



# ANUMUKTI

**A Journal Devoted to Non-Nuclear India**

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Cowardice asks the question-is it safe ?  
Expediency asks the question-is it politic ?  
Vanity asks the question-is it popular ?  
But Conscience asks the question-is it right ?  
And there comes a time when one must take  
a position that is neither safe, nor politic,  
not popular-but one must take it because it is right.

**Martin Luther King Jr.**

## *Crossing The Line*

The first time I crossed the line was in Boise, Idaho, on a November afternoon in 1971. With nineteen companions, I formed a human chain across Capitol Boulevard, a main thoroughfare in the heart of the city. There were just enough of us to block the boulevard from curb to curb.

Walking into the street that day, into the middle of traffic, I felt alternately foolish and scared. Would my nerve fail at the last minute ? Would I find myself all alone, dodging cars while motorists honked and spectators laughed ? Would blood run on Capitol Boulevard, spilled as a consequence of my rash words ? Would I be arrested, mugged, finger-printed, jailed, given a police record ?

When the first blockader reached the far curb we stopped and turned, facing the oncoming cars. The traffic came to a stop. Our supporters worked their way from car to car, explaining the delay, asking drivers to turn their lights on if they agreed with us.

We heard honks and yells. Then some lights came on, then more. In a short time officers arrived from the police station, just two blocks away. They moved up and down the line, taking our photographs. Would we be dragged or simply led away ? I wondered when the arrests would begin.

Incredibly, there were no arrests. The police allowed us to continue blocking the boulevard for the remainder of our half-hour vigil, directing traffic into their streets. At exactly 3 o'clock, as a three megaton nuclear blast went off on schedule in far-off Alaska, we trooped off Capitol Boulevard, walking on air, delighted with ourselves at having conducted Idaho's first non-violent civil disobedience action in memory.

I was a forty-five-year-old journalist at the time, married and the father of three sons, editor of a weekly political newspaper, the *Intermountain Observer*, a radical and sometimes strident organ of social protest. We had been at the forefront of social protest in Idaho through the 1960s. On this occasion we were protesting the U.S. Atomic Energy Commission's plan to test an antiballistic missile nuclear warhead off the island of Amchitka in Alaska. It was a project that stirred widespread opposition from environmentalists and peace activists but had just been given the final go-ahead by virtue of a five-to-four decision of the United States Supreme Court.

Throughout the nation there were protest rallies on the day of the test explosion. In Boise the protest took the form of a spontaneous blockade of traffic—a demonstration of outrage that I had proposed and led.

The fear, stress and exhilaration of our stand on Capital Boulevard forged a bond among us. We felt like survivors of an earthquake, a flood, a battle in which we had risked much and won. As newspaper people and political activists many of us already were part of a closely knit group. Three of us comprised the entire paid staff of the *Observer*. Others were VISTA volunteers in the war on poverty, environmentalists, veterans of the civil rights and the antiwar movements. Most of us had standing in Idaho's liberal, Democratic establishment. The Amchitka action, requiring a measure of physical courage and moral certitude surpassing the demands of conventional journalism and politics, gave us a heightened feeling of closeness with each other. It produced a euphoria that proved to be short-lived.

That night, at a social gathering of liberal Democrats, the attorney general of the state of Idaho, a close friend whose election I had helped engineer the previous fall, went into a state of shock when we paused to watch the television news. There, in full view, were the protesters blocking a city street, with the police standing by. The camera zoomed in on his wife, Betsy Park, breaking the law with the whole world watching, while the commentator made pointed reference to her husband, the state's chief legal officer.

Scarcely less shocked or pained was my own wife, Kathleen, who, like Tony Park and some other spouses of the demonstrators, had had no advance notice of the Amchitka action. The demonstration opened a breach between us on the matter of personal risk taking as a form of social action.

But that was just the beginning of the fallout. A few days later the *Observer's* advertising representative reported wholesale defection in the thin ranks of our business patrons along Main Street. I was surprised by the severity of the backlash.

Even more astonishing to me was the reaction of our principal advertiser, the local CBS radio and television station, KBOI-TV, which also happened to be our owner. When I paid my weekly call on the station's business manager to pick up her advertisement for the next issue, she explained firmly but with some embarrassment, that there would be none. "It's a matter of principle," she said. "I just cannot condone that sort of thing."

A few days later I was called to the desk of KBOI news director Dick Eardley, a friend of many years and a popular Boise sportscaster who then served on the city council and was on his way to becoming mayor of the city. Eardley sat me down in the "goldfish bowl," a glassed-in library and conference room used for private conversations.

"Sam, I don't know how to tell you this," he began, half apologetically, "but we have decided to take you off the air." He went on to explain that I had crossed over into an area forbidden to professional journalists. He was sorry about it, and may be he was mistaken, but that was the way it would have to be.

For leading a street demonstration against the testing of a nuclear bomb on an Alaskan island I had been judged no longer fit for writing, for reporting, for broadcasting at KBOI. How was this violation of journalistic neutrality different from a news director casting a city council vote for a multi-million-dollar downtown shopping mall? I saw no point in arguing the case with Eardley because the difference was clear to both of us. The difference was in the style and purpose of our activism, not the activism itself. And the message in the goldfish bowl was equally clear: There was no room at KBOI for this kind of activism.

In the newsroom of Boise's most enlightened corporate media outlet, in the liberal business community, on the Democratic Party cocktail circuit, and in my own household I came up against the limits of tolerance in the weeks following my decision to stand in the street with others. I felt the pain of rejection and the gnawing fear of the loosening of career security. But the new ground on to which I had marched or stumbled or strayed felt right to me. I decided to stay there.

The actions of my later years, taken in the company of others, have led to occasional jailing and once to a six-month prison term. Always the feelings have been the same as when I first crossed the line in Boise many years ago. First has come an inner struggle, then a deep fear, then the calm of the action itself, then exhilaration (whatever the outcome), the sometimes painful satisfaction of having, as the Quakers say, "spoken truth to power." Always when I have crossed the line the ground on the other side has felt good.

**Sam Day Jr.**

**Source:** Crossing the Line  
From editor to activist to inmate  
- a writer's journey

The temptation of using somebody else's writing for an editorial is something I usually avoid. After all, if I did not have anything to say, what am I doing editing a journal in the first place? But Sam Day's piece is precisely what I have wanted to say and he says it far better than I am able to. As we gather together on the 5th anniversary of Chernobyl, it is high time that we too cross the line and experience the ground on the other side.

**Surendra Gadekar**

# Mihama

## Narrowly Escapes Being Japan's Chernobyl

**O**n February 9, 1991, one of the steam generator tubes at Mihama Nuclear Power Plant owned by the Kansai Electric Power Company (KEPCO) in Fukui prefecture, ruptured in a double-ended guillotine break causing primary coolant leak to the secondary system and released radioactivity into the environment. Shutdown of the 500 Megawatt Pressurised Water Reactor occurred automatically when the damage to the steam generator activated the Emergency Core Cooling System (ECCS). This is the first time in the history of the Japanese nuclear programme that the ECCS, which is designed to contain nuclear accidents from turning into disaster has been triggered. It is also the first time that a double-ended guillotine break has ever taken place in Japan. Events at the reactor began at 12.40 p.m. when workers noticed that a meter in the control room showed a sudden jump in radioactivity in the secondary cooling system. According to the *New York Times* they spent the next 50 minutes trying to determine whether or not the meter was providing false readings - a common occurrence at nuclear power plants. Another report from *Associated Press*, says that the technicians simply ignored the warning, because they thought the meter was broken. In the meantime, though, the reactor was heading for potential disaster.

When workers finally realized that tons of mildly radioactive water were pouring into the steam generator, where the water supply is supposed to be uncontaminated, they tried to activate a critical emergency pressure valve. It failed to function. By 1:50 p.m. a monitor showed that radiation levels were 1,250 times the normal in the second

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dary cooling system. At the same time, water pressure in the core dropped drastically and the ECCS kicked in, shutting down the reactor.

*Japan Times* reported that, "About 50 to 500 display panels in the control room repeatedly turned off and on. Roaring similar to the sound of jet engines was heard several times. White puffs of steam were seen outside the reactor. An employees said that this was probably because a safety valve was activated following a pressure increase in the secondary cooling system." The paper said that it was not known why the emergency pressure valve didn't work. If it had, the flow of primary cooling water into the secondary system would have been far less. Reportedly, 20 tonnes of primary coolant poured out into the secondary system.

The owners of the plant KEPCO have traced the cause of the accident to one of the 3,200 metal tubes used to heat secondary cooling water in the steam generator. The tube had been severed, causing the massive leakage of contaminated cooling water. This is the second time that a tube has been completely severed. The North Anna nuclear power plant in the U.S. had the same problem four years ago. The finding has dealt a serious blow to the government and Japanese power company officials who had claimed that any faults in the reactors would be detected during routine inspections. (*Mr Nadkarni please take note of this.*) (See page 3) According to KEPCO the tube in question had in fact been cleared during an inspection conducted last year.

Engineers who examined the damaged tube found that Engineers who examined the damaged tube found that it had been

horizontally severed near the No. 6 metal plate, one of the sin plates supporting all the tubes. The exact cause of the damage has not yet been determined, but they say that the tube may have been dented by the metal plate, which could have swelled from rusting over the years. A swelled metal plate was the major cause of the North Anna problem, but KEPCO officials refused to take that seriously, saying that there was an extremely small probability of such an accident occurring in Japan.

According to experts, the plates, made of carbon steel, are likely to rust when they react with oxygen found in the secondary cooling water, possibly causing the metal tubes to dent. There are ten reactor in Japan - including five operated by KEPCO - currently using the same type of plates.

The reactor, which began operation in 1972, is one of four at the Mihama power station. Its design was based on that originally supplied by the U.S. Corporation, Westinghouse. This is not the first time that it has had problems. Cracks appeared in the piping of the reactor in 1975, 1979 and 1983, causing radioactive leaks from the steam generator.

In fact the Mihama power station as a whole has had a rather troubled history, especially its unit-1. That unit, a 340 MW plant, began operation in November 1970, but suspended operation in July 1974 after an accident involving the steam generator. Operation was suspended again in December 1976 after it was disclosed that some fuel rods had broken since March 1973 and KEPCO had been concealing the accident for more than three years. Then on 22nd May, 1981, about three tons of primary coolant leaked, causing serious radioactive contamination to workers. Three employees were splashed directly with the coolant and radioactive gas was released into the atmosphere for over two hours. On 22nd September 1982, the director of this troubled plant tried to kill himself by cutting his throat with a knife.

On March 1st, after persistent public demand, Ministry of International Trade and Industry and KEPCO released a somewhat

detailed report on the accident. This report reveals some frightening new facts :

O The main steam isolation valve of the damaged steam generator loop failed to shut when an operator in the control room tried to shut it. The valve was closed manually, seven minutes later by an operator despatched to do the job.

O The ECCS contributed little to the cooling of the core, quite contrary to the first announcements of nuclear officials. Because the pressurizer relief valves were stuck shut, the primary coolant pressure remained high (around 100 kg/cm<sup>2</sup>), preventing the safety injection of emergency water from the two high pressure injection pumps. The two pumps each had a normal capacity of 159 cubic meters per hour. They had been activated for some 47 minutes but the total amount of water injected was only 30 cubic meters.

O Due to insufficient cooling, the core began

to boil for about 15 minutes into the accident, but extensive boiling was narrowly avoided by blowing much steam from the sound steam generator and also some from the damaged steam generator into the air which caused some radiation releases into the air.

O The control room was quite unprepared for the situation caused by both of the two pressurizer relief valves not working. This was outside of the accident scenarios for which the operators have been trained using simulators. They tried in vain for about 24 minutes to open the valves. Then they used the auxiliary pressure spray to depressurize, but since it was not too effective they switched off the High Pressure Injection pumps to reduce the primary system pressure. This act is considered to be a violation of the operation manual and reminds us of the Three Mile Island accident where too judgment of the operator to switch

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off a similar high pressure pump contributed crucially to the core meltdown.

*Based on an article in*

*WISE News Communique No 347,*

*and a press release from Citizens' Nuclear*



# 'Nothing to Fear' But...

*In our last issue, Anumukti Vol.4 No.4 February / March 1991, we had reprinted an article by Shri Kumar Basu under the heading "Unallayed Fears" which described the could not-careless attitude of the Nuclear Power Corporation regarding problems being encountered with the south end shield of Rajasthan Atomic Power Plant at Rawatbhata. Well, the original article in The Independent has elicited a rejoinder from Shri G.V. Nadkarny, who is the Director, Environmental and Public Awareness, Nuclear Power Corporation. Now, normally we do not reproduce rejoinders from nucleocrats, since we feel that they have enough resources to be able to put forth their viewpoint before the public without depriving us of precious space. However, we are making an exception for this article since it provides a good footboard to raise many questions that need to be highlighted and is a very good illustration of the hubris that afflicts the nuclear establishment in India. (The comments in bold type are the editors rejoinder to this rejoinder.)*

The main objective of the ten-part series titled "Nuclear Power and You" issued recently by Nuclear Power Corporation for public information was to allay any fears regarding nuclear power; more so, given the eagerness of some journalists to come up with sensational articles likely to whip up public fears.

Why is it that the need to "allay fears" regarding nuclear power has only arisen now, more than two decades after the commencement of nuclear power generation in this country? Have the journalist suddenly become scurrilous sensationalists? Or is it because with long experience, the total irrelevance of nuclear power to India has started becoming more and more apparent and the harmful effects have now become impossible to hide.

## **Plant Performance**

A case in point is Kumar Basu's article appearing in *The Independent* of February 20, 1991. Though the article indicated that the advertisements concealed the greatest dilemma the country encountered regarding abandoning a crippled nuclear power plant or salvaging it by yet to be proved technology, serial number 4 of Nuclear Power and You series did mention the problems regarding the south end shield of RAPS-1 during 1981 to 86 and its restoration to 50 percent of full power since August 1987 as well as the performance of each of the six operating Indian nuclear power plants.

The series of advertisements "Nuclear Power and You" is indeed, aptly named. It does put the interests of nuclear power before it puts you. But for this happy nomenclature, it is an abomination-full of half truths and disinformation. It also contains grave errors of fact, vilfully used to deceive the public. A case in point is the example for nuclear power plant performance mentioned by Shri Nadkaray. Normally, plant performance is measured as a ratio of the power actually delivered in the installed capacity. However, most Indian plants have been subsequently "derated". That is, after a few years of operation and encountering serious problems, the authorities have decided not to run the plant at its full capacity but at some reduced capacity. (In the case of RAPS-1, this reduction

has been from 235 MW to 90 MW-what Shri Nadkarny persists in calling "50 per cent of full power"). The capacity factors mentioned in the ad have been calculated with these derated capacities to make them look somewhat less dismal. However, what takes the cake is the fact that in another advertisement in the same series, while toting up the cumulative nuclear power generation capacities the figures used are of the original (non-derated) capacities. A fine example of having your cake and eating it too!

## **Nuclear Mindset**

Contrary to what the article said, there was no dilemma about abandoning or salvaging RAPS-1. The clear options were implementing repairs to restore it to operation in the short run and planned replacement of the end-shield, at the appropriate time, to extend the unit's life in the long run.

To close down a potentially hazardous reactor is not to abandon it, but rather to not abandon the people (who ought to be the primary concern) to its dangers. The very language of abandonment and salvaging makes one feel that it some broken marriage that Shri Nadkarny is discussing. And his primary attachment is to this piece of junk equipment and not to the people living in the vicinity and not even to the workers who have to face the dangers.

Basu's article raises questions about whether a bigger crack in the end-shield would result in the leakage of light water leading to a loss of coolant phenomena and a consequent catastrophe or if there is continuing apprehension that there could be a catastrophe any time. The answer is no. The light water leakage will be detected immediately and the reactor shut down. Producers have been laid down to handle such an eventuality safely.

Examples abound from all over the world that it is precisely this ("The answer is no.") cocksure attitude-this nuclear mindset - which is the major cause of nuclear disaster. (See the story on Japanese nuclear accident in this issue for another example of the "It can't happen here" syndrome. The belief that pipes would spring detectable leaks before breaks seems

good in theory and probably does happen a lot in practice too, but it is not something to bet your life on. Since nucleocrats are betting not their own but their subordinate's lives this arrogance is likely to continue till comuppence.

### **Worker Exposure**

Also, apprehensions that the workmen involved in the operation may have been exposed to higher doses of radiation are not borne out by facts. By and large, among the workers involved in the end-shield repair work, no one was exposed to individual doses beyond permissible limits and the cumulative doses were also within the limits stipulated for the station.

Would DAE allow outside independent investigators access to medical records of nuclear workers as has been permitted in U.S.A. And what is meant by this by and large ? Does it mean that some workers have received dosages in excess of 'permissible' limits ? These limits themselves are set way too high. For example: the permissible dose limit for nuclear workers is 5 rems/year. Most workers usually are reported to receive around one rem every year. The latest study on cancer risks to nuclear workers (See "Another Nail in the Coffin" page) shows an increased risk even in workers who had received doses of around that much in their entire working lifetime! Also, what about the temporary workers - of whose radiation dosage no records are maintained ?

### **Organisational Autonomy**

The article also states that the "Safety Committee put its foot down and advised a permanent shut down of the unit which it believed could not be repaired. But the DAE prevailed over the Safety Committee." In fact, it was the RAPS operating crew and management which shut down the unit in September 1981, (after the leak in the south end-shield first appeared), on their own, based on the technical specifications and an inbuilt safety culture. There is therefore, no question of the DAE prevailing over the Safety Committee, neither did the Safety Committee advise or instruct RAPS for permanently shutting down the unit.

This is the one point where I am in complete agreement with Shri Nadkarny. NPC, AERB, PPED, Safety Committee, etc. are all non-autonomous organisations under DAE control. To think that they can take an independent stand on anything is rather far-fetched. The Safety Committee could not have put its foot down since it did not have any feet in the first place!

### **No Compromise on Safety**

It is also incorrect to say that in the event of an emergency, the shut down will be hurried and safety precautions not taken and that the NPC, oblivious of future catastrophe is keeping the reactor running, for fear that a power shortage in the state may evoke adverse public reaction. The NPC is fully aware of the implications of operating RAPS-1 and will not com-

promise on safety. The object of running RAPS-1 is to get maximum mileage and to not deny Rajasthan State Electricity Board the benefit of sizeable amount of power (90 MW) at which the unit can be operated safely, before long term work on the end-shield replacement is taken up. There was certainly no fear of public reaction to power shortages which are quite common in most states in India with demand far outstripping supply.

It is preposterous to suggest that during an emergency, shut down will proceed in a calm unhurried manner. Mistakes will be made and safety precautions overlooked. That is just human nature and not even nucleocrats can change it.

Contrary to the facts put forward by Basu, the end-shield of RAPS-1 were manufactured in India using sub-assemblies received from Canada. On receipt of the end-shields at site, defects were noticed and repaired by welding. Local stress relieving was carried out a site since stress relieving of the entire finished end-shield was impractical.

If the subassemblies were received from Canada, what manufacturing was being done in India ? Another application of our famous screwdriver technology! Also it seems somewhat strange that the defects were not noticed in the subassemblies. Did they not have quality control at each stage of "manufacturing."

The cracks appeared after eight years of operations. The entire issue of the causes of the leaks and the ways of plugging them was discussed in depth with various research units of the government.

Chemical plugging was tried in 1982, and mechanical plugs were used in 1985. Additional cracks in the vulnerable zone caused more leaks and these were closed with additional plugs. This was a time consuming job as the cracks were in inaccessible locations which could be reached only with specially devised remote tooling. All repairs were carried out with the approval of the AERB which stipulated a limit of 50 percent of full power on RAPS-1 operations as abundant caution, considering the stress patterns in the vulnerable zone.

The delay in long term rehabilitation of RAPS-1 is neither due to paucity of funds, nor general apathy of DAE as pointed out in the article, but due only to the complexity of the job and scheduling for appropriate time considering the need to replace to coolant tubes.

The job must indeed be extremely complex if the best "brains" and no paucity of money, it has not even been attempted for the better part of a decade.

End-shield of identical design and material (3.5% nickel steel) have been used at Douglas Point in Canada, RAPS-1 and 2 and MAPS-1. Cracks in the tube sheet have appeared only in RAPS-1. The Douglas Point reactor was not shut down due to end-shield problems. The MAPS-2 end-shield is of stainless steel and all subsequent units have stainless steel integral end-shields. These are not expected to suffer

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a recurrence of the RAPS-1 end-shield problems.

Finally Basu asks, "Why did the DAE rush ahead to commission similar reactors at RAPS-2, MAPS-1 and MAPS-2, if the performance of the prototype reactor RAPS-1 was not assessed" and assumes that the pronuclear lobby is unwilling to answer. The answer, in fact, has been given since long; the key word of the Indian nuclear power programme being self reliance best suited to our national interest.

Nucleocrats believe that by wrapping themselves in the tricolour and shouting "NATIONAL INTEREST" all questions would automatically disappear. No! Mr Nadkarny. Pray, what national interest was served by not first evaluating the shoddy performance of the post-fact "prototype" before rushing into creating, more such junk. And where has this loudly proclaimed self-reliance suddenly vanished when you are dealing with the Russian and the French for getting crumbs of their technology.

*Kumar Basu's reply: My article is based on documents furnished by Department of Atomic Energy and my conversations with members of the Atomic*

*Energy Regulatory Board. Though Nadkarny has claimed that my article is factually incorrect, I would rather believe the DAE version for I have cross-checked it with officials of AERB. It is not I but the AERB officials who have raised apprehensions about a hurried shutdown in the case of an emergency.*

Nuclear technology was once described as a Faustian bargain which required a technological priesthood to maintain it. The members of this priesthood would have to be dedicated, pay meticulous attention to every single detail, and be incorruptible. Kumar Basu's reply throws ample light on the dismal condition of our 'atomic age brahmins'. AERB's job is to oversee the safety of all nuclear facilities. If its members think that RAPS-1 poses an unacceptable hazard, they ought to shut it down/pronto. If they feel powerless to do so, they ought to publicly resign and force the issue on the national agenda. However, to raise apprehensions in the public's mind while at the same time doing nothing about the situation is merely a reflection of their own lack of moral courage.

## ***A Healthy Development***

Consumer Education and Research Centre (CERC), Ahmedabad has called upon the Centre to inquire into the leakage of radiation from RAPP at Kota and to rehabilitate, compensate and prevent further occurrence of such disastrous events.

In a memorandum to Mrs Maneka Gandhi, Minister for Environment and Forests, the CERC has said the leakage of radioactive tritium into the air and water is playing "havoc" with the lives of nearby villagers. Deformed children are being born to otherwise healthy women. According to the memorandum, the Commission of Inquiry should be presided over by a High Court Judge and should include

two or three experts of Atomic Energy (not employees of RAPP), representatives, of voluntary organisations, environment action groups, experts from the Pollution Control Board of Rajasthan, radiologists, doctors and experts on radiation therapy for a detailed epidemiological survey.

It has also suggested that a panel to hear grievances and give relief should be constituted and provisions of insurance, medical coverage, payment of compensation towards negligent and indiscriminate disposal of hazardous radioactive water should be arranged for. The present medical facilities should be taken to improve them.

## **An Example from the Land of Bofors**

On March 1st three Plowshares activists entered Swedish Ordinance's armaments factory in Eskilstuna, Sweden where they disarmed with hammers two so-called Carl Gustaf grenade throwers and one AK 5 automatic rifle. Swedish Ordinance is a major producer of Swedish weapons and the largest share of its production is for export. In particular, the Carl Gustaf grenade thrower is distributed world-wide and was extensively used in the Persian Gulf.

The group, including Stefan Falk, Anders Grip and Per Hergren, calling themselves Armsfactory Plowshares, walked directly in the factory together with the morning shift's workers. To the surprise of the employees, the activists proceeded to disarm the weapons. While they were eventually hindered by the guards, the action was met by workers, guards, and later the police calmly and without any trace of violence. The three were put under arrest, charged with unlawful entry and property damage, and later released. The three are awaiting trial.

On March 2nd and 3rd follow-up civil disobedience

actions were carried out by the support group. On Saturday, to the accompaniment of song, theater and a symbolic turning of the earth at the factory fences, four activists - Anders Grip, Per Hergren, Katarina Palmald and Stellan Vinthagen climbed over the fences and were promptly seized by the guards and later handed over to the police. On Sunday the action continued, this time the group built hotbeds at the fences and were later apprehended by the police while attempting to climb over the fences. On both occasions factory security, the police and the mass media were given exact times for the actions. The four were charged with unlawful entry and damage to the lawns and were later released pending trial.

On March 5th Linus Brohult, Lars Gustafsson and Johan Hammerstedt were tried in Eskilstuna's district court for the March 20th, 1990 Plowshares disarmament of one Carl Gustaf grenade thrower. They are awaiting the court's verdict.....



# Another Nail in the Coffin

A major new study at the U.S. Department of Energy's (DOE) Oak Ridge facility has found that workers exposed to even low levels of radiation had higher death rates from cancer than unexposed workers.

The study, published on March 20 1991 in Journal of American Medical Association (JAMA), concluded that the cancer effects of low-dose, slow-delivery radiation were ten times higher than seen in the population exposed by radiation from the Hiroshima and Nagasaki bombs. This lends new credence to the theory that long-term exposure to low levels of radiation is more hazardous than exposure to higher radiation levels in a short period.

According to the study, each rem of radiation exposure accounted for nearly 5% increase in the risk of fatal cancer. Workers at the plant were exposed to an average of only 1.7 rem over the entire course of their careers. Only 638 of the 8318 workers studied received over 5 rem during their careers. Five rem is the permissible annual amount nuclear workers may receive according to Nuclear Regulatory Commission (NRC) radiation standards.

The study included white men who worked at the plant between 1943 and 1972, and followed them through 1984. Earlier studies which covered worker through 1977, did not show cancer increases. The new study said that the excess cancers did not occur until after 1977.

The clear implication of this is that U.S. may be on the verge of seeing proof of increased cancers among all nuclear workers-including ones in the commercial industry. Because the commercial industry newer, cancers among worker would not yet be expected to show up. But the study's results suggest that future studies may be able to identify an increased cancer risk among nuclear workers.

Whether this will translate into evidence of increased risk among residents near nuclear facilities is unknown. The Oak Ridge study focused only on the plant workers, and the increased risk was found to correlate with increased exposure. It is important to note, however, that even the levels the workers were exposed to were quite low. For example, the average 1.7 rem exposure, over a hypothetical 30-

year career, equals only about 55 millirems/year additional exposure - only about half as much again as the average background radiation exposure. This level is well below the average exposure level received by commercial nuclear workers.

The study gibes with several other radiation studies, including one conducted in 1977 by Dr Mancuso of workers at the Hanford nuclear facility, and a 1988 study of workers in the British nuclear weapons complex.

Workers at the Oak Ridge plant actually were found to have lower than expected death rates, even from cancer. This is believed to be due to the nature of the study population - well paid white working men, with access to health care and other social benefits. The significance of the study, however, is that within the study group there was a measurable correlation between increased exposure and increased fatal cancer risk.

However, the study did find that deaths from leukaemia were 63% higher than expected - a potentially staggering finding, especially considering that other death rates were lower than expected. However, radiation expert Dr John Goffman cautioned that the methodology and sample size of the leukaemia portion of the study were insufficient to make such an important statement.

Political fallout from the study could include renewed efforts to revise NRC's radiation standards for workers, and perhaps the general public, and even greater opposition to the proposed regulatory relaxation of radiation protection requirements. At the \*very least, calls for similar, and ongoing, studies at other nuclear facilities can be expected to increase in frequency in the coming years.

The Department of Energy attempted to downplay the results of the study, but the best its spokesman could manage was to argue that cancer risk is low if doses are low and kept below existing permissible standards.

The study's primary authors were Drs Steve Wing and Carl Shy of the University of North Carolina at Chapel Hill.

*The Nuclear Monitor: March-25,1991*

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## Antinuclear Movement in Tartar Republic

One of the most important problems facing the population of the Tartar Autonomous Soviet Socialist Republic is that caused by the building of Tartar Atomic Power Station (TAPS). During this year some actions including demonstrations and marches against the building of TAPS have been held. Recently, Tartar Antinuclear Society has been created. It is the first organisation of this type in USSR. The

organisation considers further use of nuclear energy to be absurd! In particular, we are trying to stop the construction of TAPS.

The fifth anniversary of the Chernobyl disaster is a reminder to us that nuclear energy threatens the survival of life on Earth. From year to year we have realised the different kinds of damage that has been caused by this catastrophe. The number of sick people

affected by radiation has been steadily increasing. This year the necessity to evacuate some more people from their homes has been revealed by the government. For more than three years, hundreds of thousands of people have been living in these regions at grave risk to their lives. The government announced that the damage caused by the accident has cost 10 milliards (billion?) roubles. But this year only Byelorussia has appealed for 17 milliards roubles to mitigate the awful consequences of this accident. It should be noted that the profit from all Soviet nuclear power stations totals just 2.5 milliard roubles. So, are nuclear power stations profitable? Vast areas have been spoilt for many centuries. Because of mismanagement, lot of foodstuffs from dangerous regions were sold to people.

The ruling circles often try to represent the Chernobyl catastrophe as some kind of a natural calamity similar to, for example, the earthquake in Armenia. But there is a concrete criminal responsible for Chernobyl: It is the Atomic Energy Ministry. There is an urgent need to stop building any more nuclear power stations as has been done in many other countries. But, despite everything, the building goes on. Academician Velikhov has not abandoned his grandiose plans of atomic construction. Last year two atomic stations at Smolensk have been put to work. By the way, the Atomic Energy Ministry has taken 65 million roubles from the fund collected through voluntary donations from all over the country to help Chernobyl victims, to meet needs of its own.

The Tartar Antinuclear Society stands for alternative development. There are at present in the Tartar Republic and the country as a whole, lots of monopolies that dictate the putting of huge amounts of money into "the great projects" (nuclear power plants, cyclopien channels etc.) The real development of the national economy and the raising of the living standards of ordinary people is restrained by wasteful and uncontrolled use of natural resources. The export of gas and oil, as a result of colonial policy, will in the near future leave the country without

strategic raw materials, the government intends to build new giant hydropower stations, \*regardless of irretrievable harm done by such dams to nature.

An atomic power station is an especially dangerous object. The damage caused by its operation is enormous. The radioactivity of nuclear wastes is ten million times the activity of the initial nuclear fuel. The radioactive background level unavoidably rises, causing increases in the number of mutations and cancers. The threat of global biological degeneration produced by growing radioactivity becomes daily more real. Nuclear wastes require expensive store houses (burial grounds). Islands in the Pacific have already been turned into radioactive cemeteries for thousands of years.

In our opinion there are two ways to solve the energy problem. The first is to assimilate the energy preserving technologies, for today only about 10% of the produced energy is used effectively. The second is the exploration and elaboration of alternative energy source such as solar and wind power plants. Even in cold Sweden, solar energy has proved to be sufficient for lighting and warming. The Antinuclear Society does not restrict itself only to campaigns against nuclear power stations. We have organised a laboratory for research into alternative energy sources and also to monitor radioactivity in the environment. We also bring out a newspaper and organise conferences. But our main task right now is to stop the building of Tartar and Bashkir nuclear power station. Although the Supreme Soviet of Tartar ASSR has adopted a resolution to this effect, in April 1990, the central nuclear ministry will try to accomplish its plans. Because of this, our organisation together with active workers of Bashkiria intends to carry out a march against both stations on the 5th of July. We appeal to all people in our country and abroad for help in conducting this action.

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*Albert Garapov*

*President, Tartar Antinuclear Society*

*P.O.Box 90 Kazan USSR 420034*

## **The Era of Mild Radium Therapy**

The discovery and purification of radium by the Curies in 1898 fascinated the general public and soon became one of the great scientific media events of the 20th century. Here was an element that glowed in the dark and provided a portable and nearly inexhaustible source of powerful roentgen rays. Within a year of its discovery European physiologists were experimenting with radium and its daughter isotopes as treatments for cancer and various skin conditions.

This "Curie therapy" was hailed as a welcome addition to surgery, specially in the treatment of malignancies of the facial and genital regions where radical surgery was difficult, dangerous and disfiguring. Madame Curie won two Noble prizes and her trip to America in 1921 was transformed into a series of

whistle-stop photo opportunities, which placed her among the heroes of the new age of technology. By 1927, radium was such an important part of the medical armamentarium that the Welfare Council of New York proudly drew attention to the fact that the hospitals of that city alone possessed more than 12 grammes of radium (worth almost \$1 million) and were in the forefront of the development of new techniques in radium therapy. Every important medical school sought to establish a radium treatment center. Treatments were given in private telephone booth-sized cubicles concrete vault. By 1913, radium therapy was a well established medical subspeciality with thousand of patients being treated annually in the U.S. and Europe.



## Mild Radium Therapy

Curie-therapy made use of the destructive powers of the beta and gamma emissions of radium and its daughter elements. The penetrating nature of these high-energy emissions made it possible to use sealed radium sources, arranged in fixed geometries within the tumour bed, to sterilize relatively large areas of cancer intested tissue. The dosimetric principles evolved by the early Curie-therapists paved the way for the current use of radiotherapy in cancer treatment.

However, in the early decades of this century another approach to radium therapy also arose which had its roots in the homeopathic and physical medicine movements of the late 19th century. Called "mild radium therapy" to differentiate it from the harsh destructive treatments of the cancer physicians, the approach was predicated on the idea that radiation when used in small doses, was a powerful metabolic catalyst.

### A Physiological Role for Alpha Particle Radiation

The exact biochemical mechanisms through which radium exerted its salutary effects were hotly debated. Some said that radium compounds worked through direct end-organ stimulation. Others claimed that they worked by the destruction of microscopic toxins. Some others felt that radium worked indirectly by stimulating the adrenals or the thyroid. The only thing that the mild radium therapists agreed on was the physical \*phenomenon primarily responsible for these effects; the heretofore ignored alpha particle emissions of the radium nucleus.

Alpha particles are large, relatively slow moving chunks of nuclear matter consisting of two protons and two neutrons. They possess tremendous energy and produce a dense cloud of ionization events when traversing matter. Because they dissipate their energy so rapidly, they can only penetrate to a depth of 100 mm limiting the range over which they can exert their effects to about 10 cell diameters. This lack of penetration prevented their use in cancer therapy..

The mild radium therapists began with a different philosophic approach. They noted that throughout history, hot springs like those at Brambach in Germany, Ischia in Italy, and Sail-les-Bains in France had been touted as panaceas for a variety of ailments including rheumatism, cretinism, impotence, and melancholy. These salutary effects were achieved only when the waters were drunk or their vapours deeply inhaled. Bottled water from these springs rapidly lost its potency. The great German chemist Justus von Leibig attempted to analyze the waters from Gastein Springs, eventually ascribing their power to a dissolved gas with mysterious electrical effects. In 1903, the discovery was made that the apparent pharmacological agent in these waters was radon ("radium-emanation"), an alpha particle emitting gas with a half life of less than 4 days that was produced in decaying radium. Alpha-particle emitting isotopes, taken internally in minute quanti-

ties, were hailed as powerful natural elixirs capable of delivering direct energy transfusions to depleted organs.

The discovery of the tonic effects of radon water can be seen as the beginning of the era of radioactive patent medicines. Mineral water from hot springs had been used for many centuries with no evidence of any ill effects. The theory was that if the active agent in these waters was a radium isotopes, then long term use of small quantities of radium must be harmless as well. Many important European physiologists began to study the cellular and organismal effects of low-level alpha particle radiation. George Wendt in his address to the 13th International Congress of Physiologists in 1929, reported that human leukocytes exposed to low-level radium radiation began migrating toward the radium source and that moribund vitamin deprived rats could be temporarily rejuvenated by exposure to radium.

Radium truly seemed to be the basis for the fountain of youth legends, and because it was considered a natural element rather than a drug, it was available over the counter and was not regulated. By 1913, the parenteral and oral use of low dose of radium was well established in the treatment of rheumatism, gout, syphilis, anamia, epilepsy, multiple sclerosis and other chronic diseases. One physician reported that from 1913 to 1921, he personally had given over 7,000 injections of radium, in doses ranging from 10 to 100 u Ci each. Pharmacopoeias from the 1920s listed dozens of patent medicines that supposedly contained small amounts of radioactive materials. Paradoxically, most of the governmental regulatory intervention in the growing field of radio-pharmaceutical nostrums was limited to prosecuting patent medicine manufacturers whose supposedly radioactive preparations were found to give off only background levels of radiation. The discovery in the late 1920s that many young women had worked as radium dial painters were developing bone cancers, sounded a cautionary note to the medical world, but apparently not to the radium devotees who convinced themselves that these problems were due to impurities in the radium paint rather than to the radium itself.

## The End of the Era of Radioactive Patent Medicines

The era of radioactive and alpha particle emitting liniments ended abruptly on March 31, 1932. On that day a shriveled anaemic patient named Eben MacBurney Byers finally died of multi-system failure, the victim of a mysterious but relentlessly progressive syndrome involving multiple areas of skeletal and soft tissue necrosis, metabolic wasting and bone marrow dyscrasia. *The New York Times* reported the preliminary finding of an investigation into the death under a headline, "Eben M. Byers Dies of Radium Poisoning".

America was at that time in the grip of the Great Depression, and the death of one more poor indus-

trial radium dial worker would not have been front page news. But Byers was a millionaire, an internationally known industrialist, a sportsman and a playboy. He began the final radioactive chapter of his life after falling out of the top berth of a train in 1927 and hurting his arms. Over the next few weeks, he began to complain of chronic musculoskeletal pain and a general run down feeling that was affecting his athletic (and it was rumoured, his sexual) performance. Byers was advised to try Radithor - a radioactive wonder drug invented in 1925 by the self-proclaimed radium expert William J. A. Bailey of Bailey Radium Laboratories, East Orange, New Jersey.

Byers began drinking several half ounce bottles of Radithor each day from early in 1928 and until October 1930. He claimed to feel invigorated and restored and recommended Radithor enthusiastically to his high-society friends. He sent cases of it to his business partners and girlfriends and even fed it to his racing horses. Radithor was expensive, each bottle costing a dollar, but what was that to the wealthy members of Byer's social set? The Radithor promotional literature was filled with "testimonials" from great physiologists of the day. And also, Radithor was "absolutely guaranteed harmless".

About two years after he had begun taking Radithor, Byers told his personal physician that he had lost "that toned up feeling." He began to lose weight and complained of headaches and toothaches. Eventually his teeth began falling out. A radiologist in New York, looked at Byers radiographs and noticed some similarities in the lesions with the descriptions of radium dial painters, Byers' body was slowly decomposing, the result of massive radium intoxication from the Radithor.

Some physicians disagreed. The Radithor that Byers had consumed had contained only tiny amounts of radium, each bottle certified to include microgram quantities of a mixture of "radium and mesothorium in triple distilled water." Many believed that such tiny quantities were innocuous, being cleared from the body before they could accumulate. Radithor was widely used: if it was so dangerous, why had not these effects been reported before?

Since Byers was a millionaire and a prominent citizen, the wheels of the government began to grind. The Federal Trade Commission (FTC) launched an investigation into Radithor and in September 1931. Byers was called to testify. He was too ill to travel and so an attorney, Robert Winn; was sent to his Southampton mansion to take the deposition. He later described the scene:

*"A more gruesome experience in a more gorgeous setting would be hard to imagine. We went to Southampton where Byers had a magnificent home. There we discovered him in a condition which beggars description. Young in years and mentally alert, he could hardly speak. His head was swathed in bandages. He had undergone two successive jaw operations and his whole upper jaw excepting his two front teeth and most of his lower jaw had been removed. All the*

*remaining bone tissue of his body was slowly disintegrating and holes were actually forming in his skull."*

Byers autopsy revealed that he suffered from the necrosis of the jaw, swollen kidney cortex, cerebral abscess, hyperplastic regenerative bone marrow and bronchopneumonia. His breath, bones and viscera were all highly radioactive; despite the fact that he had taken no Radithor for more than a year.

### William J. A. Bailey

Attention now focused on the Bailey Radium Laboratories and its founder, head scientist and chief executive officer, William John Aloysius Bailey. Bailey disagreed with the diagnosis of Radithor induced radiation poisoning, declaring, "I have drunk more radium water than any man alive, and I have never suffered any ill effects." The next day when health officials tried to obtain further information they found that Bailey had left town.

Bailey's involvement with the pharmaceutical industry began somewhere around 1918. That year he was fined \$ 200 plus costs for fraudulently promoting the "Las-I-Go- For-Superb-Manhood" patent medicine. Chemical analysis of these pills which were advertised as a potent aphrodisiac; revealed that the active ingredient was strychnine. Sometime in the early 1920s Bailey became interested in radioactivity and became president of a company called Associated Radium Chemists Inc. This company produced a line of radioactive patent medicines including Arium, a tablet and Linarium a radioactive liniment. Bailey was also listed as the inventor of another brand of radioactive pills, Thorone Tablets, which were marketed as a treatment for sexual impotence.

Among other devices that Bailey invented were the Radioendocrinator, a small radioactive chip that "ionized the endocrine system." the Bioray, a radioactive paperweight that would supply "a steady flow of gamma rays without any fuss or bother," the Thoronator; a radon water charging device for producing radioactive water in home or office; and the Adrenoray, a cure for impotence that consisted basically of a radioactive belt clip. Some of these devices were sold for as much as \$ 1,000 apiece, and all apparently found a ready market in the Roaring Twenties. Bailey later claimed that it was the Great Depression, rather than the Federal Trade Commission, that eventually caused him to get out of the radioactive patent medicine business.

Bailey died of bladder cancer on May 16, 1949. He had reached the age of 64, an astonishing feat of longevity for someone who claimed to have consumed more radium water than any living man, it is perhaps ironic that his final contribution to the literature of mild radium therapy came almost two decades after his death, when his bones were exhumed as part of Massachusetts Institute of Technology/Argonne National Laboratory study on radium physiology, his remain revealed extensive radiation changes and were still quite radioactive when studied in 1968.

With the realization that the magnitude of radon problem is greater than had been previously appreci-

ated, interest in the health effects of low-level alpha particle exposure has been rekindled. Some critics have suggested that these radon health risks are being oversteered and that low-level long term exposure to this "natural" isotope is unlikely to cause much harm. Before crediting this line of argument, we would do well to review the history of the rise and

fall of mild radium therapy in the early decades of this century.

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*Dr Roger M. Macklis*

*Excerpts from a paper in JAMA Vol. 264,  
(August 1, 1990)*

Work is proceeding on a war footing to establish a

## *News From Kerala*

nuclear power plant at Peringome, about 18 kms eastwards of Payyanur in Kannur district of Kerala. Site selection is presumed to be almost confirmed and acquisition proposals are on. Simultaneously, the proposed construction of Kakkadavu Irrigation Project, shelved for the past two decades, owing to the public agitation, is being taken up again with the singular objective of providing cooling water to the Peringom power plant. There will not much need for large scale evacuation of people from within the 1.6 km radius 'exclusion zone' since it is at present itself, government owned rocky land. The authorities have been extremely careful in suppressing all information, so that the likelihood of any immediate revolt against the proposal can be averted. Survey work and other activities have been carried out at night and various government departments have already provided vital information, called for by the nuclear power authorities. This plant is almost certain to materialise, especially as there is positive feedback from a section of the population.

Apart from several villages, highly populated cities and towns with lakhs of people, come within 30 km radius of the proposed plant. \*In spite of this majority of the people seem to be rather indifferent to this nightmarish prospect. People clamouring for so called "development" and "progress" are openly campaigning for the plant with promises of abundant electricity and employment.

We seek your solidarity and support in spearheading a strong movement against the proposed plant. We propose to do hectic campaigning during the next few weeks followed by an antinuclear workshop-camp at Peringome on Chernobyl day. All kinds of audio-visual materials like slides; posters; films and song cassettes will be very useful to us. We seek the presence of all antinuclear enthusiasts in the camp to be held from April 26. There is a great need for resource persons and display material, so that the people can be awakened from their blissful ignorance and complacency. A nuclear power plant should never come up in such a densely populated state as Kerala, where even the International Atomic Energy Agency specifications can never be fulfilled.

We have become active in antinuclear activities again. You may have learnt about the meeting we organised on October 2, 1990 at Kottayam. It was very successful and effective. About a thousand people participated in the programme including some very

eminent persons like Dr U. R. Ananthamurthy, the Vice Chancellor of Mahatma Gandhi University.

Kerala Government had continued to maintain perfect silence over the plans regarding the proposed new nuclear power plant in the state. This made us feel that they were dropping the idea as there had been state-wide protest on the issue. Now suddenly, after the District Council elections are over and the Left Democratic Front has won a massive success, they are again pressing this idea. Already a state level seminar, in which people like Dr. P. Klyengar and a number of "official scientists" participated; has been conducted at Ernakulam. They have also decided to hold such seminars at all district headquarters in the state.

We too, have started the counter campaign. We feel that right now there is a great need to concentrate on the semi-urban and rural areas of the state. One such corner meeting has already taken place at Kuravilangadu. Two of us Mr. M. J. George and Mr. Jacob spoke there.

Mr. Rajagopal, a very active member of our group and the staff reporter of the daily *Mathrubhumi* was recently given an award for environmental journalism by the State Committee on Science and Technology of the Government of Kerala for his article, "Pollution in Kerala." The award was presented to him at the State Science Congress '91 which was held at Calicut. He received the award and then returned it back to the committee. In his speech, he said, "When our government and science organisation will show integrity by deciding against the installation of the nuclear power plant, he will take the award. We organised a gathering yesterday at Kottayam to accord him a reception.

Now that we have decided to move into the villages, we feel the need for an effective poster exhibition. Any ideas, pictures, cartoons for it would be of great help. Also, have you or anybody else prepared a list of nuclear accidents in India and what is happening to Indian nuclear waste? Where are they

---

*Abey George*

*Ayamkudy, P.O. Mathuchiva*

*Kottayam, Kerala.*

dumping it?

# REVIEW

*The Fire in the Rain*  
*The Democratic Consequences of Chernobyl*  
Peter Gould  
The Johns Hopkins University Press, Baltimore

When the Greek forces finally did overcome the Trojan resistance after resorting to the trick with the "Trojan Horse", they were intoxicated with victory. In their arrogance with their own cleverness, they forgot the Gods who had made it all possible. The Gods punished them by sending storms in the sea in which most of them perished. The Greek word which describes this kind of arrogance -- which leads to ultimate disaster - is hubris.

Peter Gould's book on the democratic consequences of Chernobyl, is a book which describes the hubris of modern civilisation. After successfully wresting the secrets of the atom, modern man is no less intoxicated with cleverness, but disaster awaits.

In many ways, this is indeed a splendid book. Its main theme is the political fallout that followed the radioactive clouds over Europe. How nations with different political systems reacted to this unforeseen threat. How they tried to 'manage' the crisis - the suppression of news; the deceptions practiced by 'experts'; the bureaucratic games played with great skill in the 'democratic' countries like Britain and France and with brute unfeeling force in countries of Eastern Europe, are all there in the book - the various strands gathered by a "shepherd" of the intellectual world and presented in a way that brings order and meaning to data and allows lessons to be learnt. Woven into this masterly presentations are technical interludes - in which the author tries to make the subjects of reactor physics and radiation biology intelligible to the lay reader in order to answer the question, "what actually happened at Chernobyl."

These technical interludes are well done - they may not be as authoritative as some others by experts, but they do take the lay

reader across the main difficulties likely to be encountered while attempting to make sense out of rads and rems and positive "reactivity co-efficients" and such like. Thus, this book is an important addition to the growing literature on Chernobyl and one that ought to be read widely. Its choice of subject matter, though of vital importance, is one that is not often discussed in other publications.

However, I am unable to give the third full throated cheer to the book for it suffers from a serious flaw, - its last chapter. Peter Gould's dilemma is best put in his own words :

*"Chernobyl brought us face to face with a dilemma and if any good may be said to have come from the catastrophe it is the possibility that it has opened the path for reflective thinking once again. The dilemma comes from the fact that it is not easy to think prudently, for the choices are agonizing. We have built a civilisation on energy. Our movements, our food, our communications, our material comforts.....all require prodigious amounts of energy, and we have fallen into profligate habits. Even the stability of nations, and therefore the world system made up by them, becomes questionable when energy sources are suddenly placed in jeopardy. If civilisation is to continue to unfold in more humane ways, the energy to fulfil the hopes and necessities of civilised life must be there. The sheer pressure of people on energy resources and a fragile environment lies behind this horn of the dilemma."*

Gould's way out of the crisis is the next nuclear chimera - inherently safe reactors. He does not realise that Hiroshims, Bhopal, Chernobyl, the Gulf war,... are all names of the same crisis. The crisis produced by profligate habits and a way out needs one to reflect on how to give up these habits. This is a fatal flaw in this otherwise fine book.

.... !!!

*Investigator* I have only a few questions.... You were not at the power station at the time, were you?  
*Director* I wasn't able to be, but I was at the very beginning.  
*Investigator* Did you realise at once what had happened?  
*Director* More or less. In general terms.  
*Investigator* And you left the station?  
*Director* I, er, temporarily absented myself. You see...  
*Investigator* I know. Your grandchildren were alone at home.  
*Director* I saw that work was in hand to extinguish the reactor. My son's mother-in-law lives in a village nearby, eight kilometers away. I thought I'd just dash over to the village, leave my grandsons there and come straight back.  
*Investigator* But why didn't you alert the whole town? Then they could all have dashed out into the country, even if only, say, five kilometers up-wind. They could have gone that far on foot. It only needed an announcement on the local radio to notify everybody. There was no need for them to wait those twenty-four hours until the official evacuation order was given.  
*Director* It's not as simple as that.  
*Investigator* But to put your grandsons into your car and drive away - that was simpler was it? After all, you knew better than anyone else what had happened. Yet children were still playing football in town *this morning*. And freshly picked cucumbers were being brought in and sold on the streets...  
*Director* I couldn't get back. You know why. They must have told you.  
*Investigator* Yes - a silly accident. Your car skidded off the road and got stuck on the verge for a quarter of an hour. Fortunately, your grandsons didn't get out of the car. Yes, I know about that. And on the way back you were stopped and detained for a medical check.  
*Director* I had driven right through the "dirtiest" area of the fallout.

## Letter Box

### An Invitation to Join Indranet

We feel sure that you are concerned about the mounting turbulence of our present time; the increasing destruction of all life support systems, the spectre of global climatic change, the sharpening communal tensions, the shameless politics, the rapid degeneration of our culture and the hundreds of other problems that beset us. The aftermath of the Gulf War and Bush's agenda for a new "world order" is added cause for alarm, if only because the global arm twisting will be more blatant. Millions of people already pauperized by "modern development" will be further marginalized.

A number of activists and other individuals; concerned with social justice and sustainable development, have expressed the need for urgent action in this critical situation. One of the suggestions was the formation of a network which will provide for mutual support, for access to sources of information and for a forum for discussion.

There is an ancient Indian story that Indra weaved a vital net, with a pearl at each node. Each pearl symbolizes a single individual and each pearl reflects the light received from all the others.

Our aim is to build just such a living network. Each person's contribution, no matter how little can significantly help other individuals and greatly

enhance the collective influence. Hence this invitation. We would be happy if you join us as a participant in Indranet.

If you are interested in joining the network, we would like to know more about you personally : your interest, your background, your hopes and fears. We would also appreciate having information on your work and organization, if any, its genesis, its aims, its achievements, the problems it faces, the areas in which you need support or in which you can offer some help or guidance. Others will surely benefit from this information. This information and other suggestions by network members will be published in a newsletter.

The network is being run by Maharashtra Prabodhan Seva Mandal at present, but members willing, could be made independent. There is no membership charge but donations to cover costs of paper and postage and to enable us to reach more people are most welcome. Each individual in an organisation can also be a member. If you agree with what we are doing, do try and get others involved in the network.

*Winin Paceica*

*Maharashtra Prabodhan Seva Mandal*

*79 Carter Road,*

*Bandra. Bombay 400050.*

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You will be happy to know that we had a good meeting on Women's day (March 8, 1991) on the subject of the Kaiga nuclear power plant. Dr. Kusuma came as an invited speaker and there was a slide show and a short video film on the subject of environmental at Kaiga.

We are planning a series of publications on the various nuclear power plants in India which we want to bring out in time for the April 26th conference at Bangalore. The Bookstore is planning to put up a special sale of nuclear related publications at this conference. We already have books on Narora and Shivaji Rao's Silent Killers, etc. and we are preparing booklets on the others, for example Kaiga, Koo-dankulam and Kalpakkam.

However, we do not have material on Rawatbhata and Kakrapar. The booklets are planned as a mixture of reports, articles and some press clippings on agitations. The purpose is to provide information on the plants to those who might be interested. We believe that the antinuclear stance is hotting up and we must take advantage of this to push it further. Therefore, if anybody has any reports, documents, reports of agitations etc. on Rawatbhata or Kakrapar could these please be rushed over to us.

*Mr. Norma Alvares*  
*The Other India Bookstore*  
*Above Mapusa Clinic,*  
*Mapusa, Goa 403507.*

#### EDITOR'S NOTE :

By the time this issue of *Anumukti* reaches you, it would be rather late for sending material to Ms. Alvares to meet the April 26th deadline. However, I feel that even though these booklets may not be ready in time for the meet, they ought to be published all the same, since they would fulfil a very strongly felt need. Therefore, I would request all *Anumukti* readers to help in this cause.

I am using back issues of *Anumukti* to draft a solidarity resolution highlighting the shared concerns of Bhopal and the antinuclear movement. I think that it is important that we publicize these issues as interconnected.

Also, we are planning an Earthday (22 April) rally in Madras to initiate renewed focus on the Eveready Boycott. (Union Carbide's manufacturing facility is in Madras.) We shall be spending the week before the rally visiting Madras organisations to mobilize participation. There is also a great need to mobilize support in Madras for the protest against both Koo-dankulam and Kalpakkam.

*Kim Laughlin*  
*Eklavya, E-1/209 Arera Colony*  
*Bhopal 462016.*

Already a lot must have been said about Nuclear Power Corporation's advertisements in *Sanctuary*. Still I want to add my little bit.

The reasons which propel Nuclear Power Corporation to give ads in a magazine like *Sanctuary* can be some of the following:  
*Anumukti 4.5*

1. The readers get misinformed and 'follow the line'.

2. The readers get the impression that *Sanctuary* does not hold a view strongly opposed to nuclear power.

3. Nuclear Power Corporation can use *Sanctuary's* name in campaigns of the type "Even these people accept us."

If all these objectives can be unambiguously defeated, I feel there is no harm in taking the ads. Some might doubt if this can be done. I believe that Nuclear Power Corporation's designs can be defeated. If I was to do it, I would :

1. Invite reaction of Anumukti or similar group and print it on the page next to the advertisement.

2. As editor, write a note saying "We oppose nuclear power and also this advertisement campaign which is spreading disinformation... We thank Nuclear Power Corporation for sponsoring this issue in which we plan to expose their hollow claims" (All this should be done after providing prior intimation to NPC.) If even after that, NPC wants to give the ads they ought to be welcomed.

The activists/researchers at times get rather fussy about such issues. One reason may be the fear that a fast buck can corrupt the value system. However if such guidelines are followed while accepting advertisements, this can be prevented. In fact, with such guidelines in operation, chances are that organisations like Nuclear Power Corporation will never give advertisements to magazines like *Sanctuary*, in the first place.

Have you printed any posters? Do you plan to? A3 size posters of two colours can be both effective and affordable. (It would cost around Rs. 2.50? per poster for a print order of 500 posters.) In case there is interest in this, I can take responsibility for sale of posters worth Rs. 200/.

*Girish Sant*  
*c/o Dr Kulkarni*  
*Amrita Clinic, Athwale Corner,*  
*745 Deccan Gymkhana*  
*Pune 411004*

While travelling in a bus from Jamshedpur, I encountered a very interesting person who works as a machine operator with the Department of Atomic Energy. He is middle-aged and had worked previously at Jaduguda. Nowadays, he drills out samples of mineral at various probable sites. At present they are working very close to my village. There are three such sites-Rangamati, Galudih (near Raj Kharsawan) and Sanjay. During our conversation he told me that his son aged about 6 cannot talk and had been examined by doctors at various places including the Tata Memorial Hospitals at Jamshedpur. The Tata Hospital's report mentioned was that the son had a defect in the brain. What struck me was the possibility that the defect in child's brain may have something to do with the radiation absorbed by the father in the course of his work. Therefore, it would be very useful if a sample survey could be conducted in the

area to see if there are many other cases amongst the workers involved in nuclear mining. I'll be very happy if I could be of any help in conducting such a survey. I have also noted down the person's name and home address.

*Dr Mangal Mahato*  
*School of Physics*  
*University of Hyderabad*  
*Hyderabad 600134*

Please accept my felicitation on your excellent editorial "The Road From Hiroshima" and a very good issue of *Anumukti* Vol.4 No.4. February/March 1991. You have provided good coverage on nuclear issues and problems both within India as well as abroad.

Citizens for Alternatives to Nuclear Energy (CANE) is organising a three days workshop on nuclear energy and people's movements from April 26th to April 28th, 1991 at Bangalore, as you had announced in the last issue of *Anumukti*. In view of national elections, it will be an excellent opportunity if we all meet at Bangalore and make it into a National Convention Against Nuclear Power. It may also be appropriate to prepare a manifesto/resolution 'a GREEN Manifesto from Bangalore Convention which will be presented to all political parties and asking the electorate to vote for only those candidates who agree to our demands of a moratorium on nuclear power and nuclear weapons and also agree to provide more funds for non-conventional sources of energy and for the protection of the environment.

*Dhirendra Sharma*  
*Committee for a Sane Nuclear Policy -•*  
*M -120, Greater Kailash-I,*  
*New Delhi 110048*

My wife and I have been travelling in India to visit our friends and relatives. At Malati Devi Choudhuri's house we came across an impressive copy of your periodical *Anumukti*. Having been involved in providing information questioning the wisdom of building additional nuclear power plants in Britain, we were glad to see the dangers ahead set out clearly.

The size of the construction contracts and the secrecy surrounding semi-military decisions make your task particularly difficult.

*Nicholas Gillet*  
*Oakcroft, Cross on the Hill,*  
*Maples, Cheshire SY148DH U.K.*

Just today (April 4, 1991) I heard on the B.B.C. radio that there has been an increase in the number of deformed children born in the vicinity of Rajasthan Atomic Power Plant at Rawatbhata. (See "Chernobhata" in *Anumukti* Vol. 3 No.6 June/July, 1990-Editor). British television has shown a film which was secretly made regarding this and the increasing cases of sterility amongst the youth of the area. It also gave reference of some government doctors who refused to say anything probably due to fear of administrative action. All this is definitely the outcome of your hard work and continuing efforts. I feel certain

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that these efforts shall prove effective and be fruitful.

*Rampratap Gupta*  
*Government College, Rampura*  
*District Mandasur M.P.*

I learnt from *Janosatta* (Hindi) that a team of doctors and experts from the Bhabha Atomic Research Center had been to Rawatbhata for investigating the very high incidence of diseases over there. Their findings were that the diseases were due to the ignorance, carelessness and superstition of the villagers. The news item also mentioned the denial to this issued by Shri Ratanlal Gupta, the Sarpanch of Rawatbhata. He said that if this was so, then why have the diseases increased after the opening of the nuclear power plant since ignorance and superstition have been present for ever. It is necessary that an independent investigation of these diseases be carried out quickly. A group known as Socially Active Medicos from Indore has also shown some interest in this but somebody has to take the responsibility of organising it.

*Sunil*  
*Kisan Adivasi Sangathan*  
*Kesala, Dist: Hoshangabad M.P.*

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