective, and if so, how? There are many possible answers to this, none of which can give the public any confidence in the safety protection of the CANDU system.

What About the Indian CANDUs?

The operating record of Indian CANDUs is much worse than that of the reactors in Canada. In fact the operating record of the Canadian reactors has been held up as an ideal by Indian nucleocrats.

On an average Rajasthan Unit-l—the "prototype"Indian CANDU—has been down 233 days a year. Of these around 150 days have been due to equipment related failure.

Rajasthan Unit-2,—the most productive Indian CANDU—has been down 106 days a year of which some 65 days have been due to equipment failures.

History of Problems

We can get a better perspective on these events and the dangers they present when we look at other incidents, The sad fact is that such runaway reactions have constantly occurred at CANDU stations and present station managers with endemic problems. In the early years, the Pickering station experienced frequent loss of regulation accidents. In fact, during its first four years the plant had six such accidents. Subsequent design modificatons have not been able to solve the problem as recent events indicate.

Even prior to the September 1900 events at Pickering-2, a similar flux tilt was experienced at Unit-1, Pickering on February 15, 1989. Although, the Atomic Energy Control Board (AECB), Canada and Ontario Hydro officials reassured the public regarding the September incident at Pickering, there have been two similar incidents subsequently on November 22nd 1990 and on January 10, 1991 at the same station.

Gauges that don't work and regulators that don't care

The AECB is charged with the responsibility of regulating the nuclear industry in Canada. It has been frequently criticized for being too close to the industry, apologizing for it rather than regulating it.

Michael Abbot was a technologist with Reuter-Stokes in Cambridge, Ontario, the firm that manufactured the flux detectors. In 1986 he reported that the company was passing on defective? detectors, ones that had failed the tests. He said that test reports were rewritten to omit the fact of failure When Abbot reported his concerns to the company, he was told to forget about the matter. After much introspection, he wrote to AECB and Ontario Hydro, giving details of the falsified test reports No official of either of these bodies ever spoke to Abbot. They checked with the manufacturer and accepted their word at face value. Abbot was subsequently harassed by the company and forced to leave his job. It is only now, after the incidents at Pickering and elsewhere that AECB has admitted to the press the validity of Abbot's charge. And, as a consequence, Ontario Hydro recently "made a decision to replace all the flux detectors rather than wait for a rash of failures."

Conclusions

The CANDU reactors pose unacceptable risks. Greenpeace believes they should be phased out as soon as possible. An immediate ban on future nuclear expansion should be declared and existing reactors should be taken out of service and the money saved should be used to phase in safer methods of generating electricity and to create alternative economic development.

How USSR Squanders Its Energy Reserves

This article was written at a time when USSR was still a political entity. However, its observations and conclusions still hold true. In fact, one could replace the word USSR with India in the article and the whole thesis would still be valid!

One of the most urgent priorities talked about in the Soviet Union is how to increase energy production. The hope is that big Western companies will rush in to drill holes and build gas pipelines, thus enabling the USSR to "exchange" its raw materials for modern technology that will help "reconstruct" the country.

True, the Soviet energy system is in a bad way. There are serious shortages in some sectors, like coal, and the country cannot do without the hard currency it derives almost entirely from its energy exports. Energy production and transmission certainly need to be modernised, but it is more urgent to overhaul the corruption system, without doubt one of the most wasteful in the world. More efficient energy use is vital in so many areas that there can be no economic recovery without it. If encouraged with unwavering political determination, however, it will have a decisive bearing on modernisation, higher living standards, increased productivity and repair of the environment.

The most striking feature of the Soviet energy system is the diversity of its production and the size of its resources: the USSR is the world's biggest producer of oil and natural gas, and the third biggest producer of coal. Its oil reserves represent 8 percent of world reserves, its gas reserves, 40 percent, and its coal reserves, almost 30 percent.

The USSR is a net energy exporter: exports are the equivalent of 19 percent of total consumption. The US imports 18 percent of its energy, and the EC, 51 percent. There is an abundance and apparent superiority, but there is also economic vulnerability.

Energy use per inhabitant varies greatly: the US figure of 7.7 TOE (Tons of Oil Equivalent) is more than twice that of EC (3.4 TOE), with the USSR in between (4.9 TOE). But this consumption pattern does not take into account differences in economic levels, as can be seen from the figures for energy intensity (energy consumption relative to the GDP): per $1,000 of GDP, the USSR uses two and a half times as much energy (0.89 TOE) as the EC (0.35 TOE) and the US one and half times as much (0.53 TOE)

Some of the discrepancy can be explained by the much harsher climates and huge distances that both the US and USSR have to contend with. But it mostly arises from their less efficient use of energy at consumer level which is due to the plethora of resources they enjoy compared with the EC, and to a production oriented ideology that has dominated, both systems.

Priority has always been given to increased output at the expense of steps to improve energy efficiency. Hunger for profit and hunger for power have converged, in the short term at least, in an unbridled exploitation of natural resources.

The limitations of Europe's energy resources have forced it to be more energy efficient than the US and USSR. This gives its economy an overall competative edge, thus turning a handicap into an asset. The EC has also expanded its energy production facilities prudently. Only in France have successive governments, obsessed with notions of grandeur, overreached themselves with a massive nuclear energy programme.

The situation in the US did, however, change significantly after the first oil shock and the country's increased dependence on oil imports. Between 1974 and 1988 energy use per habitant more or less steadied as a result of greater energy efficiency. Energy intensity fell appreciable over the same period. In the USSR, despite official talk of energy-saving programmes, that intensity has risen relentlessly in the last decade.

Energy use is disastrously inefficient in every sector of activity, and nowhere more so than in urban heating, which gobbles up energy and results in colossal wastage. If you stay at a Moscow hotel in January, you have to keep the window of your room open all night because the temperature inside is 30+°C—and there is no regulation system. The route taken by the pipes of the urban heating network is betrayed by lines of melted snow on the pavements.

Because of its inability to control energy production and, above all, consumption, the USSR paradoxically faces very serious problems despite sitting on gigantic resources. The production-oriented dogma characteristic of Soviet economic history is still rife in official circles, even if it has been considerabley watered down by

Soviet Relief

Five years ago many Soviet citizens thought they were donating their roubles to an "aid fund for Chernobyl victims". This year, when the Soviet government's state commission for extraordinary situations released a detailed report on its total expenses since the Chernobyl accident, they learned that the government had spent 425 million roubles to reloctate evacuees, 5.8 million roubles to purchase contaminated meat, and even 1.5 million to entertain foreign scientists. But the best was that the figures also included 66 million roubles to cover the general expenses of the ministry of nuclear energy, which, were paid from the Soviet public's contributions.

economic and especially ecological constraints.

The country lavishes 40 percent of its productive investment on the energy sector. At the same time, it is having to spend large sums on modernising industry and improving living standards. There is much scope for energy saving, both in existing installations requiring renovation (building insulation, heating regulation, industrial conversion and modernisation) and in new equipment, housing, transport systems, household appliances and so on

Soviet experts believe that if appropriate steps are taken they can reasonably expect to save about 2S0 million TOE over the next ton years. That may seem a lot, but it should be remembered that France, whose primary enegy consumption is now about 200 million TOE, or seven times less than that of USSR, achieved annual savings of 40 million TOE between 1071 and 1089.

Energy savings has already been the subject of important decisions by Soviet leaders. But even they admit that results have been disappointing: the USSR's energy intensity has risen steadily. Free marketeers believe that the main if not the sole, reason for that failure is extremely low energy pricing, which does not reflect production costs. Energy products are regarded as indispensable staple commodities and are therefore subsidised. So there has been no incentive at any level to save energy.

There will have to be a slow process of increased tariffs that goes hand in hand with the modernisation of the production system. The consumer can reasonably be expected to pay for the real cost of energy only when obsolete and leaking urban heating systems have been renovated. In other words, energy saving programmes should be implemented before the notion of realistic pricing is introduced.

The main problem is a centralised decision-making system that precludes any initiative or responsibility. The central planning agency decided on an energy-saving programme that specified the rate at which each ministry and enterprise was to reduce its energy consumption. Meanwhile the industrial production agency was given the task of ensuring that equipment would be manufactured that would make such targets feasible. But it was not given the proper resources to do so, since priority was still being given to energy production.

The system soon seized up: consumers found excuses for not respecting their targets, some of them justifiable, such as the fact that no energy-saving equipment was available. But the biggest obstacle was that no one saw rational energy use as a priority.

Energy saving is just one example, albeit a very important one, of the USSR's difficulty in changing the way it runs its economy. The right solution will not be found in the mirage of privatisation or realistic pricing which is overenthusiastically peddled by Westerners—and now all the rage in Eastern European countries—nor even in the more general principles of a market economy. A successful process of change will hinge above all on the decentralisation of decisions, responsibilities, resources and programme implementation.

Recent political developments suggest that this decentralisation will have to take place at the level of the various republics. As for the Russian republic, it will almost certainly pull through the crisis only if it abandons the illusion that it can organise everything from Moscow.

Bernard Laponche
Le Monde
From Guardian Weekly
December 8. 1991

Editor's Note:
The dissolution of USSR and the rapid political and economic changes being put through in that region of the world has not invalidated any of the points being put forward by the author. But more interestingly, in fact, vitally for us, his arguments are of even greater validity when applied to India, since our energy wastage is greater, we are no less enamoured of the magic wand of privatisation and foreign capital and to top it we have far less resources than what were available USSR.

Koodankulam Gets a Reprieve

The Soviet-aided nuclear power project at Koodankulam in Tamil Nadu has been scrapped, according to a spokesperson of the Nuclear Power Corporation (NPC).

'The project stands cancelled and the NPC has already disbanded its staff assigned to the project, "hesaid. Under an agreement with India, the earstwhile USSR had offered to build a 2,000 MW nuclear power station. It had also agreed to provide a Rs 5,000 crore loan for the project. The NPC spokesperson said that there had been no communication from the present authorities in Moscow, but "we have indications that the project is off."

Except for site preparation and foundation studies, NPC had not done any major work at Koodankulam and India had not paid the Rs 100 crore to the Soviets for the preparation of the detailed project report, he said. According to the spokesperson, the Koodankulam site will not be abandoned. The NPC has sought the government's permission for setting up two 500 MW reactors of Indian design in the same place.

Indian Express January 20,1992

SUN DAY 1992
A Campaign for a Sustainable Energy Future

A growing number (already more than 300) of U.S. national and local environmental, consumer, student, government, business and other organisations are joining together to sponsor a coordinated campaign to promote improved energy efficiency and revewable energy technologies as solutions to global warming, energy imports, radioactive waste, and other local and national environmental pollution problems. This campaign is being called Sun Day 1992: A campaign for a sustainable energy future.

The campaign will include a national day (Earth Day - April 22, 1992) to focus attention, particularly of the media and government officials, on these issues. But it is not being planned as a one day, one-shot event. It is rather an attempt to encourage, launch and support on-going educational, political and other activities. It will serve as an umbrella for many diverse but uncoordinated local efforts so that their impact should bo greater than the sum of multiple individual efforts.

Need

Global warming threatens worldwide environmental disruption; already six of the hottest years on record occured during the 1980s and 1990 was the warmest year ever recorded. Yet national policy makers remain indecisive amidst this pending global catastrophe. Other energy related problems, such as the build-up of radioactive wastes, acid rain, oil spills, and urban smog continue to worsen.

Ironically, there have been both tremendous advances in renewable energy technologies likesolar, wind, geothermal, biomass, and hydroelectric and in the efficient use of energy during the past decade, coupled with dramatic reductions in the cost of these technologies. Today, energy efficiency improvements have saved more energy and renewables are producing more energy every year than nuclear power and "clean coal" combined.

Moreover, many improved energy efficiency and renewable energy technologies could reduce CO2 emissions by at least 25% over the next two decades. These technologies are inexpensive, quick to implement, and environmentally safe options for reducing CO2 emissions. These technologies are also sensible solutions to other adverse envirnomental and economic impacts of conventional energy supplies.

Nevertheless, it now seems increasingly likely that U.S.Congress will approve either weak supportive legislation in 1992 or none at all. It may even approve legislation that actually worsens the damage to the environment, consumers and taxpayers. It is virtually certain that there will be no significant initiatives from the White House to promote these sensible solutions.

Even the national media, while reporting aggressively on the so-called "revival" of nuclear power and the development of so-called "clean-coal", have generally failed to cover the technical breakthroughs, price drops and energy contributions of improvements in energy efficiency and emerging renewable technologies.

In the absence of national leadership, there is a growing number of local and state initiatives to promote progressive energy policies. These efforts are largely uncoordinated; inadequate communication among policy makers and others has led to much duplication, as well as a sense among individual activists that they are "out there", all alone.

Moreover, there is a great reservoir of untapped energy among grassroots citizen groups, local and state government officials, rural organisations, students, religious groups, unions, businesses, and individuals who are searching for opportunities to promote an energy program based on efficiency and renewables. However, in many cases, would-be activists lack information, resource contacts and policy ideas needed to translate their potential energy into action.

Notwithstanding the advances made by renewables and efficiency during the past decade, their gains have largely constituted a "quite revolution". That is, most members of the general public as well as media and key decision makers remain unaware of their current contribution to the nation's energy supply, cost and near term potential. Despite their advantages, these safe-energy options continue to be dismissed as alternatives to nuclear power, increased oil exploration or coal based energy technologies.

Structure and Programmes

SUN DAY 1992 will be modelled on, and borrow from, both the original SUN DAY (May 3, 1978) and the 1990 Earth Day. Earth Day (April 22,1990) was very successful in generating media attention for weeks prior to the actual day and resulted in positive changes in consumer buying habits and business perceptions of environmental issues. The original Sun Day on the other hand, was more of a launching pad for a sustained effort at the local, state and federal levels to promote renewable energy technologies. The movement it helped found remained active and effective for several years. However, both that Sun Day and Earth Day 1990 were, to large degrees, centrally planned and operated on a top-down basis. Both relied heavily on large budgets and corporate or governmental fianancing which, in some cases, may have compromised their initial objectives.

SUN DAY 1992 will include an aggressive media outreach effort

Statement of Principles and Goals

Global climate change, oil spills, air pollution, acid rain, radioactive emissions and waste, rising oil imports, and other energy-related environmental and economic problems continue to worsen, threatening major worldwide impacts. The nation's energy strategy must, therefore, begin now to shape and manage a transition to a sustainable energy future that assures a safe, clean, affordable, adequate, and independent energy supply.

National surveys confirm that the American people overwhelmingly believe that such a strategy should be based primarily on efficient energy use and renewable energy s upplies, rather than on conventional fossil fuel and nuclear power energy sources. However, national energy policy makers have thus far failed to implement such a strategy. From this failure comes the need for a national grassroots campaign for an energy policy that embodies the following principles.

First, the United States must give priority to those energy options that maximize benefits such as environmental protection, local economic development, regional self-sufficiency, and job creation, while minimizing economic, environmental and social costs.

Second, the United States must avoid energy technologies that are particularly hazardous to human health or to the local and global environment.

Third, the United States must minimize the use of energy imports in order to avoid economic disruptions and protect national security and the economy.

Consistent with these principles, tha nation's energy policy should be based on improving energy efficiency, conservingenergy, and developing clean, renewable energy sources through local, state, and national initiatives. To facilitate the transition to a sustainable energy future, U.S. energy policy should strive to implement, at the minimum, the followinggoals, while recognizing that more aggressive targets are achievable and may ultimately prove to be necessary.

- National energy intensity (i.e. energy use per unit of Gross National Product) should be reduced by 3 percent per year, while total energy consumption should be reduced by 10 percent from today's levels by the year 2010. This can be accomplished through the implementation of existing energy-efficient technologies, energy efficient motors and appliances, high - output low-wattage lighting, and more fuel efficient vehicles and alternative modes of transportation (e.g. mass transit, bicycles), as well as through recycling and common sense energy conservation measures. (Such measures reduced projected energy demand by at least 25 percent between 1973 and 1986.)

- The environmentally responsible use of existing direct solar (e.g. photovoltaies, solar thermal, hot water and space heating), wind, hydroelectric, solar-hydrogen, biomass (e.g. wood, agricultural wastes, sewage, alcohol fuels), geot hermal, and other renewal bo energy technologies in both centralized and small-scale appplications should, in total, be tripled by the ear 2010, so that they provide 25-30 percent of the U.S.'s energy supply. (These technologies now account for 8 percent of energy consumption and 13 percent of electricity generation.)

Realizing the above goals would enable the United States to reduce emissions of carbon-di-oxide, the primary global-warming gas, by at least 20-25 percent by the year 2010. (Other industrialized nations such as Germany, Austria, New Zealand, Denmark, and Australia have already set goals of 20-25 percent reductions in CO_2 emissions by the year 2005.)

to help focus the attention of the general public and decision makers on the status and potential of renewable energy technologies and energy efficiency improvemnts. These will include frequent news releases, press conferences and radio and TV talk shows. However, the campaign has been designed to be more than just a one day event. Hence it will include:

- Working with participating groups to survey the energy views of and to solicit support from candidates for elective office in 1992 at all levels of government.

- Associating with local, national and international conferences on energy, environmental protection, economic development and global warming issues already planned for the months following April 22, 1992, such as the United Nations Conference on Environment and Development.

- Provide information on model programmes to public officials and others to facilitate legislative and administrative initialives that advance the SUN DAY 1992's goals.

- Prepare and distribute materials to teachers, students, the media, activists and others in addition to sponsoring ongoing educational programmes in schools and colleges as well as among environmental, labour, business and other communities SUN DAY 1992 will have a national information clearinghouse that will collect, develop and dis-

tribute written materials. These will include:

- Listings of organisations and bibliographies of written materials
- Basic information on the cost and availability of different efficiency and renewable energy technologies
- Model legislation (good programs around the country and in other countries.)
- Ideas for ongoing local projects

On the national level, supportive tasks will be carried out by many participating organisations, to the degree of commitment they make to the programme. By relying heavily on the existing staff of participating groups and by emphasising planning at the local level, the financial costs of the programme's implementation should be kept to a minimum and the need for a large administrative staff eliminated. Furthermore, the decentralized and low-cost structure put into place for this programme is one that should be sustainable and thus able to continue to support these and other ongoing activities in the months and years following beyond SUN DAY 1992.

Though focussed primarily on the United States, efforts will be made to alert organisations in other counries to encourage them to launch parallel efforts. At the very least, there will be an ongoing exchange of information with such organisations.

Any person or organisation that wishes to be formally associated with this effort can do so simply by endorsing a short statement of goals. (See Box, previous page)

Contatct Address

Ken Bossong
Public Citizen
215 Pennsylvania Avenue, S. E.
Washington D.C. 20003 U.S.A.

Global Warming
Impacts of Competing Energy Technologies

A recent advertisement distributed by the U.S. Council for Energy Awareness, the nuclear industry's public relation arm, claims that "Every time you breathe out, you release more carbon-di-oxide than the generation of electricity from nuclear energy." This ad is a part of nuclear industry's campaign to portray nuclear power as an environmentally clean technology that produces no CO2, the primary greenhouse gas, and is therefore a logical solution to the world-wide problem of global warming. The campaign's goal is to build support for the construction of a "new generation" of nuclear reactors at public expense.

Left. unsaid by the nuclear industry is the fact that many renewable energy technologies and energy efficiency options produce either significantly less or comparable amounts of CO2 than do nuclear power plants. During the last few years there have been a number of independent studies conducted by different organisations to find out what are the impacts of competing energy producing technologies on greenhouse gases.

U.S. Department of Energy

Dr. Robert A San Martin, Deputy Assistant Secretary for Renewable Energy at the U.S. Department of Energy (DOE) prepared the study, *Environmental Emissions from Energy Technology Systems: The Total Fuel Cycle.* When the total fuel cycle, including uranium mining, plant construction, and subsequent operations and maintainance, is examined, a boiling-water nuclear reactor actually produces 7.8 metric tons of CO2 per gigawatt-hour. While significantly less than that produced by the combustion of coal (964 t/g-h), the CO_2 resulting from nuclear generated electricity is equal to or greater than that produced by renewable energy technologies in most cases.

However, wood and biomass combustion coupled with the regrowth of trees actually reduces CO_2 concentrations by 160 t/g-h. This occurs because wood plantations create a carbon cycle over the life of a plant by absorbing CO2 from the atmosphere during crop regrowth. Emissions are further offset by the carbon storage capacity of the roots and other unharvested portions of the biomass that remain in place.

The DOE study can be obtained from Dr. San Martin's office at the U.S. Department of Energy, Washington D.C.

Friends of the Earth

The second study was conducted by Earth Resources Research Ltd. for Friends of the Earth (U.K.) and a supportingstudy was done by Dr Nigel Mortimer, an independent energy consultant. It found that operating a 1000 megawatt nuclear power station produced 230,000 metric tons per year of CO2 while renewable energy technologies operationg at a comparable output yielded three to four times less. Hydro power resulted in 78,000 t/y, tidal power 52,000 t/y and wind power 54,000 t/y. But most spectacular were energy efficiency improvements: fiberglass loll insulation - 24,000 t/y; polystyrene cavity wall insulation - 23,000 t/y and low energy lighting-12,000 t/y.

Furthermore, the FOE study notes that expanding nuclear power capacity worldwide would increase uranium consumption. However, only limited amounts of

high-grade uranium ore are available. Additional uranium resources are known to exist at lower ore grades, but as the ore grade declines, larger quantities of energy, including fossil fuels would be needed to mine and process the ore. thus increasing the amount of CO_2 released. As the grade of the ore declines, CO_2 emissions eventually equal that of fossil fuel electricity generation. Dr Mortimer concluded that the "point of futility" - where as much CO_2 would be released in producing nuclear power as from direct use of fossil fuels - would be reached in just 23 years in U.K. if U.K. completely switched to nuclear power. The Friends of Earth report can be obtained from

FOE,
26-28 Underwood St.
London U.K. Nl 7JQ

Dr Mortimer's paper The Controversial Impact of Nuclear Power on Global Warming can be obtained from him at

cloEERU,
Faculty of Technology,
The Open University,
Walton Hall, Milton Keynes U.K.

Northwest Power Planning Council

The Northwest Power Planning Council has issued a third, related study: New Resources: Supply Curves and Environmenal Effects. This study attempts to quantify some of the environmental pollutants emitted by each electricity generating technology but only gives partial consideration to total fuel cycle impacts.

The report founded that "compared to all other resources except conservation, solar-thermal, solar photovoltaics, and wind are relatively benign" and their CO_2 emissions were quantified as zero. It added that the environmental consequences of hydro power are about the same relative level of servity as solar thermal resources. However, hydropower development is somewhat riskier, because of possible future fish, erosion, water use, and water quality concerns."

Finally, while stating that CO_2 emissions from nuclear reactors are "negligible," the report added that a typical commercial nuclear power plant does emit 8-9.5 curies of radioactive carbon-14 annually. It adds that nuclear power's "overall effect on the environment is about the same as natural gas" while cautioning that the risks of nuclear power are "dramatically different."

Copies of the report can be requested from

851 S.W. Sixth Avenue, Suite 1100, Portland, OH 9720-1-1348

Institute for Applied Ecology

West Germany's Oeko-Institute (Institute for Applied Ecology) has released a fourth stydy confirming that wind, small hydro, and solar technologies emit less CO_2 when their fuel cycle is considered that both fossil energy and nuclear power sources.

The study, performed under a grant from the Ministry for Economy and Technology of the German state of Hessen in Wiesbaden, found that micro-hydro units produce 200 kilograms (kg) CO2 per 100 megawatt-hours (MWh). Based on analyses of 25-kW wind and photovoltaic systems, the researchers found that the wind energy sources produced 3,000 kg CO_2 per 100 MWh..

By comparison, nuclear power generated 5,400 CO2 per 100 MWh. This is an amount greater than the gas-fired cogeneretion system considered in the study which generated only 3,300 kg CO2 per 100 MWh.

For more information, contact

Uwe Frische, Oeko-Institute,
Prinz-Christians Weg 7,
6100 Dramstadt, Germany

Rocky Mountain Institute

The findings of these four studies should be further considered in light of a 1988 study issued by the Rocky Mountain Institute, a private research firm based in Old Snowmass, Colorado. It concluded that investments in nuclear power actually contributes to global warming in that it precludes investments in more effective carbon dioxide abatement strategies.

The study, Greenhouse.Warming. Comparative Analysis of Two Abatement Strategies, assumes that the future cost of nuclear power drops to only 5 cents per kilowatt-hour of electricity produced while the cost of energy efficiency investments is only 0.5 cents per kilowatt-hour of electricity saved. At those costs, electricity efficiency investments would displace between 2.5 and 10 times more carbon than would similar investments made in nuclear power.

Consequently, the "environmental cost" of a six-fold expansion of nuclear power worldwide would total 17.3 million metric tons (MT) of CO_2 between 1995 and 2025 That is, "for every $100 invested in nuclear power as a CO_2 abatement strategy, one MT of CO_2 is released into the earth's atmosphere that could have been avoided had that $100 been put into efficiency."

The Rocky Mountain Institute can be reached at

1739 Snowmass Creek Road. Old Snownmass, CO 816549199

Conclusions

The bottom line for all of these studies is that nuclear power does generate CO_2 when its full fuel-cycle is considered and will likely generate more as higher-grades of uranium ore are depleted and if new nuclear reactors are built.

While usually producing less than many fossil fuel options, nuclear power docs generated more CO2 than an array of energy efficiency and renewable energy technologies.

The nuclear industry would do the general public a service if it presented a more complete and accurate picture of its role in global

warming than its current campaign is presently doing.

Furthermore, the high cost of nuclear power may preclude investments in less expensive energy option such as efficiency and renewables that have lower CO_2 emission.

In as much as choice will need to be made among competing energy options when deciding how to invest limited research and development dollars, energy efficiency and renewable energy technologies appear to be the better global warming solution in which to invest.

A Discussion of 'DEFENDUS'

When we look at the energy scenario over the next seventy-five to hundred years, it becomes clear that there are going to be major upheavals. The mainstay of today's energy - oil and gas are likely to be in extremely short supply. Coal and nuclear are already facing opposition because of their adverse environmental effects. Thus, the question arises, as to what would be the future sources of supply?

A paper entitled "Development Focussed Enduse Oriented Scenario (DEFENDUS), published by Dr A.K.N.Reddy and others was published in two parts in *Economic and Political Weekly* in its April 6 and April 13, 1991 issues. This paper not only identifies the reasons for the failure of the current electricity planning to deliver the goods, but also presents an alternative approach which emphasizes equity and sustainablity.

A two day discussion was held in Baroda on October 5th and 6th, 1991 to discuss in detail the DEFENDUS approach. The participants at the discussion ranged from energy specialists, power engineers, rural development workers, environmental activists... In other words a typical I.I.T. crowd. The discussion ranged over the whole gamut of issues raised by the new DEFENDUS approach—the general theory as well as difficulties associated with the introduction of some specific new technology. Out here we shall briefly present some of the points raised by the participants.

DEFENDUS Approach

The Development Focussed End Use Oriented Scenario is based on a three pronged approach which encompasses both the demand and supply sides. These are:

- Assigning specific growth rates (as against an extrapolation of past trends) for various categories of consumers. These rates are determined by social goals like satisfying the basic needs of all and creation of maximum employment

- Maximising the use of demand side management techniques like increasingenduse efficiencies, load management and the appropriate substitution of electricity with other forms of energy.

- Use of decentralised and renewable energy sources to augment electricity supply

The Discussion

All the participants agreed that setting up specific growth rates for specific sectors is a valid methodology of managing the demand. In fact, this is precisely what is done by the conventional planning by assuming the continuation of past growth rates for future. This too, is a choice in itself, though it may not seem as such.

It is important to understand that the elecricity planning should address itself to not only supplying the projected demand, but should concern itself with the shaping the magnitude and the pattern of that demand in the context of social goals.

It is in this context that the search for alternatives assumes great significance. For example, the most needed evolution of low cost housing ideas based on composites and local materials would dramatically reduce the importance of cement industry. A shift towards organic farming has the potential to render a large section of the fertilizer industry redundant, thus reducing oil as well as power consumption. Similarly, use of sound water-shed management techniques can dramatically change the availability of surface and ground water and can bring down the consumption of irrigation pump sets to a very low level.

It needs to be emphasised that these kinds of efforts to evolve alternatieves are eminently desirable in their own right. The failure on part of the establishment to encourage and support such initiatives is driving us towards a more inequitable and energy intensive society. These errors need to be urgently rectified.

Unfortunately, a large part of the Indian electricity establishment has still not grasped the significance of the fact that improvements in enduse efficiency and load management offer the cheapest, fastest and the most environmentally benign option for managing increasing demand. While some agencies are making genuine efforts, these measures are considered at best as an appendix to the power planning excercise.

Many studies have shown that the potential for efficiency improvements is vast in the country. For example, Gujarat Energy Development Agency claims that 16% of the projected demand of Gujarat up to 2000 AD could be met by efficiency improvements alone. This comes to some 1,600 MW: far more than the capacity of the yet to be started Kakrapar Atomic Power Plant (470 MW). More attractively, the payback

period of most of these schemes ranges from a few months to three years.

There are a number of specific efficiency improvement measures discussed in the DEFENDUS paper, like for instance, improvemerits in irrigation pump sets and introduction of compact fluroscent lighting. The participants in Baroda tried to pinpoint the difficulties and the problems which are a roadblock to the large-scale adoption of these eminently sensible measures. Thus, for example, it was felt that compact fluroscent bulbs which require a high initial investment are vulnerable to the erratic power supply obtaining in most of our cities and therefore require extensive field trials before they would become acceptable. On the other hand, efficiency improvements in irrigation pump sets has already proven itself in extensive field trials and needs to be vigourously implemented by the State Electricity Boards (SEB). Even if the SEBs were to bear the full cost of the necessary modifications, it still remains the least-cost and most attractive investment for the SEBs in terms of the capacity releaved for other uses. However, most people within the electricity establishment look at this only as some kind of subsidy to farmers. It is this kind of attitude, which is the major hurdle in the large scale implementation of these schemes.

The participants in the Baroda discussion also considered problems encountered with a lot of decentralised and renewublesources of energy. We shall be presenting their views on these in a future article in *Anumukti*.

Shripad Dharmadhikari
Narmada Bachao Andalan
58, M.G.Rd. Badwani M.P.
Girish Sant
Amrita Clinic, Athawale Corner
Karve Rd.Pune 411004

Environmentalism Becomes a Dirty Word in Czechoslovakia

My country is a notable example of unecological development. We breathe almost unbreathable air, some of our rivers are almost lifeless and food is contaminated. The agricultural landscape, which used to be the embodiment of fertility as well as beauty, has changed into a monotonous, neglected, large-scale production area. The woods, once famous among foresters, have either vanished or are in a catastrophic condition. The generic diversity of plants and animals has been decimated. The devastation of the environment is linked to the devastation of values that Czechoslovakia has been exposed to for the last forty years. Citizens enclosed themselves within their families, whithin the four walls of their flats, or their weekend houses. Few were strong enough to resist. The idea of morality became secondary and the satisfaction of material needs became the official ideology. The ideas of progress and historical optimism became compulsory. It is symptomatic that the word link 'ecology crisis' was inadmissible even in specialized texts. The utilitarian view of nature and profound nnthropocentrism prevailed.

Yet, even in this dismal terrain of values, there remained an undercurrent of the opposite orientation which enabled non- material values, values of altruism, concern for fellow creatures and for nature, a super-generational and global way of thinking to survive. Some people turned towards religious faith and others became interested in the protection and preservation of nature. In the period of frustrated civil interests and blocked professional careers, nature became a refuge.

A more active form of interest in nature and landscape appeared in the course of the seventies. Nature conservation associations, which used to have a relatively long tradition in this country before they were disbanded after the Communist take-over, were revived. During the second half of eighties environmental movements became vents for letting out the tensions of opposition against the fading regime.

Our conservationists cleaned up fountains and brooks, rescued individual plants, kept records of ant-hills, protected amphibian migration on roads. If they could not prevent the construction of a dam. they at least transplanted bulbs of snow-flake from the future lake bottom to safer localities. The administration on the other hand was capable of transforming whole regions into wasteland with the stroke of the pen.

While the green and alternative movemnts in Western Europe were generated mainly from the radical Left orientation, it was quite the opposite in Czechoslovakia. Our environmentalists regarded the capitalist system and market economy with hope. In fact, they did not understand the standpoint of their Western colleagues. Ecological damage was perceived as a simple consequence of the centrally planned socialist system.

The political transformation of November 1980 seemed to bo the guarantee of a miraculous turning point in the ecological situation of this suffering country. References to the catastrophic ecolgical situation were among the main arguments in the speeches from the platforms in the squares during those and also in president Vaclav Havel's first New Year speech. The new government used to go to their first sessions together by bus! A

number of new environmental initiatives appeared in the first post-revolutionary weeks. The Czech Green Party, awaited by the public for so long, was founded at that time. Opinion polls in January 1990 established that 83% of the population considered environmental problems to be the most important of our society.
Soon it became evident that the matter was not as simple as that. The new government as well as the mass media supported the idea of intense economic growth. The neoliberal economists gained the upper hand. Environmental concerns have been put aside. The influential finance minister, Vaclav Klaus is of the opinion that, "We must earn enough to finance ecology", and "economy is like a cake and ecology only whipped cream on the top of it."

Conservationists are coming to be regarded as a reactionary force, hindering the rapid inclusion of Czechoslovakia among the advanced European countries. The essential attraction of green movement has disappeared. Some of the competent and politically conscious people who were active in the environmental opposition group have vanished. Some of them are in the government. They probably still sympathize with our movement, but it is not enough.

We can sadly sum up: the environmentalists' post-revolutionary hopes of changes in human values are dying and this country has been swallowed up by the desire to catch up with the West as quickly as possible. One of our 'unprofitable' environmentalist journals has ceased publication, while pornographic magazines sell well.

The small number of people who are still engaged in environmental activities have decided to reject high materia] consumption as the goal of our society. They are attempting to live a life of intentional poverty and alternative values.

Because our government wants society to be regulated by the principles of free market, and wants to exclude all interventions of non-economic character, including ecological interventions, our environmentalists have reached the same position as the majority of green movements the world Over: the position of criticizing an economy oriented towards the stimulation of material consumption. I think that only now have we fully grasped the concerns of our freinds in the Western environmental movements.

Hana Librova
Resurgence, Nov/Dec 1991

Letter Box

The Citizens Awareness Network (CAN) is a non-profit grassroots organization based on Shelburne Falls, Massachusetts. Most of our members live in small cities and towns located within the ten mile radius of the Yankee Rowe Nuclear Power Station, and within twenty miles of Vermont Yankee nuuclear reactor. Yankee Rowe, as you may or may not know, is the oldest operating commercial atomic reactor in the United States. (Yankee began operating in 1961.) Although at this time it is shut down, (Nuclear Regulatory Commission recommended a shut down due to "safety reasons" on October 1, 1991) Yankee Atomic has begun to spend millions of dollars to "improve" its operations and will seek to restart this summer. CAN, of course, will do what is necessary to prevent this aged and embrittled reactor from operating.

In the meantime CAN members have been researching the effects of longterm exposure to low-level radiation. One of the things that we have come across in our discussions with friends and neighbours is that there appears to be significant incidences of Down's Syndrome. (In the tiny, rural town of Buckland, for example, there are six Down's Syndrome children that I know of. All live within two miles of each other and four live within a quarter of a mile of each other. Buckland's population is around 1,000. Other health problems that CAN feels are significantly high for this area, and may be attributed to Yankee Atomic, include infertility, menstrual problems abnormalities, leukaemia, breast cancer, brain tumours and immune deficiency diseases.

CAN has brought our concerns to the Massachusetts Department of Public Health and with the help and support of U.S. Senators Kennedy and Kerry a preliminary health study may soon be underway.

We have also been concerned about tritium pollution in the Deerfield river. Yankee Rowe has been dumping liquid radioactive waste into this river for thirty-one years. The largest population areas are directly downstream and many people swim and fish in the river. There is also a possibility that many drinking water wells draw from the Deerfield River.

Kemp Houck at *Atoms and Waste* in Washington D.C. let me know about the survey work that you did in the villages surrounding the Rawatbhata nuclear power plant. I am most interested in receiving information about how you went about performing the survey as well as in receiving a copy of the survey results. As the size of the Rawatbhata plant and Yankee Rowe are similar (Yankee is 185 MW), I feel the results of your survey will be useful to the Citizens Awareness Network as a means of helping us along with our research and also in putting pressure on the Department of Public Health to take our concerns seriously.

Gail Steinbring
Citizens Awareness Network
P.O.BOX 83
Shelburne Falls, MA 01370
U.S.A.

We want to take this opportunity to let you know we think your newspaper is wonderful and often wish we had the funds to make copies and send it to all our readers. Keep up the good work, and success in your struggle.

Ayn Lowry
Editor, WISE News Communique

On 22nd of November, 1991 a nuclear emergency preparedness drill was held in four villages near Rawatbhata. There was strong opposition from the local people to the whole exercise and the people of Jharjhani stopped all traffic (Rasta Roko). At a meeting that evening all expressed their opposition to the activities of the nuclear authorities. On 28th November, 1991, Ms Margaret Alva gave a statement in the Parliament that the diseases being seen in the Rawatbhata region are not due to radiation but are the result of malnutrition, water pollution and the lack of medical facilities. This statement has been given on the basis of the investigation carried out by the medical team from Udaipur Medical College and also claims that similar illnesses are not being seen in the workers of the nuclear power plant. The nuclear authorities seem to be now adopting an aggressive stance. When will the results of the Rawatbhata health survey be published?

Rotanlol Gupta
Rawatbhata 323305

I saw an abstract of your epidemiological study around the Rawatbhata nuclear power plant in WISE news Communique No.361. You announced that the full report, after finishing the analysis, will be published. Could you please send me a copy as soon as it is available.

I have full understanding of your plight to do this research on a shoestring budget against the opposition from official organisations. I like to commend you and your collaborators for your selfless efforts. If it were not for courageous individuals everywhere who can not be bought off, the truth about the costs in human lives, bourne by those without a political voice, of "technological progress" would never be known.

Dr Rudi H Nussbaum
Professor Emeritus of Physics
Portland State University
2393 SW Park Place # 301
Portland, OR 97205 USA

Cleanup Costs Rise Sky High

For years, the U.S. Energy Deparment has been telling Congress that it would cost about $3 billion to close and decontaminate its three obsolete uranium enrichment plants, and for years skeptics in Congress have suspected that the real figures would be much higher. It appears the skeptics may be right.

According to a report by engineering consultants that was delivered to the Energy Department in August but never made public, the cost is likely to be $20 billion. An earlier draft in July, had put the cost at $37.7 billion.

The Energy Department has recognized that cleaning up radioactive nuclear waste and decontaminating nuclear facilities is very expensive, but was apparently shocked by the consultants projection. The estimate for just three uranium enrichment plants is nearly equal to the department's projected cleanup costs at all its nuclear weapons and uranium enrichment plants.

The department said in a statement that it would not "blindly rely on its contractor's estimates without challenging them and reviewing them to assure that they are well developed and worthy of presentation to the Congress."

The so-called "D and D" costs—"decontamination and decommissioning"— are a political hot potatoe because Congress must decide who will pay the bill when it comes due, probably within this decade: the taxpayers, the nation's nuclear utilities or the utilities' customers.

In public hearings last spring, the Energy Department stuck to its three billion cost projection. But under pressure from members of Conress, the department hired Ebasco Services Inc. of New York, a nuclear and environmental engineering subsidy of the Ebasco Corp. to assess the cleanup issue.

On July 15, Ebasco submitted detailed, site by site estimates. A total of $37.7 billion or $45.6 billion, depending on whether some building were to be abandoned or refurbished for new uses. "What's happened in this estimate is these guys figured sky is the limit," one source said. "It's way to high." But the House Interior Committee Chairman, George Miller, charged that the "gross discrepancy between Department of Energy's previous estimates of these cleanup costs and the estimates contained in the new draft report raises the possibility that the department has been deliberately misleading the Congress on this issue.

Guardian Weekly,
November 3,1991

Largest U.S. Nuclear Accident Since Three Mile Island

A major leak of tritium from the ___Savannah River Nuclear Weapon's Plant has contaminated the Savannah River and threatens the drinking water supplies of tens of thousands of South Carolinans. The leak, which let loose some 7,500 curies of radioactive tritium may have been the largest U.S. nuclear accident since Three Mile Island.

Contamination levels in the river were reported as high as 270,000 picocuries/litre—more than 13 times greater than the lax government guidelines permit. Water officials in the southern parts of the state were forced to shut off intake valves to the river, and had to rely on reserves for more than a week.

Public reaction to the accident was immediate, with even conservative South Carolina water officials calling for the shutdown of the plant. Public concern was probably heightened by the poor performance of Westinghouse, the plant's operator, in acknowledging the incident. Westinghouse in fact, seemed unsure as to when the accident actually happened; officials said only that it occurred between December 22 and 25.

The accident has, at least temporarily, shelved the Department of Energy's plans to restart its tritium producing K reactor in the Savannah River weapon production complex.

However, this is not the first instance of pollution by the weapon's plant. In a report released in November, 1991 the US Department of Energy (DOE) acknowledged, that it has routinely released substantial amounts (an average of 50,000 curies every year) of tritium into the air and water aroud the Savannah River Plant (SRP).

A South Carolina newspaper, *The Island Packet* recently reported that radiation has seeped into many streams near SRP and into the Savannah River in addition to the acquifers in the region. Across the river from SRP in Georgia, people have been complaining for years, about tritium in their groundwater and milk. In October, 1991, Georgia's Governer Zell Miller demanded a federal study regarding the contamination.

The releases have been occurring since 1950s. According to DOE, environmental releases of tritium were the result of a "widely held belief among weapon industry workers that tritium was less dangerous than plutonium, and other radioactive substances and thus required less careful control. Department officials themselves said DOE was more concerned about the financial implications of tritium loss rather than its environmental impacts. Tritium is used to enhance the fusion explosion of nuclear bombs. DOE's priorities are transparently obvious.

The Nuclear Monitor
Vol 7 No. 9, January 13,1992
WISE News Communique 364
December 19,1991

People's Initiative at Trisbane

Trisbane is a small village, population around a thosand, on the river Albe, some 30 km from Hamberg. It has the misfortune of being a neighbour of one of Germany's oldest power and research reactor sites

In the past, there was not a single case of leukaemia in the village, but during the last two years there have been a sudden spate of cases—seven children are suffering from the dreaded disease.

This leukaemia epidemic has caused consternation amongst the areas inhabitants. A burger (people's) initiative has been formed and they have forced the government to take notice. The government has appointed a high level committee of epidemeologists, radition scientists and radiobiologists to study the causes.

One of the members of this team of scientists, Dr Inge Schmitz-Fauerehake, told *Anumukti* that she has found a large number of dicentric chromosomal aberrations in the siblings of leukaemia sufferers and she is doing biological dosimetry in adults.

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