



ANUMUKTI

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A Grim Tale From The Nuclear **Fairyland**

A Heavy Whitewash

Un 27th of July, there were barrels of heavy water which needed upgrading, standing in a corner of the upgrading plant building. The building was to be whitewashed and a contractor had been assigned the job. One of his labourers, Shri Madholal, who was to do the actual whitewashing found that there was no water in the taps. He made the wash in the barrel of heavy water and then proceeded to put a coat of whitewash on the walls of the room. After finishing his work, Shri Madholal washed his brush and then washed his hands and face with the same heavy water. The report said that in the process about 40 litres of heavy water worth Rs 250,000 was contaminated and thus wasted. As soon as information regarding this event reached the authorities, there was consternation and panic amongst them. The new coat of whitewash was scraped off the walls and sent off to the laboratory for tritium analysis. Shri Madholal immediately disappeared from the scene and his whereabouts were unknown. The chief superintendent

of the power station, Shri T S V

Ramanan, even while admitting the veracity of the incident insisted that the quantity of heavy water lost was very small. According to him Shri Madholal had only washed his brush in the heavy water but had not used it to paint the walls. No other officer at the plant, besides Mr Ramanan was willing to talk at all about the incident with news correspondents.

Rajasthan Patrika 21.8. '91

Dainik Navjyoti 21.8. '91

(Translated from Hindi)

Editor's Note:

Indian nuclear reactors use heavy water in large quantities for cooling and moderation. The coolant heavy water is circulated under pressure and quite often it leaks from the pipes on to the floor of the reactor building. Heavy water is extremely expensive. The Comptroller and Auditor General of India had estimated in 1988, that a kilogram costs Rs 13,400. In fact using the C.A.G.s figure the cost of 40 liters would be more than 5 lakhs, but that is besides the point. I mention it only as an illustration of the petty kind of chicanery, the

nuclear administrators do to minimize damages caused by information leaks. But it is indisputable that any heavy water which is lost is a great financial burden and great efforts are made to recover all leaks and spills. But, despite all effort some heavy water cannot be recovered. It is important to make this point because nucleocrats have now started claiming that "Every drop of heavy water is collected. (See Lies, Damned Lies and Nucleocratic Explanations on page 7 of this issue.) It has been reported that the Rajasthan unit-1 reactor's spillage is of the order of 95 tonnes a year and the recovery is about 78 tonnes a year. The other 17 tonnes is lost to the atmosphere. That is, around 45 kg, worth more than Rs 6 lakhs in 1988 prices is lost every single day. Similarly unit-2 loses around 10 tonnes of heavy water every year.

Used heavy water is radioactive since neutron bombardment experienced by the molecules of heavy water result in the production of tritium which is radioactive. It can also be contaminated with ordinary water and this severely affects its neutron absorption

properties. Thus the heavy water which is recovered from the reactor building needs to be upgraded—that is brought back to requisite purity—so that it can be reused in the reactor. This is done in an upgrading plant situated in the heavy water plant complex.

The incident well illustrates the lax safety procedures and the lackadaisical attitude towards the safety of their own lower rank workers obtaining amongst officers in nuclear establishments in India. The people who do the actual work are often casual labourers employed on a temporary basis through labour contractors. They are given no training whatsoever and have no understanding of the hazards involved. Supervision is at times non-existent. The major effort of the authorities, on those rare occasions when a failure of the information security system does throw the glare of public scrutiny on them, goes in trying to play down the seriousness of the consequences. And it is the Madholals of the world, who have to pay the costs of this wretched system. Not only does this poor man, lose his only means of a meagre livelihood, no serious effort is made to trace him and help him medically since there can be no doubt that he at least has ingested measurable quantities of radioactive tritium. The only loss that bothers the authorities is that of their precious imported heavy water.



From The Editor's Desk

any years of my life have been spent "doing research" in Physics. Some would prefer the word wasted, but I don't subscribe to that view. Doing research meant many separate actions: sitting in air-conditioned comfort in a library and reading journals and books; talking and discussing ideas with friends till early hours of the morning; sitting with a pen and paper (usually backs of used computer sheets) trying to come with a theory to explain the phenomena of interest and so on. Usually I ended up just doodling pictures, but by and by I learnt the tricks of the trade and became fairly adept. Not by a long shot in the first rank, but able to get along and be accepted as one of their own by most of the physics biradari.

The research that I did do reflected the priorities of the international physics community. Phase transitions and critical phenomena, dynamical theory of glasses, charge density waves, 'and so on. All rather interesting and great fun to do, but even I would not claim that my doing this work had any relevance to the lives of the common mass of people whose taxes were paying for it. What kind of research should the state sponsor is a complicated question and something of a Pandora's Box and anyway is not of immediate interest to readers of *Anumukti*. But over the years, I often wondered if it would be possible to do research which would be of immediate relevance to people's lives and how to do it and who would pay for it. The health survey of villages around Rawatbhata and Rampura that we organised in September was a small attempt at doing people oriented research. We could not have done this work at all without the great help rendered by many different groups of people. In this issue we have a report regarding how the survey was done and also about the reactions it engendered amongst nucleocrats. The analysis of the data that we gathered is being done and we ought to have complete results by the middle of February at the latest.

An Apology

This issue which should have been out by the beginning of October has become so late that it is a shame and a scandal. People have started wondering if they have received 'mukti' from *Anumukti*. No apology can suffice. My only excuse is that we have been overwhelmed by work. However the important point to consider is how to get back on the regular schedule. What we intend to do is the following: get the next issue out by January 25th, 1992 and then a double issue focussing on the Rawatbhata health survey analysis by the 15th of March. We will not bring out a separate April/May issue and then resume regular schedule of publication with the June issue.

Mohan Parikh 1922-1991

'Monnai' was a versatile genius who accomplished more in one lifetime than what most can manage in many. He was an inventor, a designer, a popularizer of science, a teacher. He took science to the villages not through writing books and articles but by designing and producing tools and implements which would be of direct use to people. His passing away is an immense loss to the worldwide movement for an ecologically sensible and humane alternative society. The loss to Anumukti and to me personally is even greater.

A Report on the Rawatbhata Health Survey

We first went to Rawatbhata in April, 1990 at the invitation of the Parmanu Pradooshan Virodhi Sangharsh Samiti, which was a body formed by Sarpanches of villages around Rawatbhata. Despite the name, this was not an antinuclear group. The invitation to us was the proverbial clutching at straws when drowning. They had originally invited us a year previously, but then had later cancelled the invitation. This cancellation had been done because the RAPS (Rajasthan Atomic Power Station) authorities had promised to look into their complaints on the condition that they would cancel their invitation to antinuclear groups to come to Rawatbhata. Their demands were the usual demands of people with respect to development projects: When would we taste the fruits of development. They wanted jobs, schools, roads, access to medical facilities... One of the points they made was the fact that even after seventeen years, the village on whose lands the reactors had been built, (Tamlav) had still to receive electricity connections. (See Sunil's article *Rawatbhata: Development Brings Dissatisfaction* in *Anumukti* Vol.3 No.5, April, 1990)

Our report about the visit (*Chernobhata*?) was published in *Anumukti* Vol.3 No.6, June, 1990. It received a good amount of national and some international publicity. During the last one and a half years, other newspapers sent reporters and photographers to the area and they have published a number of reports. A British journalist, Christopher Mitchell made a clandestine film, "The Price of Power", which was shown on channel-4 in Britain on April 2, 1991. Excerpts from this film along with an interview with the Secretary, Atomic Energy Regulatory Board (AERB), Dr. K.S.Parthasarathy, were shown in the September edition of "Eyewitness"—a videomagazine brought out by *Hindustan Times TV*. The

release of this video caused quite a commotion with questions being asked in the parliament and the subject remaining in the news for quite a few days running.

Nuclear Santa Claus

The glare of publicity has caused some movement in the usually slow moving government machinery. For example, just since May 1990:

- Electricity connections have been made to some houses in one hamlet of Tamlav.
- The authorities have admitted that the water in the wells and in the ponds may be contaminated and have warned the people not to drink it. A pipeline extending well over a few kilometers has been laid to supply the villagers with potable water and a tank has been built in Tamlav to store the pipeline water.
- Appointment of a compounder and an auxiliary nursing midwife has been made to the village dispensary of Jharjhani and they are residing there at present.
- While our survey was in progress the state government announced that it was converting this village dispensary at Jharjhani into a primary health centre and a resident doctor would soon be posted there.
- Some local youths have got permanent jobs in DAE (Department of Atomic Energy) run establishments. Besides the DAE authorities have within the last year promised:
 - Rs.50 lakhs towards the construction of a local referral hospital at Rawatbhata.

- Rs 50 lakhs to the road department to construct all-weather roads linking some of the villages with Rawatbhata.

- Rs 22 lakhs to the forest department for afforestation of the denuded hill slopes around Rawatbhata.

I am not claiming that this downpour is only due to the publicity generated by our trip, but the fact remains that DAE and the State Government had not done any of this during the last seventeen years after the plant was established but did do it during the last year and a half. At the same time, DAE mandarins and some nucleomaniacs in the press started a systematic campaign of trying to discredit the observation that there is something unusually wrong with the health of the people around Rawatbhata. (See *Lies, Damned Lies and Nucleocratic Explanations* on page 7.) Therefore, it became more and more necessary to find out some basis for objective assessment rather than relying solely on subjective evaluations of different 'biased' individuals.

The Basic Difficulties

For the past year we had been trying to persuade various independent organisations who had expertise in the matter to conduct a door-to-door survey of the area. We felt diffident about doing the survey ourselves since we had very little expertise and virtually no resources to undertake this task. Unfortunately no organisation came forward to do this work on their own. Some organisations, who did show an interest, wanted to submit project proposals and get approval and grants from the government before proceeding. However, government approval essentially means approval from DAE and they have been notorious for delaying grant of approval for such surveys. For example, they

delayed for five years before giving grants to South Gujarat University for making a baseline health survey of the area around Kakrapar nuclear power plant.

At the same time there were repeated requests from the people around Rawatbhata and they promised all possible help in carrying out the survey. Also, at the Bangalore meeting of antinuclear groups in April 1991, (See *Anumukti* Vol.4 No.6) there was strong support for the idea of conducting the survey. It was all these things together which helped us to decide to do the survey ourselves.

Not having done a survey ever before we were totally ignorant of the difficulties involved and had no inkling of the different kinds of organisational skills required. Now that the data collection part of the survey has been successfully completed, I don't mind admitting that without expert help, there is a good chance that we would have made a fine mess of things. But fortune favoured us and we had a very lucky break in the form of a chance meeting with Dr Leela Visaria of the Gujarat Institute for Area Planning. She not only helped in the design of the survey schedules but also sent two absolutely invaluable investigators to help conduct the survey. Shri Vinayak Dave and Ms Ila Mehta not only taught us a good deal but also took care to see that the survey was properly conducted and no household was inadvertently left out.

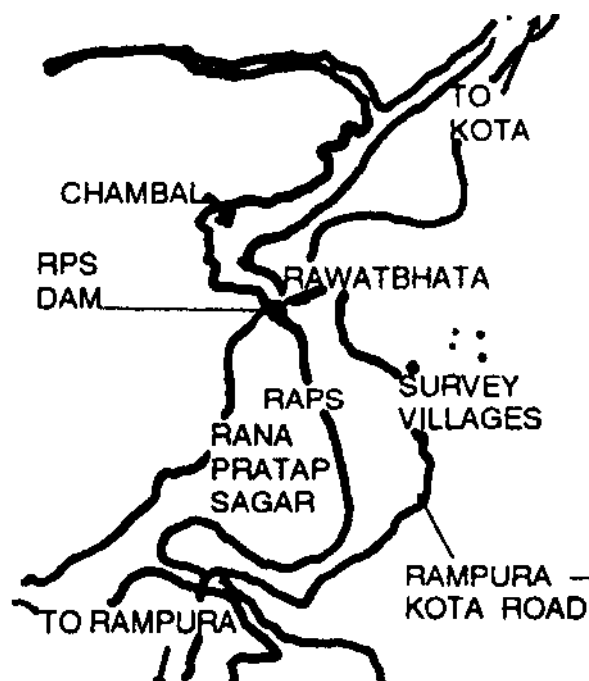
The second great constraint was money. We toyed with the idea of applying for a research grant, but gave that up due to considerations of the time and effort involved in obtaining one. Then we had a happy thought. First of all reduce expenses to the absolute minimum and then share the burden so that no single entity gets too much of a load. It was decided that all investigators would volunteer not only their time and energy but also contribute their travelling expenses; boarding expenses would be the responsibility of our local hosts in the villages and at Rawatbhata and expenses such as publication of schedules and on medicines and

other equipment would be borne by the *Anumukti* group. We made an appeal for both volunteers and donations and the response was overwhelming and far beyond our expectations.

Communications posed a severe problem since the survey was a joint cooperative effort involving many people most of whom lived far apart. We were not able to solve this problem satisfactorily and I think that if there is to be any future survey, central coordination needs to be done from some metropolis with adequate communications. Originally the survey was fixed for 11th of August, but that had to be postponed with very little notice. Even with just a week left there was no information if the survey schedules were printed or not; (they were not) or if any volunteer was coming for certain. Even the notice of postponement which we sent by telegrams did not reach some friends on time and three doctors from Indore and an investigator from Hoshangabad made a vain trip to Rawatbhata.

The Terrain

The reactors are situated on the banks of Rana Pratap Sagar—which is the reservoir formed the



dam of the same name on the Chambal. But for Rawatbhata township, the area is sparsely populated. The villages selected for the survey were Tamlav, Deep-pura, Malpura, Bakspura and Jharjhani. The reason these villages were selected was that they lie in an East-North- Easterly

direction from the plant and during the monsoons they are directly downwind. Except for Tamlav, which lies closest to the plant all the others are situated in a canyon called the Kundal. Deep-pura and Malpura lie just in the beginning of the valley and the walls of the canyon are very close to these villages whereas Bakshpura and Jharjhani are further within the valley where it has opened up. There are other villages further down and there have been some reports of genetic abnormalities in children from some of these villages, but we did not include them in the survey, since to have done so, would have meant increasing the size of the population covered rather substantially. That would have made the survey well beyond our capabilities.

For the sake of comparison, we chose four villages Khetpalia, Dhodhlai, Anandipura and Chandrapura near Rampura in Mandsaur district of Madhya Pradesh. These villages are a little more than 50 km distant from the nuclear power plant. Our reasons for selecting these villages was that they have similar size, and caste composition and are yet distant enough (we hope) from the nuclear power plant. In all we have covered a population of little less than six thousand—of these some three thousand one hundred are near Rawatbhata and two thousand seven hundred in the control villages.

The data that was collected provides information not only about health of the people but also things like where they were born, their educational status, employment, births and deaths within the last two years in the family, pregnancy histories of all women of child-bearing age, land holdings, fertilizer and pesticide use, animal holdings, nutritional status... Thus, we hope not only to compare the health of the people in the near vicinity and those farther away, but also try to see what positive difference this giant nuclear enterprise made to the economic status and prospects of its neighbours. Isn't that what development is supposed to be all about?

The Volunteers

There were three separate groups of volunteers but they all shared one quality—unbounded vigour and enthusiasm for work. It was indeed a revelation to see this kind of dedication. There was a group of eighteen college students from Delhi some of them post graduate students. They came in two batches, being unable to stay for the entire duration of the survey due to exams and other academic commitments. The other group were students of the Rampura college and they did all the work in the control villages. There were two volunteers from Hoshangabad. Another group were eight doctors from different parts of the country who came for the last few days and helped by diagnosing the different ailments of the patients.

The Nitty Gritty

Each and every household in the selected villages had to be identified first. To do this every house was numbered. Since we wanted the numbering to last for sometime in case a revisit was needed later, a small metal numbered disc was nailed to the front door of every house. Next a volunteer would write down the name of the head of the household and the total number of family members. A third person would at the same time draw a map of the village and place the house in the context of the map. All this had to be accomplished before any survey questions could be asked. Sometimes even this seemingly straightforward task could present unexpected difficulties. In Deppura one day, all of us were astonished to see a group of people emerging from what looked like a field of tall corn. Further enquiry revealed that we had completely missed four houses since they did not have any visible entrance, being surrounded by fields on all sides.

The numbering had to be logically consistent and the logic had to be apparent to someone who had not participated in the numbering process. Remarkably, this was accomplished so successfully that

later on some villagers approached us with a request for a copy of our list, because they said the village panchayat numbering was inaccurate and inadequate and they would prefer to adopt our more systematic approach.

For the filling of survey schedules, a team consisting of a male and female volunteer each was assigned houses according to the map. Quite often there would be nobody at home and repeated visits had to be made. We had to reach the village almost at dawn since by 7.30 A.M. most folk would leave for work. Thus the most productive times were early mornings and late evenings. Women in the family were the more crucial contact since only they could give us details of pregnancy history. Since women are the most over-worked group, having to work both in the field and at home, answering our persistent and seemingly never ending questions was an additional imposition. But they cooperated most wonderfully and answered all the questions with exemplary forbearance. Sometimes, especially initially, there were communication problems due to the local Mewari dialect, but luckily most local youth did follow and speak Hindi and after a few days the volunteers had picked up enough to get by.

A Typical Day

The day would begin usually around 4.30 in the morning since we had to get ready and catch a bus or hitchhike on trucks to reach the villages early enough. The house numbering, listing and map making team would start on a new village while the scheduling team would fill schedules in previously numbered and listed area. Quite often, some villagers would think of us as some kind of undercover government agents, who had come to do 'Nasbandi' (Sterilization) and refuse to answer any questions. This happened more often in control villages since there the local medical authorities had very kindly and generously provided us with transportation. In such cases one had to explain to them what the

survey was about and persuade them. At times this could be a severe test of persuasive skills. But finally, there wasn't a single instance where a family did not consent to answer questions. In some cases people mistook us for people who would provide them with land deeds. In these cases too, the false hopes had to be removed.

An air of uncertainty hung regarding lunch, though our hosts in Rawatbhata went to extraordinary efforts to provide us food on time. I don't think anybody ever went hungry, but lunch wasn't something you could count on.

A lot of time was spent walking large distances during repeated visits to a house whose residents had gone out for work. Vinayak had the most work, since he had to keep the whole thing coordinated, distribute new house numbers to those who were unable to locate people in their assigned houses and then keep track that no house was left out and that there was minimum duplication.

By the time we got back to Rawatbhata in the evenings, hitching a ride back on trucks, it was around 9 P.M., and all of us were dead tired. A bath and dinner and most of all sleep was a welcome prospect. However, before one could go to bed, one had to complete anything left unfinished in the schedules and also meet together to discuss the problems encountered during the day and take the next days assignments. We rarely managed to get to bed before midnight. Tomorrow was already upon us.

Initially there was some culture shock, since city-bred volunteers had previously very little experience of extreme poverty and the lack of sanitation in the villages. But the warmth with which the villagers welcomed us soon won us over and we decided to stay in the villages to avoid the transportation hassles. We were treated so royally well that we felt like 'baratees'. I ate some of the tastiest meals I have ever eaten.

But my best memories of the survey are connected with the truck rides back to Rawatbhata in which

there was a lot of singing and some incredible feats of balancing on a fast moving truck without any kind of hand-holds. It was this spirit of bonhomie and unfailing good cheer that has established strong feelings of comradeship between all of us.

Another positive side effect of the survey was that all the volunteers who came to Rawatbhata, none of whom had any previous strongly held antinuclear convictions, became ardent antinukes. The days spent at the survey counting diseases and watching stark poverty face to face and contrasting this scene with the monster development project nearby was the best possible education on the 'benefits' of nuclear energy. Any 'free' time was spent discussing all aspects of nuclear energy production and distribution. It was without doubt the best nuclear energy awareness camp that I have ever attended..

A Special Problem

Despite earlier fears to the contrary, there was no direct attempt by the authorities at stopping the survey. However there were rumours and scares aplenty. Informers and CID's were a constant bother. Probably the reason there was no direct attempt at stopping the survey was the fortunately bad relationship between the RAPS big bosses (their overbearing attitude hasn't made them loved) and the local administration. However, this is just speculation on my part. The RAPS authorities did succeed in forcing the local administration to take some 'action'. This action essentially consisted in putting pressures on our local hosts. They were repeatedly harassed and questioned regarding the identity and the bona-fides of the volunteers.

The Last Days

After completing the work at Rawatbhata we went to Rampura. By then the volunteers had become veterans and knew the codes in the schedules like the back of their hand. Unfortunately, this was the

precise time that most of them wanted to had to return. They postponed their departure by a few days and helped in training the students of Rampura college in filling the survey forms. The work at Rampura, was just as busy as Rawatbhata, but it was easier and better organised. The local medical authorities had given us a vehicle, so getting to and fro from the field area was no longer such a hassle. These student volunteers of Rampura, astonished me most of all. I suppose it is my elitist attitude, but I expected the volunteers from Delhi to do all the enormous amount of work they did and bear all the hardships involved without complain. But to find the same dedication and diligence in students from a small almost semi-rural college was a very welcome surprise.

While the work in Rampura continued, some of us had to get back to Rawatbhata, since the group of volunteer doctors was arriving. We wanted them to check all the cases which had been identified in the survey and confirm the diagnosis. But by then we were part villagers ourselves and invited ourselves to stay in the villages. The doctors not only went to every house diagnosing, they also had to distribute medicines and to listen to all kinds of complaints.

On the last day, September 22nd 1991, we requested The Kota Cancer Society and The Mahavir Vikalang Society to organise a cancer detection and a prosthetic camp. They organised two: one at Jharjhani and the other at Rawatbhata. There was great enthusiasm in all the villages about these camps and there was such a great rush of people that it almost overwhelmed the arrangements. A number of polio victims were provided with calipers and artificial limbs, a number of biopsies were conducted of people suspected of suffering from cancer.

Right now we are making the schedules computer ready. Once this task is completed we can put all the data in a computer and get correlations between different

variables, and then finally the analysis can begin.

Acknowledgements

There were so many people whose unstinted help and cooperation made the survey possible that it is difficult to know where to begin giving thanks. Unfortunately, I cannot publish the names of many, especially those who live in and around Rawatbhata because I do not put it past the RAPS authorities to 'punish' them for this effrontery.

The help given by Dr Leela Visaria and the Gujarat Institute of Area Planning, Ahmedabad in design of the survey was what allowed us to even think of undertaking the survey in the first place. The Institute is also doing the analysis.

Rajeev Singh, Ratna Mathur and Nivedita Menon of the Network to Oust Nuclear Energy, were responsible for recruiting the volunteers from Delhi. It was Ratna's will to see the survey through which gave us a new impetus at a time when we were feeling rather depressed following the first postponement. Rajeev and Ratna did so many things that it would take pages to just enumerate them. Similarly crucial was the role of Shri Ram Pratap Gupta of Rampura College, who not only made all the arrangements there but also had to convince the villagers of the desirability of having the survey. Ms Sudha Hardikar put us all to shame since she not only did all the work that was assigned to her but like Oliver asked for more!

I cannot complete this article without mentioning two names from Rawatbhata. They have already suffered so much harassment that they are immune to any further provocations. Jaan Mohammad Saheb not only opened the doors of his hotel to us, he opened the doors of his heart. And more than anything else it was the courage and the perseverance of Shri Ratanlal Gupta—Sarpanch of Rawatbhata, which carried the survey through.

Lies, Damned Lies and Nucleocratic Explanations

The release of the September edition of "Eyewitness"--*Hindustan Times TV's* videomagazine was a media event in itself. No event in recent memory has caused so much consternation among nucleocrats and their acolytes. The video showed a ten minute clip depicting a small sample of the health problems of the people around the Rajasthan Atomic Power Station (RAPS). There has been a veritable flood of press statements, explanations, denials, issuing of clean chits to RAPS administration by their bosses, and numerous articles in various newspapers. There is a common thread through all this outpouring and since it is part of a long running systematic campaign, it might be worthwhile to analyse its main points.

Defense in Depth

The main idea which governs the safety of nuclear reactors is called defense in depth. The idea being that there should be so much redundancy in safety features, that if some particular feature fails to function, the safety of the whole system would not be threatened since some other safety system would work and there would be no leakage of radioactivity to the environment. A similar defense in depth strategy seems to be the governing principle in the attempt to plug the leaks of information to the general public.

However, despite all the redundancies, safety systems have been known to fail. In case of failure and the leakage of radioactivity to the environment, the governing principle is called damage limitation. The same principle seems to be in operation with regard to information leaks. Like a game of chess, the arguments of the pronuke lobby have a discernable opening, middle game and an ending.

No Health Effects At All Opening

Stout denial is the name of the game. The dominant theme of the pronuclear argument has been to deny that there are any health effects at all to be seen. It is all a figment of the biased antinuclear (read unpatriotic) imagination. Thus, we have

"Atomic Energy Commission Chairman Dr P. K. Iyengar strongly denied these reports as uninformed and in some cases part of a campaign to stop India from pursuing its nuclear research and power generation."
(*Hindustan Times* 17.9.1991)

Dr D.V.Gopinath, Director, Health, Safety and Environment Group at BARC, was more direct. According to him, *"these reports are based on conjectures and have no basis whatsoever."*
(*Hindustan Times* 17.9.1991)

To Dr K.S.Parthasarathy, the Secretary of the Atomic Energy Regulatory Board (AERB), and presumably the guardian of public interest vis-a-vis radiation, the health effects are nothing unusual and can be seen in every backyard.

"On an average ten percent of all new born children will have some defects or the other. They include cleft palate and additional fingers. The birth defects recorded in the film can be seen in any village."
(Dr Parthasarathy's letter in *Times of India* 24.9.'91)

In fact, Dr Parthasarathy characterized the film

"It does not raise an issue. It creates a seed of suspicion by deliberate propaganda. It can be dismissed in the light of current scientific information available."
Times of India 13.9.1991

With the big guns booming like this can the acolytes afford to remain far behind

"Cancer is nothing new to this region. In recent times cancer incidence has shown an increase all

over, even in regions far away from nuclear power plants."
(Dileep Bhatia - an engineer with RAPP in the Hindi Daily *Jananayak*, 14.10.'91.)

Nothing To Do With Radiation Variation

The stout denial opening has become untenable since the health of the people in villages around Rawatbhata is so extraordinarily bad that it shocks any unbiased observer. So any reporter who goes and sees for his or her own self cannot but help write about it. Also, newspapers publish pictures which are worth a thousand words and readers can make up their own minds just looking at the pictures. Therefore, the new variation of this opening is not to outright deny the existence of sickness but to claim that it is not due to radiation . *"Scientific evidence points to no link what so ever between the reported health problems in the villages near RAPS and the operation of RAPS."*

Mr. S.L.Kati, Managing Director, Nuclear Power Corporation in *Finanacial Express* 21.11.1991

"There is absolutely no evidence of radiation, in any dose, leading to polio-like deformities."

R.Ramachandran's article "Who is Right About RAPS", *Economic Times* 27.10.1991

Editor's Aside:

I saw R.Ramachandran's article rather late to reply to it by sending a letter to *Economic Times*. If one wants to read only one pronuke piece on the whole Rawatbhata affair, this is undoubtedly the one to read. It is a committed nucleophile's polemic. The point that he is making in this quotation is that most of the photographs of deformities that have been publicised depict polio victims which according to him cannot be caused by radiation.

Why Not in Hiroshima Counterattack

To firmly establish the fact that whatever health effects that may be visible, they could in no circumstances be due to radiation from RAPS, the next stage in the argument is a counterattack.

The average doses to parents at Hiroshima and Nagasaki were 13,000 times more, than that to the parents in the Rajasthan villages. Since no genetic effects were found among the thousands of children in Hiroshima and Nagasaki, it is unscientific to expect such effects in the Rajasthan villages.

Dr K.S.Parthasarathy in his letter to *Times of India* 24.9/91

If Hiroshima is too far, Mr Kati brings the point closer home

"The reported health problems in a few villages around RAPS had not been evident beyond natural incidence in the plant workers or their families living in the adjacent plant township. It was to be noted that the limits for radiation exposure for occupational workers was 50 times that recommended for the public"

Dr D.V.Gopinath is characteristically more direct. Giving details of the data collected from the RAPS hospital he claimed,

'Among the 10,000 strong population of plant workers and their families, only 30 deaths attributable to cancer had occurred over the last 24 years. The incidence of only 1.3 cancer fatalities per 10,000 per year compared favourably with the national average of four to five cancer deaths for similar number of population.'

However, nobody plays this attack better than the Chief Superintendent of RAPS Dr Ramanan

"If the main mischief maker is RAPS, then why are the children of the plant workers not deformed? I have worked at the Madras Atomic Power Plant for 14 years and at Tarapur for nine years before I came here a few months ago. Logically I am receiving much more radiation sitting on my chair here than a villager at Jharjhani or Tamlav, but am I affected?"

Where is the Smoking Gun Middle Game

Having launched the attack, the next step is to deny that RAPS gives out any radiation at all! So how can it be blamed for whatever radiation related or not diseases that are to be found in its neighbours?

"None of the two hundred and fifty shutdowns of the reactors has caused any radiation exposure to the public. Leakages do happen as in any industrial plant. Every drop of heavy water is collected. (Heavy water costs several thousand Rupees a kilogramme.) All leaks are contained."

Mr Kati puts the same point in another way

"Generally leaks in the nuclear power plants are misconstrued to be leaks into the environment, which is not true. For example, in the case of the South End Shield

So much for the Internationally Accepted Limits

The following is a translation of a newsreport which was published in Nai Duniya-a Hindi Daily from Indore. A friend sent me the cutting but unfortunately it doesn't carry a date. This report needs a thorough investigation, because if true, it is a damning indictment of the RAPS administration and their masters the nuclear authorities.

Officers of RAPS, in league with labour contractors have been toying with the health of young local labourers ignoring safety regulations. These contractors employ local youth during the shutdown of the nuclear power plant as helpers, feeders, supervisors etc. for maintenance and cleaning purposes. During the course of this work, these youth receive radiation far in excess of the limits set by international regulatory authorities. These young workers, who have no previous experience of working in radiation fields and who have no knowledge of the possible effects of radiation on health are ready to do anything due to their greed for money.

International regulations limit the dose of radiation to 2,000 mrem in one year. But there are some youths who have received 3,000 to 5,500 mrem during the course of a single day! This is not only in contravention of the international safety regulations but is also dangerous to health. The nuclear power plant records show the dose to be only 800 to 1,000 mrem. The actual dose received by the worker can be measured from the thermoluminescent-dosimeter (TLD) carried by the worker. The interesting point is that the contractor does not allow the worker to carry the TLD into the plant so the youth have no way of knowing the amount of radiation they have actually received.

Some youth who have worked during shutdown told us that they are made to work in areas with very heavy radiation. Some ignorant youth even discard their protective clothing while working inside the plant. They claimed that anyone receiving 800 mrem during a day receives Rs 1,600. But the contractor calls them for work again, so that the total cumulative dose can become as high as 5,500 mrem. However, only 800 mrem is recorded. To facilitate receiving the extra dose, the same worker is registered in the records with a different name each time.

*leak at RAPS, the leak was that of light water into the reactor building and not a leak to the environment. There are provisions for collection of leakages and its treatment to meet the regulatory requirements on effluent releases to the environment. Recovery systems were provided to recover heavy water leaks from the system into the plant building because of the radioactivity associated with the release and the cost of heavy water. **

SCIENCE is my Lord and Protector Defense

However, as Vishwanathan Anand will tell you, it is not enough just to attack well. One cannot afford to forget about defense. Nucleocrats like saints have a halo around them which is visible to their acolytes. This halo has the word science written all over it. Thus,

every atomic energy functionary is by definition, a scientist, whereas antinukes are emotional and shrill. R.Ramachandran says it all

"Scientists complain that what they have to say has gone unheard amid the strident campaign run by antinuclear activists."

However, you may not be sufficiently in awe of the desi variety of scientist. Hence every single report does not fail to mention that the radioactivity releases (if any) are well within "internationally accepted permissible limits,"

But in case you are even immune to the immense prestige of internationally renowned scientists and insists on measurements, Mr S.L.Kati has numbers in plenty

"Environmental Survey Laboratory has been in operation over the past 19 years. Radiation surveys as well as collection and analysis of 2,500 samples a year of water, soil, food, air and various other products, had been carried out in an area of about 30 km radius around the plant. The average annual radiation dose computed on the basis of actual air and water route releases over the past 17 years has been less than 5.5 mrem per annum, except 1988 and 1990, when it was about 8 and 12 mrem per annum respectively.

Dr D.V.Gopinath puts it succinctly

The total radioactivity exposure from all routes, external as well as internal by way of food etc., received by an individual in the RAPS environment has been around 1-1.7 mrem per year. The total background radiation in the area is around 81 mrem per year and the exposure limit for the general public set by international regulatory bodies is 100 mrem per year.

Nobody can say that pronukes are not independent of each other. Their figures certainly are!

Universal Trinity Ending

Nucleocrats do not want to keep us guessing as to the cause of whatever health problems that exist. They already know all the answers! It is malnutrition, unsanitary living conditions and lack

of health facilities that are the culprits.

Dileep Bhatia, RAPS engineer even has it on film

"Village women collect drinking water from a pond where pigs are swimming and even a dead dog is floating! We have captured this on film."

R.Ramachandran does not rush to his camera, when he sees a women drawing water. He prefers to quote the Central Water Commission

If the poor health condition of the people reflects anything it is the dismal living, particularly sanitary conditions and near absence of any health care system. For example, the coliform count—as collected by the state government authorities—of the water that is generally consumed by the village population is in thousands and tens of thousands when potable water should have near zero count. The bacteria levels are also very high. These can be the cause of the general poor health conditions making them highly vulnerable to a whole lot of infectious and other diseases.

The Final Check

For the clincher, nucleocrats go back to their opening statement that there are no health effects at all, but now it is not they who are saying it but "independent" experts—doctors appointed by the Rajasthan government to look into precisely these reports.

Pathik Guha reports in *The Telegraph*

"In fact, two independent reports by experts say that the stories regarding radiation mal-affects on the population near RAPS are totally imaginary and facts being mentioned do not have even a distant relation to reality. Some highly placed RAPS officials say that the stories being circulated are "motivated". They maintain that villagers are "trying to blackmail RAPS". These people think that through such adverse propaganda they can force RAPS to provide them with more employment and free medical facilities."

I do not intend to write a detail point by point rebuttal of this bar-

rage. However, it is necessary to clear up some persistent misconceptions.

Science as Scripture?

Is science merely the pronouncements of people who style themselves scientists, or is it an activity, a method of searching the truth? If the latter, than anyone who follows the scientific method is doing science, and anyone who doesn't is unscientific despite his or her 'eminence' and position in the scientific heirarchy. The basic tenet of the scientific method is observation. One just has to open one's eyes and see. Would Dr Parthasarathy have closed his eyes when Galileo was dropping his stones from the Leaning Tower of Pisa, because it would have been "unscientific to expect" both stones to fall simultaneously in "the light of current scientific knowledge?"

The Clean Chit Industry

What needs to be done is simple and straightforward. First and foremost, help must be provided to the sufferers. Next step is to find out if there is an unnatural level of sickness. Once that is established, then one must try to investigate the cause of the problem. There need not be a single cause. It could be a combination of different factors. The cause may indeed be malnutrition, unsanitary living conditions and lack of medical facilities. But these factors unfortunately are common to a lot of regions of the country and should not by themselves lead to uncommonly high level of sickness. It may be that all the deformed children have been born to fifty year old women who have married their cousins. But whatever be the cause, it has to be established using the scientific method. The scientific method does not stop at speculation. It provides proof.

Scientific practice also requires one other key ingredient. Whatever be the results they need to be openly published, so that others can examine them and question them and if need be refute them. "The guarantor of truth in

science, is pluralism in research, free availability of information and open critical debate."

Unfortunately, the two 'surveys' carried out by doctors appointed by the Rajasthan Government, do not come in the category of science but instead belong to the clean chit issue industry. Their work has no scientific value since they have not published it. Hence their methodology of obtaining data remains a mystery. In our country there is no dearth of people who will issue clean chits at the drop of a hat to anyone and especially to someone as rich and powerful as the nuclear establishment.

Hiroshima Red Herring

Whenever one makes comparisons, care has to be taken that the comparison is being done between comparable objects. This is the old apples and oranges problem. Thus, when health of two populations is to be compared to determine the effect of some pollutant, care must be taken that other factors that affect health, are similar. It makes no sense to say that permanent workers at the nuclear power plant, a well paid, well fed, well cared for group does not show similar symptoms as poor, malnourished, unclean water drinking villagers. It would be a great surprise if the health condition of these well to do people was the same as that of the poor villagers. In fact, the claim that cancer deaths in RAPS hospital

are much less than the national average is a pointer in this very direction.

Similar is the case of the Hiroshima and Nagasaki survivors. These people are not an ordinary sample of the general population. They had not only survived the bomb, but also its aftermath—a nation devastated by war, rampant disease, a very severe winter and total disruption of civil supplies and medical facilities. To make an assumption that the survivors did not have a stronger constitution than the non-survivors is absurd. This skewed selection in Hiroshima data has obscured the fact that there are other effects of radiation besides cancer. One effect that has been well established, especially after Chernobyl is damage to the immune system. And this immune system damage does result in an abnormally high level of sickness, whether it be polio, T.B., or Anaemia. (See Dr Alice Stewart's article in *Anumukti* Vol.4 No.3.

A point that needs to be made is that there are many other people living in Rawatbhata township besides RAPS workers. These people are a comparable group to the people living in the villages nearby. A survey can establish whether the assertion that the health effects are visible only in the villages and not in Rawatbhata is true or not. However, nobody has done it. The repeated assertion by nucleocrats that there are no such effects has no basis in experiment.

However, as an aside I would like to make some comments on this very low rate of cancer mortality in RAPS hospital, since it does illustrate the nuclear mindset rather well. The number is a fraud. It would make sense if each and every member of RAPS staff or any of their family members would go only to this facility in case of terminal cancer and go nowhere else. That is obviously not the case. When somebody falls seriously ill, he or she is referred to specialist hospitals in metropolises. Thus, the number and the cancer mortality rate paraded with so much fanfare represents nothing at all. But, unashamed at participating in this fraud, nucleocrats go one better. They calculate the mortality rate by dividing from 1967 when the hospital opened rather than from 1973 when the plant opened. As they say in computerese: garbage in; garbage out.

The Burden of Proof

Although villagers have taken the initiative and have gotten a survey carried out, I think it is a shame and a pity that in our country, the burden of proof of injury falls on poor victims of pollution rather than on the polluters. Similar is the case of Bhopal and numerous other places. Unless we can shift this burden from the victim to the polluter, we would remain an unjust and uncaring society.

Down's Syndrome Higher Near Nuclear Plant

A Canadian federal government study has found puzzlingly high incidence of Down's Syndrome in Pickering and Ajax, two communities near the Pickering nuclear generating station. The study, done for the Atomic Energy Control Board, tracked congenital abnormalities in a 25 kilometre radius around the nuclear plant from its startup in 1971 to 1988. The study was done by Ken Johnson, head of the birth defects section at Health and Wel-

fare Canada. Mr Johnson is also responsible for the national data base that records birth defects, the Canadian Anomalies Surveillance System.

Although the study concluded that infant mortality and incidences of most types of birth defects are no higher near the plant than the average elsewhere in Ontario, Down's Syndrome rates in Pickering were 86 per cent higher than the provincial average and in Ajax 46 per cent higher. The study was

undertaken after widespread media coverage three years ago of a birth-defect study by David McArthur, a York University graduate student, that raised a possible connection between childhood abnormalities and releases of tritium from the Pickering station. (See *Anumukti* Vol.2 No.5 April 1989)

The research on birth defects adds another dimension to the debate over the safety of living near nuclear facilities. In a study

released in June by the Atomic Energy of Control Board, (AECB) childhood leukaemia deaths in Pickering were found to be 34 per cent higher than the provincial average, but the researchers concluded the finding might be due to chance.

This is not the only report of a connection between radioactive contamination and Down's Syndrome. Earlier, Dr Patricia Sheehan, a Down's Syndrome specialist from Ireland had shown a similar connection with respect to the fire at the Windscale nuclear facility in England in 1957 (see *Anumukti* vol.1 no.4) Also, the

West German Institute for Human Genetics had detected a significant increase of Down's Syndrome in children born in January 1987 in West Berlin following the Chernobyl nuclear disaster in April 1986. There has been an extensive work carried out by Dr Kochupillai and coworkers and later on by the group headed by V.T.Padmanabhan, which has shown a connection between the high background levels of radiation in the monazite bearing sands of coasts of Kerala and Down's Syndrome. However, the Canadian study is the first which links 'harmless' routine releases from nuclear power plants

with this condition. It is also the first such study conducted by an official nuclear energy authority anywhere in the world, which admits that a problem exists.

Ontario nuclear power plants routinely release small amounts of tritium. According to a statement issued by AECB, these releases result in a very small radiation doses to the population in the vicinity of the plant. The amount being in fact less than one hundredth the dose received from naturally occurring sources of radiation.

Narora: New Era of Nuclear Irresponsibility

There was a time when nuclear power plants, missile flights, large construction projects and all such fanciful white elephants were "dedicated" to the nation with a ceremony befitting the birth of a son in a royal household. The Prime Minister would do the dedication while the high and mighty would be in attendance. The whole event would be conducted with extravagance. A fling to commemorate the lavish waste of public funds which had been the hallmark of the project in the first place.

Unfortunately, nowadays we live in the age of uncertainty. One doesn't know for sure, that the august personage one invites for the grand event would still be holding his or her exalted office by the time the great day comes around. One doesn't even know for certain that the button that is pressed to signify the start of operations, would not result in an explosion. Being men of the world, nucleocrats have decided that discretion is the better part of valour, and have opted for 'simple' opening functions. The opening of the second unit of Narora Atomic Power Station was announced by Dr P.K.Iyengar, the Chairman of Atomic Energy Commission, at a press conference.

The earthquake of 20th October, which devastated vast areas of Ut-

tarkashi and Chamoli districts of Uttar Pradesh, put a damper on the festivities. It was yet another grim reminder of the fact that this region is geologically unstable and is prone to tremors of moderate to severe intensity. Whether these occurrences become calamities or not depends not, only upon the magnitude of the tremors but also on the architecture and lifestyle of the people inhabiting these areas. Japan and California are also regions of geological instability and yet earthquakes there of similar intensity do not cause as grievous harm. The Japanese in particular have for a long time designed light structures for their dwellings and places of work which do not result in serious injury even in case of collapse. One simple and sensible precaution that any government could easily undertake would be to insure that no structure which could cause widespread devastation in case of failure was ever put up in a region prone to 'natural' calamities.

Politics Predominates

However, to expect sense to prevail over political considerations in India, is to expect the impossible. When the idea of the Narora project was first mooted in 1974, the late Dr A.K.Ganguly, who was one of the members of the site

selection committee, strongly objected to the choice. However, more obliging nucleocrats, ever eager to please their political masters, argued that if nuclear power plants were to be excluded from a region on the basis of seismic unsuitability alone, than more than two thirds of the country would become out of bounds for reactor construction. With the change of government in 1977, the Narora project went into cold storage. Although Shri Charan Singh was very keen to have the project approved, he did pay heed to the warnings voiced by technical experts. However, once Smt Indira Gandhi returned to power in 1980, she was especially interested in the project as a means of demonstrating to the farmers of western U.P. her clout by accomplishing a task which even Shri Charan Singh had been unable to do. All technical objections were brushed aside and the project was on its way once again.

Earthquake Proof Design?

Luckily the recent earthquake which measured 6.1 on the Richter scale was not in the near vicinity of Narora. The epicenter was more than two hundred kilometres away. According to Dr S.L.Kati, the Chairman of Nuclear Power Corporation, instruments at the

plant site designed to measure ground acceleration, recorded a reading of 0.025g. Dr. Kati claims that Narora can withstand tremors even ten times as strong. He has in a letter to newspapers tried to clarify the seismic design concept underlying Narora. He says that "the concept of the plant takes into account two levels of earthquake; one is known as the operating basis (0.15g) which is expected to occur once during the lifetime of the plant and at which time the reactor is expected to remain operational. The second level (0.30g) indicates the maximum magnitude at which all safety systems are expected to be fully functional and the reactor shut down safely. The seismic instrumentation at Narora is set to shut down the reactor at a conservatively low level of 0.1g. The recent recorded ground acceleration of 0.025g at Narora is very much lower than this value. Under international procedures and regulatory requirements, the level of ground acceleration that was felt at Narora on October 20, does not call for an automatic reactor shutdown or any special examination of the plant and equipment. No visible damage to structures in the vicinity of Narora was reported and there was no disruption in telecommunications, water supply, electrical and power systems." So far so good! One hopes and prays that the Narora power station never has to undergo an earthquake of an intensity which would severely test all its safety systems. However, the present earthquake does raise certain questions which need to be seriously addressed.

- The assumption that a nuclear reactor has been built to withstand earthquakes of a particular intensity, is based on computer modelling, which has been found defective in the past. For example, in 1979, the U.S. Nuclear Regulatory Commission temporarily closed five nuclear reactors when it discovered that the engineers had underestimated the stresses that

pipings in the reactors' coolant system might have to withstand in the event of an earthquake. Other nuclear plants, such as the Humboldt Bay reactor in northern California, have been closed after years of operating because they were belatedly found incapable of withstanding a severe earthquake.

- The safety of nuclear reactors also presumes that individual components like piping, valves, electrical circuitry, etc., have been specifically engineered to meet desired seismic specifications. There have been persistent and serious allegations made by Dr Dharendra Sharma that substandard and counterfeit parts have been widely used in the construction of Narora reactors. Nucleocrats have chosen to just ignore these charges rather than to publicly conduct any inquiry into them.
- The 'science' of earthquake prediction is yet in its infancy. Although the design basis earthquake is presumably based on the data gathered over the last hundred years in the region, there is no guarantee that the next earthquake would not exceed in intensity anything previously experienced and hence the value which the engineers have guessed for it. Even in California, geologically the most studied region on earth, there have been earthquakes in places and of magnitudes which have surprised experts as little as two years ago. In fact, a one mile section of a freeway in San Francisco collapsed following an earthquake which measured 7.0 on the Richter scale in October 1989. An earthquake of that magnitude is certainly possible in the Narora region. It is what

Dr Kati assures us, that Narora has been built to withstand.

- Of even greater concern than the safety of the reactor containment building are the radioactive waste storage pools situated near the reactor site. The waste stored in these pools can contain more radioactivity than found in the reactors themselves. Since, these pools are designed as temporary structures, their construction vis-a-vis seismic criteria is more lax than for the reactors themselves.
- The emergency evacuation plan developed by the nuclear authorities does not even consider the possibility of a nuclear disaster following an earthquake. It assumes that thousands of people can be evacuated quickly and in an orderly manner. Even in the best of times this is unlikely to happen, but just after an earthquake, with damaged roads, overworked and impaired communications systems, loss of electrical power and panic amongst the ranks and also in the populace, it is surely impossible.
- Lastly and most importantly, Narora is located on the banks of the Ganga. The Gangetic plain is the most populous and fertile region of the country. We cannot afford a Chernobyl anywhere, but in Narora it would mean the end of our civilization.

The Great Indian Megawatt Vanishing Trick

For the last many years one has been hearing time and time again that Narora is a standardized design: the forerunner of other reactors of 235 Megawatts capacity each. The advertising blitz launched last year "Nuclear Power and you" also says this and in fact goes on to add capacities of

A Nuclear Quiz

various non-existent plants to show how they would all together contribute 10,000 Megawatts by the year 2000 A.D. However, all the newsreports regarding Dr. Iyengar's press conference opening Narora-2 stated very clearly that its capacity was just 220 Megawatts. This figure of 220 MW was mentioned at four different places in one newsreport. The reports in fact mentioned that the capacity of the previously -opened Narora-1 was also 220 MW. That this figure is not just some inattentive reporter's slip or the ever convenient printer's devil, gets confirmed from a signed article by the Chairman of the Nuclear Power Corporation, Shri S.L.Kati in the *Financial Express* (21st November, '91) which too mentions the same figure of 220 Megawatts. He if anyone ought to know.

This loss of 15 Megawatts is no joke. Since Narora is the standardized design, other reactors now under various stages of construction in different parts of the country would also presumably be of 220 MW capacity. This would

The question concerns two Indian reactors. One is a 220 MW reactor which opened in 1973. In 1981, cracks were discovered in its end shield. It was shut down for repairs for three years briefly opened and had to be again shut down. It was called a prototype and was almost written off, but heroic efforts have revived it. However, for safety reasons, it has been derated and is not allowed to operate beyond 90 MW. There is also the other reactor. The very latest (before October 24, 1991) 235 MW reactor which opened in March 1989. It probably had some initial problems (what are called teething troubles by doting nucleocrats) but these were overcome and it has been in commercial production for more than a year now. Its design is the standard which subsequent reactors in the country would emulate.

Question:

During the year from July '90 to June '91 which of these two reactors produced more electricity?

Answer:

The correct answer is that they were both awful, Narora-1 did produce a little more electricity than RAPS-1, but both together produced less than either of the units at Tarapur. The plant load factor was just 25 %.. In July and August '91 they both did not produce a single unit.

mean a total cumulative loss of 120 Megawatts from the nuclear generating capacity. That is more than the capacity of RAPS-1!

Cheapest Nuclear Energy in the World!

Another point to emerge from Dr Iyengar's press conference was that Indian nuclear power plants cost roughly \$650 per kilowatt to build while the international cost

of a nuclear power station is around \$2,000 per kilowatt. Capital costs are the main component of costs of nuclear electricity since as the nucleocrats keep telling us the maintenance cost are small—"it takes only a few truckloads of uranium a year to run a nuclear power station instead of a whole trainful of coal every day it takes to run a coal-powered plant." With a cost advantage of almost three times, the Department of

Atomic Energy is producing what has to be the cheapest nuclear electricity in the world. I wonder there is no sense of urgency or a sense of rush of our Indian experimenter in nuclear power plant construction. Either no body believes these wonderful figures, or else outsiders are fearful of plants that lose 15 Megawatts of capacity at press conferences. Perhaps they look at overall plant performance and decide that however cheap these reactors may look at first sight, they are worthless since they hardly produce a quarter of their capacity, (See Box)

Fire Delays Kakrapar Opening

During the budget session of the parliament, the government had informed the house regarding the imminent opening of unit-1 of the Kakrapar atomic power station. It was said that the unit would become critical latest by December. Some articles eulogising nuclear energy also appeared in Gujarati newspapers. The role of nuclear energy in mitigating the chronic

power shortage in Gujarat was stressed. They all greatly praised the heroic work done by the engineers and the construction workers who had managed to complete the construction in just seven years instead of the sixteen that it had taken Narora. As a matter of fact, construction workers had struck work, demanding bonuses for having completed the construc-

tion so quickly. The authorities did give in to these demands.

Now it seems that these announcements and press briefings may have been somewhat premature. As the saying goes, never count your nuclear chickens before they are hatched. A fire broke out in the turbine room during a routine preliminary test. The test was being carried out taking power

from the Ukai hydroelectric power station. The engineer on duty ignored warning signals and hence the fire is being attributed to human error. The fire has caused extensive damage to transformers and the whole electrical circuitry in the power station. The authorities were tightlipped regarding whether the fire had caused damage to the control room of unit-1. Visitors to the plant after the fire were shown around all other parts of the reactor, like the calandria etc., but received only excuses when a request to be shown the control room was made. They were told that the "fire had started in a structure in between the turbine room and the transformers. The only structure in this location was the control room. It took more than a week just to restore electricity supply to the station following the fire. The whole area around Kakrapar, including the workers' colony at Moticher remained in darkness all this while. Estimates of monetary damage vary from Rs 4 crore to Rs 36 crores. These numbers are not very relevant, since the interest charges for a few months on the hundreds of crores that Kakrapar has cost would themselves be comparable to these amounts. And

there is no doubt at all that this fire has delayed electricity generation from Kakrapar by well over a few months. If one adds to these costs the cost of the lost production in downstream industries because of the delay in the commissioning of the plant, the loss to the nation due to the fire could be well around Rs 100 crores.

Normally one would expect, with losses of such magnitude, that the press in Gujarat would be publishing reports after reports and discussing this incident threadbare. Unfortunately, normal criteria do not apply with sacred cows like nuclear energy. The only report that appeared was a small inconspicuous bit on an inside page of *Gujarat Mitra*. The only 'National' newspaper to publish an account was *The Economic Times*, and it did this almost, a month after the event and most of that report consisted of reassurances from the plant authorities that no nuclear materials were involved in the fire.

This fire has caused great consternation amongst the people living in villages in the vicinity of Kakrapar. They had for long been fed "facts" by nuclear authorities: like accidents in a nuclear power plant are rarer than meteors falling upon houses. Therefore, a

major accident even before the formal opening of the plant has been a cause of severe anxiety.

Another issue which is agitating some villagers in the neighbourhood is that the authorities are in the process of raising the height of the Kakrapar dam. This is being done, because it seems that the water presently available in the dam would not be sufficient to meet the current needs and also simultaneously meet the needs of the nuclear power plant as well. What is still somewhat unclear is whether this realisation has dawned just now or whether this was part of an old plan. It is quite possible that the water requirements of the nuclear power station could never have been met by the old dam, but the authorities had kept the local people in ignorance of this fact. Quite often one hears "Where were you till now" and "why did you not protest before these hundreds of crores were spent" as criticism of protest actions. All such criticism fails to take into account the nature of the authorities who love to keep the public in the dark regarding their plans till the last possible moment and then plead that the time for protest is long past.

Peringome: People March Ahead

People turned up in large numbers from different parts of Kerala to participate in the march organised by the Peringome Antinuclear Forum. The 70 km march, started from Peringome on 1st of November, 1991 and ended at the collectorate at Kannur on the 4th of November. It demanded from the government that it scrap the proposal to establish a nuclear reactor at Peringome. The agitation against the Peringome plant started on 26th of April, 1990. On 6th of August, 1991, thousands of people had picketed and paralysed work at five government offices in Peringome. But despite all this, the authorities had remained unconvinced and in no mood to abandon

the proposal. They had continued to abandon the proposal. They have instead, gone ahead with the construction of the Kakkadavu dam, which would provide cooling water to the proposed reactor.

The most remarkable feature of the Peringome struggle is the fact that it is not aimed simply at avoiding a nuclear reactor at Peringome. The people are not only against siting the plant at Peringome, but they oppose the siting of the plant anywhere else in Kerala, or in India or for that matter anywhere in the world. Thus, although the actions are local and site-specific, the slogans used are global and against nuclearisation everywhere. The campaign has stressed the economic, ecological

and ethical questions involved in the nuclear option.

The other remarkable feature of the agitation has been the wide participation cutting across all political barriers and petty sectarian biases which have been so important in Kerala till now. All participants have come voluntarily of their own will and convictions; there have been no party shepherds to flock the sheep. Artists, writers, professionals, media people and ordinary folk joined hands in solidarity and made the march a memorable experience.

The march was inaugurated on 1st of November at 11 A.M. by Mr M.T.Vasudevan Nair, an eminent writer and film director. He told the gathering, "We have to say an

emphatic NO to nuclear power, not for our own sake, but for the sake of future generations. We have no right to make their lives miserable and unlivable." Shri M.P.Veerendra Kumar, managing director of *Mathrubhoomi*, demanded that the government publish a white paper on its nuclear projects and that the Atomic Energy Act of 1962 be scrapped. Scientists, however clever and intelligent they may be, should not be exclusively entrusted with the authority of taking decisions involving severe risks. Bishop Dr. Paulose Mar Paulose, champion of liberation theology and a renowned orator in Malayalam, presided over the inaugural meeting. He pointed out that if democracy has to have any meaning, people should have active participation in the decision making process and it is the people's will that should prevail. The minority decision to impose a nuclear power plant on the people militates against the very spirit of democracy.

Antinuclear friends from outside the state had also come to demonstrate their solidarity with the struggle of the people of Peringome, and their presence added a unique momentum to the entire campaign preceding the march. Dr. Sanghamitra Gadekar of the *Anumukti* group and Shri Rajeev Singh an activist from Network to Oust Nuclear Energy in Delhi, spoke about their experiences at Rawatbhata, Kakrapar and Narora. Dr Sanghamitra said that the people of Kerala are lucky because unlike the people of other states with nuclear power plants, they already have before them the bitter experiences of nuclear energy production.

There were receptions organised by the local people all along the route of the march. Several teams of actors put up street plays at various centres. Some organisations had raised huge banners along the route greeting the marchers. Besides continuous slogan

shouting, the marchers enthusiastically sang songs and recited poems. Copies of a Malayalam booklet, *Nuclear Power: False Promises, Horrible Realities*, were distributed all along the march.

Antinuclear Forums

An Antinuclear forum was formed at Thrissur on Nov 2, 1991 under the chairmanship of Prof K.Satchidanandan, poet and critic. Mr P.K.Venugopalan is the convenor.

The forum shall educate people at the grass-roots level, so that a new perspective of development can be achieved. As part of this programme an antinuclear training camp shall be held in February to train activists.

Till now, 12 antinuclear forums have been formed at panchayat level. Work is going on to form units in other panchayats of the district.

Ms Nandini, Ms Asha, Dr C.K.Jagdeesh, A.K.Ramakrishnan, N.Subramaniam, T.S.Ravindran, K.Ramachandran, A.Mohan Kumar, T.Ravithran and several other activists explained the potential threat caused by the Peringome plant.

There were three overnight halts during the march. Each evening there were public meetings organised at each of the venues. The first night the halt was at Payyanur, the second at the Taluka headquarters at Thaliparambha and the third night at Puthiyatheru town. People gathered in these meetings in very large numbers. Among the speakers besides those already mentioned were editor of *Ankh* Prof John C Jacob, Sathyam Mokeri M.L.A., veteran freedom fighter Shri A.V. Sreekanta Poduval, K.T.Kunhikannan, Kasturi Devan, Ashraf, Rajeev Kumar and other leaders of organisations.

On the last day of the march, a charter of demands was submitted to the district collector asking that the government declare in unmistakable terms that the nuclear plant would not be set up. The renowned poetess Sugatha

Kumari administered an oath, "In order to guard the future generation's right to live, we shall struggle against the nuclear plant till our breath lasts and till the last drop of blood is within us." Later, a valedictory meeting was held at the Stadium Complex, Kannur. The meeting was presided by Dr T.P.Sukukaran, noted playwright, educationist and social worker. It was addressed by luminaries like Dr Sukumar Azhikode, Bishop Rev. Sebastian Valloppalli, Sugatha Kumari, K.V.Surendranath D.Vinayachandran, C Unni Raja, and Dr Sanghamitra.

There is no doubt that the march and the campaign has renewed confidence in the people and has made them more determined than ever to resist the atomic menace.

K. Ramachandran
Peringome Antinuclear Forum
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Kerala

LETTER BOX

What are the other nations of the world doing and thinking with respect to the production of nuclear power? Recently in *The Times of India*, there was an article on the son of Field Marshal Romel, who is now the mayor of Stuttgart. The article says that this German town has two nuclear plants; I have read in *Anumukti* that the most recent tendency in the developed countries is to frown upon and discourage new nuclear plants, because of the dangers of radiation and because of the problems associated with the disposal of radioactive wastes. I think it would be worthwhile to publish a survey of the nuclear plants already established in developed countries of Europe and North America and in Japan. Japan would be of particular interest since it is known that it has no sources of coal and oil.

All our nuclear plants like Kaiga are situated far away from inhabited areas, but the Stuttgart report shows that the plant there is situated close to the city. Can *Anumukti* organise a conference in

India of the representatives of these countries for a discussion on this subject? In a world of progressively depleting fossil fuel resources, the importance of the subject of peaceful utilisation of nuclear energy should be obvious.

I would also like to draw your attention to the letter published in *The Times of India* of 24th September, 1991, under the title "RAPS Safety", bearing the signature of Dr K.S.Parthasarathy, Secretary, Atomic Energy Regulatory Board. On a similar complaint published in *Anumukti* last year by Sanghamitra Gadekar, I had sent an enquiry to the Atomic Energy Commission in New Delhi. That enquiry has elicited no reply upto now.

Shri R.K.Patil
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Editor's Reply:

No new nuclear plants have been ordered in the western part of the presently united Germany for more than fifteen years. Nobody, not even the Indian nucleocrats is advocating that new nuclear plants be built near the cities due to the risk involved in a catastrophic accident. Thus, the fact that there are old nuclear plants not too far away from some cities in Western countries is indicative not of the safety of nuclear energy but rather of the ignorance and arrogance of nuclear establishments of these nations in days past.

Not all our nuclear plants are situated far away from densely inhabited areas. The latest addition to the nuclear family, Narora, is situated right in the midst of the most populous and fertile regions of the country. Even where nuclear plants have opened in sparsely populated regions, like Rawatbhata, over the years,

people from other parts migrate to the region to provide services to the workers' colony. In a few years the area no longer remains uninhabited.

A nuclear industry journal, *Nuclear Engineering International*, does publish country wide surveys of nuclear establishments in various parts of the world. This journal is available in libraries of some engineering colleges and might be available with the National Institute for Research in Environmental Engineering in Nagpur.

As far as your proposal for a conference on the peaceful uses of atomic energy is concerned, I don't see any merit in it, even if *Anumukti* had the capacity to organise such an event.

In a world of depleting resources, the future lies not in persuading fossilizing technologies, but in using less, wasting nothing and working towards self-sustainable technologies and lifestyle.



I was pleased to read about your bi-monthly journal on non-nuclear India, in the July/August issue of *Good Life*. I am a perma-culturist. Permaculture advocates the planning and design of totally self-sustainable, independent systems which generate all the five F's (food, fodder, fuel, fertilizer and fibre) within the system by employing common-sense, en-

vironment friendly technology. In energy generation, permaculture advocates conservation and waste recycling.

But more importantly, I am a natural hygienist-I and my family are enjoying the benefits of a drug-less life for the last four years. We have slowly moved away from a lot of artificial things and are now planning to settle down on a farm of our own. I am therefore a staunch opponent of the nuclear power (for whatever purpose) lobby.

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