



ANUMUKTI

A Journal Devoted to Non-Nuclear India

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The Worst Danger

*Labour's exploitation is not the worst danger,
Police beating is not the worst danger,
Greed and betrayal of trust are not the worst dangers,
...The worst danger is to be overwhelmed
by the peace of the grave
To lose one's capacity to react with sensitivity,
accept everything quietly,
to leave home for work, and then return home from work,
The end of our dreams
This is the worst danger.
The worst danger is that eye
which sees yet coldly ignores everything.
Whose sight loses the capacity to kiss the world with love and
which is lost in the blinding stream of happenings...
The worst danger is the moon,
which after every massacre rises in the quietened courtyards
But does not dig in your eyes like hot chillies,*

*Struggle will bring
beautiful designs for the embroidery of our sisters,
struggle will appear
as milk in the breasts of our wives,
struggle will become
glasses for the eyes of our old mothers,
struggle will smile
as a flower on the graves of our dead.*

*Avtar Singh Posh
(Translated from Punjabi)*

From The Editor's Desk

Anumukti in the Time of Troubles

The last few months have been a terrible time; a time when everything seemed topsy-turvy; a time when all of us appeared to have given way to a collective frenzy; a time when reason was lost and an irrational rage and fear reigned everywhere. A time to be ashamed of.

And yet as Dickens said of another turbulent era, "it was the worst of times, it was the best of times."... Shining like jewels in a sea of horror are innumerable stories of courage and sacrifice. People like Jamu Behn in Rander, Surat who single-handedly stared down a large crowd and saved four of her neighbours; or of the muslim brother whose neighbour a Hindu grocer ran away to save himself from mob-fury after handing him the keys of his shop; this man proceeded to open the shop and sell goods and after peace was restored and his neighbour returned, restored to him, the entire proceeds. Or the Muslim girl who refused to accept the nasty circumstances that her friend would not be able to appear in examinations since the school they both went to was located in a muslim area; and who therefore went to her friend's house alone at a time of tension to invite her to come and live in her house. The parents of the Hindu girl were apprehensive and asked the Muslim girl to come back with her father. Well, the father accompanied his daughter back and assured the family that they had nothing to

fear and could safely send their daughter to his home; and now both of them were living together in a Muslim home and preparing for their exams... Stories of Hindus saving Muslims, Muslims saving Hindus. No, I am putting things badly. They are tales of ordinary people exhibiting extraordinary courage to save fellow human beings.

Chandrashekhar, one of my students, raised a question that continues to bother me. The whole country is burning, he said, and yet you continue to talk about nuclear energy. The question of communal harmony is more vital. We should quit everything else and try our best to restore sanity.

No doubt communal harmony is vital. But then does sanity mean just the mere absence of communal or other civil strife? Does it not mean a striving for a just society where irrational schemes like nuclear power and large dams and military and the like are impossible? The major sites of the current bout of madness have been large industrial cities like Bombay, Surat, Ahmedabad, Calcutta, Kanpur... Places where a vast rootless underclass is forced to live in inhuman conditions just to eke out a living. The roots of continuing violence are not basically religious but are actually related to the disorientation and dehumanization caused by this monster of development and the idea of a 'hard' STATE. There is

the builder lobby setting fire to slums so that they can get hold of the land. There are the goondas trying to terrorize and extort 'protection money'. There are the politicians who are thinking of the next elections and how all this fear and hatred is going to come handy then. And there are 'decent' middle class families who are sick of all this rioting but who have in the past been so engrossed with themselves that they have not bothered to share their joys and sorrows with their neighbours and in fact don't even know who their less well off neighbours are. And isn't combating all this, what *Anumukti* is all about?

However, the bold declarations need to be tempered by a dose of realism. The disruption caused by the riots, and more especially the uncertainty, has been a great hindrance. The greatest problem has been the mails. For a whole month since December 6, we did not receive any mail at all, and after that it has been somewhat sketchy. I have started realising what isolation means.

Our printing schedule is no longer a schedule. It is a joke. To get back to some semblance of regularity, we plan to bring out two issues together. Unfortunately, there is no way for us to know if you are receiving the issues or are the mails just as bad at your end. So if you do get this issue could you please drop us a line and let us know that order has returned to our land.

Three Cheers for Clinton's Budget Proposals

President Clinton in his "State of the Union Speech", came up with some very fine proposals which ought to be emulated by our finance minister. Most praiseworthy was the idea that one cannot go on increasing the national debt. It is time that one said enough is enough and took solid measures to curb the debt. Clinton found 150 'useless' public spending programmes. I am sure we can find more. One of the programmes that Clinton found useless and unworthy of government support was research and development of *nuclear power*. Is Narasimha Rao listening?

'The Way of Science is to Seek the Truth'

A Reappraisal of India's Cloak and Dagger Nuclear Policy

In the last issue of Anumukti, we had reviewed a video film "Nuclear India: A Dream Gone Sour" which had been shown recently on British television. This article by Anthony Tucker, the former science editor of The Guardian is a serious reevaluation of the Indian nuclear programme in the light of experience. It appeared in The Pioneer from New Delhi on January 29, 1993. It is heartening to note that such a reappraisal of the Indian nuclear programme is taking place all over the world. It is a pity that Indian nucleocrats are yet immune to world currents.

I Europe and in North America, even before Chernobyl, the cocoon of secrecy and public deception that, from the outset, surrounded and protected nuclear power programmes had been systematically stripped away. It took two decades of investigation by the media, of activity by peaceful truth-seeking organisations like Pugwash, noisy activity by antinuclear protest groups, agonising reappraisal by Governments and the self sacrifice of a handful of courageous whistle-blowers — all of whom knew that they could expect to be treated savagely, as indeed many were.

Yet the nuclear industry, even where shown to be uneconomic, technically unjustifiable or socially irresponsible, its continuing nuclear weapons link publicly exposed, still interprets criticism as unpatriotic hostility and seeks to confound or obfuscate any evidence that might damage its former image. Even in the United States, where nuclear power is effectively dead and investigators have the advantage of a Freedom of Information Act, the industry continues to defend its last niches of secrecy irrespective of the

fact that these often have direct relevance to worker and public health. It is as if the nuclear industry still believes itself to operate by divine right, without any need to be publicly responsible.

Thus, even in the wake of Chernobyl and in countries whose political systems require Parliamentary accountability, the unraveling of nuclear power programmes has only slowly revealed the extent to which they have obstructed investigation and minimised problems while dominating and unbalancing national energy investment programmes. Every national nuclear programme has rested, often to a great extent, on information manipulation, on the imposition of arbitrary secrecy, and on systematic public deception on matters of cost, technical achievement and promise. Worst of all, because of the huge costs of commitment, programmes have in many countries evaded public criticism by the concealment or understatement of health, engineering and environmental problems. India is not alone in this nuclear trap: the difference between the situation in India and that of Europe and United States, is that in India the cocoon of concealment remains dangerously intact.

This message emerges repeatedly in "Nuclear India: a Dream gone sour" screened by British Independent Television in September. Of course, it was compiled clandestinely for, under the rule of secrecy imposed by the Indian Government, it could be compiled in no other way. Inevitably it has infuriated the Nuclear authorities

in India elsewhere and, since it presents a short, simple and fragmentary account, it is not free of error. Nuclear hawks will pick at it voraciously.

They will say, for example, that single measurements of high gamma radiation do not prove serious contamination, and that anecdotal evidence of malpractice in radiation monitoring does not prove failure in health physics control. Further, neither cases of workers with chest and back keloids nor the

fact that some villagers near nuclear plants have a high incidence of genetic malformations, necessarily demonstrate causal connections with the nuclear power programme. But when all these factors recur and combine in a single investigation around nuclear sites, the circumstantial evidence of malpractice becomes compelling, if not overwhelming.

To those with knowledge of radiation protection standards, of health physics, of worker and

public epidemiology, the evidence implies serious failures in duty of care and unforgivable laxity by the Indian nuclear authorities in many sectors of management and control. This is a terrible indictment, made more terrible in the programme because it seems that the nuclear authorities in India may be deliberately exploiting the profound ignorance of radiation hazards among workers and villagers.

This indictment would have dismayed and sickened the pioneers of the Indian nuclear programme. Dr Bhabha was open and proud about what India was doing. Evidence of profound health effects would have prompted him to ask for open investigation

This indictment would, I am sure, have dismayed and sickened the scientific pioneers of the Indian nuclear programme. We need to remember that they were driven by the purest of ideals. Some who read this may have talked long and quietly with Homi J Bhabha on the slopes above Trombay in 1960s, as I did when the Indian nuclear dream was being born out of incredible difficulties. India presented a peaceful face but everyone knew, even then, that an important political and defence requirement was a route to nuclear weapons.

Not everyone realised that India could have taken the alternative route to weapons of uranium enrichment—a route which needs no civil nuclear power programme as a cloak off peace. South Africa has taken this route and, inevitably, India also now has this additional weapons technology. Thus there is no longer a unique military imperative behind the Indian civil nuclear power programme. It should be judged solely on its civil achievements, economics and hazards.

Of course, historically it matters that the dream of nuclear pioneers required a true balance between future civil and military needs in India. But Dr Bhabha demanded, and initially possessed, not only impeccable technology, but management and control powerfully insulated against political pressures. Everything, he said, would be dedicated to achieving industrial, social and national benefits while minimising any adverse impacts. He chose the plutonium route based on the inherently 'safe' Candu reactor technology—and a completely internalised fuel cycle with both uranium and thorium in mind—for reasons that seemed morally and technically irrefutable at the time. The dream died the moment it was dispossessed of its political independence.

That India's nuclear pioneers, along with many other countries, were deceived in their beliefs of low cost electricity and great social benefits, is an observation of hindsight. The central point is that, as a great scientist, Homi Bhabha was open and extremely proud about what India was doing and why it had to be done.

It follows that evidence of concealment of profound health problems in and around India's nuclear plants, would have sought urgent and open investigation. The way of science, he would say, like that of all honest men, is to seek the truth.

No country that perceives itself to be under nuclear threat will voluntarily abandon its own nuclear weapons programme although, in time good will and diplomacy will surely find routes towards nuclear weapons-free zones. Nor can any programme involving enormous investment of national resources be halted overnight. Changes of direction are especially difficult if a Government is in the grip of self seeking advisers whose role is to reinforce and expand, by every means, commitment to existing policy, irrespective of its true worth to the nation.

However, misdirection may all too easily become evil in situations where informed criticism is silenced by secrecy law, and where academics and representatives — however intellectually honest in principle — are manipulated by Government control of their financial support and tenure. In such situations the intellectual fabric of society becomes so corrupted and enfeebled that the outcome is likely to be disastrous, economically, technically and socially.

Recent history tells us of the tragic speed with which economic and social disorientation can overtake a major power suffering from suppression of criticism, with its associated self-de-

caption and enfeeblement and impairment of judgment. Chernobyl was as much a symptom of this sickness as an avoidable international disaster (and a demonstration of the inadequate powers of the International Atomic Energy Agency). One way or another the truth about the failure and mismanagement of nuclear technology — and about defects in the scientific, technological or medical fabrics that permit mismanagement— will emerge.

What can and what should India do now that its nuclear programme is under the spotlight of international concern and seemingly grossly flawed? First, she must have the courage to investigate openly, perhaps through the WHO environment arm. If things are awry, she must put them right. Remember, too, that wherever civil nuclear power has come under open economic and safety scrutiny, it has been found to be excessively expensive, unacceptably hazardous, or both. Open societies are only just recognising and taking seriously the health, waste, investment distortion and other burdens imposed by their once much-wanted nuclear programmes.

India's nuclear problems may prove ingrained and intractable, but the country has great richness of skills and many other energy options. Hydro and other benign sources await proper investment together with the deeper involvement for her world level physicists, chemists and engineers. Even if nuclear-related health problems can be adequately controlled, nuclear's outrageous resource demands are themselves a potentially lethal ailment for the nation. Socially crucial opportunities are being missed. Surely Bhopal should have taught India that concealment offers no solution to health, technical or political problems.

Anthony Tucker The Pioneer

Changes of
direction
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Government
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seeking
advisers
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and
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every
means,
commitment
to existing
policy,
irrespective
of its true
worth to
the nation.

Editor's Note:

I would like to add just a few comments to this article, which expresses *the Anumukti* position rather well. The first is an observation. The immediate reliction of the nuclear establishment to the recent disclosures of radioactivity leaks from Bhabha Atomic Research Centre, and the general rise in newspaper scepticism regarding Department of Atomic Energy handouts has been to propose changes in the already draconian and infamous Atomic Energy Act of 1962. The new amendment makes it unnecessary for the nuclear authorities to obtain the Attorney General's permission before prosecution. Doesn't this remind one of "*the intellectual fabric of society becomes so corrupted and enfeebled that the outcome is likely to be disastrous....*"

Apropos the suggestion in the article regarding investigation of health problems through WHO, I feel that there is no dearth of competent and honest expertise in Indian universities and medical institutions which can and should carry out such investigations. There is no need for us to ask multinational bodies for help in carrying out tasks which ought to be the prerogative and the duty of local institutions.

Hydro has been mentioned in the article as a 'benign' source. Now hydro, especially in its micro and run of the river forms is indeed one of the most safe and inoffensive way of producing electricity. Unfortunately, in India our engineers think of hydro only in terms of giant dams, which by no stretch of imagination can be considered benign.

Surendra Gadekar

Haunted Houses: Living Within Wails of Radiation

For most people, radiation remains an abstraction, difficult to comprehend, talked about in technical terms and restricted to nuclear power plants and other military and industrial nuclear facilities.

For the people of Taiwan that reality is changing fast. Beginning since July 1992, there have been a series of discoveries of radioactively contaminated housing structures in Taipei that is making the Taiwanese question as never before the security of their own homes. To date ten buildings constructed between 1982 and 1985 have been discovered to have been built with irradiated reinforcing bar. — ("rebar"-the steel rods used to support concrete). These structures have become known to the Taiwanese people as haunted houses; with their invisible killer lurking inside.

In late November, the threat spread for the first time outside of Taipei, to the city of Taichung, where anti-nuclear coalition for Taiwan members investigating for irradiated rebar discovered extremely high radiation levels not inside a structure, but in its iron front gate and door. This new discovery has two major implications. That the possibility of radiation in buildings must now extend beyond Taipei to the whole island, and that it no longer can be confined to rebar; all types of iron and steel products regardless of their manufactured date may be contaminated.

On July 30 of last year the atomic energy council (AEC) received an anonymous letter from a resident of the Taiwan power company workers dormitory in Taipei, stating that the dormitory was showing high radiation

levels and demanding an investigation. On investigation the AEC found, 14 apartments to have radiation levels up to 76 millirems per hour. That level is 6500 times the safety standard of 100 millirems per year for public exposure set by the International Council of Radiation Protection (ICRP). When compared to Japan, Taiwan's nuclear neighbour, we find it 130000 times the Japanese suggested standard.

Two weeks later, on August 15, news broke that the Min Sheng Villa apartment in Taipei also had high radiation levels. Investigation showed that of the 70 apartments, 34 had radiation levels similar to those in the Taipower dormitory.

More cases followed. On September 5, the Energy Commission building at the Ministry of Economic Affairs was also discovered to be contaminated

(Not a few people claimed this ironic justice). Four days later, another 7-story building in Taipei was found contaminated. This time the AEC refused to reveal the name of the building.

It soon became obvious that the Atomic Energy Council was not prepared or not willing to deal with this crisis. It was not until October 7 that the AEC formed an Irradiated Rebar Steering Committee. One of their first proposals to deal with situation was to buy cancer insurance for residents of the Min Sheng Villa. (One wonders when buying insurance became part of the Atomic Energy's Council's responsibility?) In mid-October the AEC finally began distributing radiation testing units to residents of potentially contaminated buildings.

Frustrated by AEC's slow maneuvering, residents of the Min Sheng Villa formed their own

Where Did it come From?

The origin of this radiation remains unclear. The problem seems to originate in a batch of iron that was produced around 1982. To date, the contaminated steel that has been identified-some still has not been traced-has all come from Jin Shan Steel Company. However, the source of the original iron is still unknown. There is speculation that the iron was imported, but this remains unproven.

What is certain, is that in the process between Jin Shan's purchase of the iron and its use as rebar and other steel products, it was not checked for radiation. Whether this was due to deliberate cover-up, negligence on the part of AEC, or sim-

"Self-Rescue Committee' to represent them in dealing with the government. They finally forced the AEC to agree to provide medical examinations for the residents of the villa. However, the long term problem—what to do about the building itself—is still not solved. No agency is willing to put forth the money to reconstruct the building.

The AEC Complicity

The most frightening aspect of the case is the fact that the AEC was aware of the high radiation levels in the Min Sheng Villa as early as 1986, but chose to disregard the problem. At the time, a dental clinic operating in the

Min Sheng Villa reported extremely high levels of radiation even when their machines were turned off. After investigating, the AEC suggested that the dental clinic lead-plate the walls, and then closed the case.

The Spreading Fear

The response of the people to the news has been to demand radiation testing in their own homes and offices. As more such cases are discovered, this fear is bound to grow. Geiger Counters may become the hottest selling product on the island. The Taiwanese public is for the first time, becoming aware of the need for strict regulation and

better enforcement of nuclear safety standards.

Taiwan's "haunted houses" represent something far deeper than the ten individual cases found so far. They are a symbol of a dangerous source of energy mishandled in a small island country where nuclear accidents can cause disaster to millions of people. For the people of Taiwan, the only solace lies in the knowledge that the incidents have helped in creating public awareness regarding the dangers of nuclear power.

Nuclear Report from Taiwan

Nuclear Lobby Returns to Power in Russia

Fire broke out at the Chernobyl nuclear power station, but officials said that there had been no increase in radiation. Ukrainian news agency quoted an official at the station, as saying that the fire broke out in a room housing technical equipment between the station's first and second reactors. This has nothing to do with the nuclear process," Viktor Borisenko, technical shift foreman told the agency. There was no change in radiation levels. There was no violation of safety norms. No one was injured."

The Russian government has approved a massive programme of nuclear power plant construction ending a moratorium inspired by the 1986 Chernobyl disaster which sent radioactivity spewing across Europe, according to documents' and interviews.

The ambitious building plan which would add at least 30 new nuclear power stations and double the nation's nuclear energy capacity by 2010 AD is

Next Door in Finland

The Finnish Parliament passed by 96 votes to 78 an amendment to the bill setting out government's energy policy. The amendment stated that nuclear power should not be part of Finland's energy strategy. The government had hoped for a favourable legislative decision, after which it would have submitted for approval or rejection by parliament a decision in principle to build a new, fifth unit in Finland. In the event, the Prime Minister, Esko Aho, is reported to have told his party that the decision in principle to build a fifth unit could not now be submitted to parliament.

However, despite the clear mandate from the representatives of the people in a democracy, the country's main electricity suppliers intend to keep alive the nuclear option for baseload generation.

likely to heighten alarm in Europe already concerned about safety standards in the former Soviet Union's atomic industry.

The plan was approved without publicity at a December 24, 1992 cabinet meeting despite objections from President Boris Yeltsin's ecology advisor Alexei Yablokov who called it "unacceptable from the legal, ecological, economic and political points of view."

The programme is designed to guarantee energy supplies as Russia's oil industry falters and its economy becomes ever more dependent on revenues from oil and gas exports. Critics here said it also reflects the resurgence of the atomic industry powerful and well-funded in Soviet days and the weakness of Russia's fledgling environmental movement.

At least one of the new plants would be of a design similar to the Chernobyl plant that exploded in 1986 bringing death

and illness to thousands of Ukrainians and Belarussians.

Yevgeny Reshetnikov, deputy minister for atomic energy, said the design had been improved to prevent a similar accident but western experts here maintained that the inherent dangers if a Chernobyl-type plant cannot be eliminated.

Russia's ability to implement the building programme may be limited by the disastrous state of its finances. But approval of the new programme signed into law on December 28 as one of Prime Minister Viktor Chernomyrdin's first official acts reflects Yeltsin's commitment to

overcome seven years of popular opposition to nuclear power.

Environmental groups here and in the West argue that political instability, antiquated systems and economic hardship make another nuclear catastrophe uncomfortably probable.

Reshetnikov rejected criticism of his industry in an interview saying Russian power stations are as safe as those in the West and calling Yablokov a 'dilettante.' To continue a moratorium on construction, Reshetnikov said, would bring 'catastrophe' to certain regions that are especially dependent on nuclear power.

The deputy minister, a veteran of the Soviet atomic industry shrugged off the possibility that Russia's decision to spend billions on atomic energy might discourage Western countries from delivering promised aid to improve the safety of existing plants. Reshetnikov complained that in any case Europe and the United States have given little beyond promises, documents and site visits.

The approved programme calls for spending 100 billion roubles this year and every year through 1996.

The Independent

Lessons from Chernobyl

Hydro-Ecological Nuclear Power Plant Site Selection

The Chernobyl accident makes it necessary to review the way nuclear power plant sites are chosen from a hydro-ecological point of view. It is also essential to study existing emergency response and remedial measures for their adequacy, said a workshop on the hydrological impacts of nuclear power plants, held under UNESCO auspices at Paris between 23-25 September, 1992.

The fifty participants, hydrologists from Commonwealth of Independent States and other countries, called for the creation of an international co-operative research programme to study the planning, risk assessment and remedial actions in case of accidents.

Their statement pointed out that accidents at nuclear power plants, which release major quantities of radionuclides into the water cycle, can endanger the safe exploitation of water resources over large areas, far beyond national borders.

"Although it is less important than contamination through the atmosphere or through food,

water contamination lasts the longest, much longer than any other form. It can last for hundreds or thousands of years in the groundwater", said Abraham Mercado, Consultant of Hydrology and Environmental quality, and one of the key speakers at the workshop.

Reports presented at the workshop made it clear that although the water contamination affecting the inhabitants around Chernobyl has been of secondary importance compared to other forms of contamination, radionuclides have moved to the shallow groundwater aquifers at a faster rate than expected. This shows that the ways radionuclides move through the unsaturated zone are not known in detail.

Under different conditions than those at Chernobyl the consequences on water might be more serious, especially if water resources are scarce or of high economic value, **the workshop pointed out. The worst case for water resources would be a melt-through, where the bottom of the reactor gives way, and the**

radioactive matter is released straight down.

Groundwater, which circulates at relatively shallow depths, from tens to hundreds of metres, is very vulnerable to that kind of pollution, and can transport contamination over long distance. It is also hard to track or contain contaminated groundwater.

Three main aspects were identified by the workshop for the hydrological assessment of nuclear power plants: the need to protect the power plants from dangerous hydrological phenomena such as floods and mudslides, the need to have a reliable water supply for the operation of the power plant, and the assessment of a nuclear power plant's impact of water systems— through radioactive, chemical, or thermal contamination.

An ideal site for a nuclear power plant, from a water point of view, would be on solid rock, where the groundwater is very deep down, where the unsaturated zone is as impermeable as possible, and where the ground-

water flows are well known and simple.

Also, it is necessary to seek **ways to** retain contaminated **water in** case of an accident, to reduce the spread of contamination. At present there is no reliable way of doing that, nor is **there a** good method for decontaminating household water. Both these topics need further study, the workshop concluded.

Follow-up of Chernobyl

For the follow-up of the Chernobyl accident, the workshop called upon the international scientific community to support researchers working in the region by providing technical assistance and equipment.

The radioactive material released from Chernobyl continues to move about in the affected ecosystems - but we do not yet know enough about this migration to predict the effects on the waters.

The major part of the radioactive fallout on the European territory of the Commonwealth of Independent States entered the catchment area of the Pripyat, Dnieper and Desna rivers. Most of it is contaminated at a rela-

tively low level, but as the area is very large, the cumulative amount washing out into the rivers can be higher than that in small catchments that received larger amounts of fallout.

After the accident, measures were taken to limit the spread of radionuclides into the waterways; in total 131 various constructions were put up by May 1987. River barrages were built with absorbent materials, which were intended to absorb caesium **and** shortlived radionuclides, and stop them from spreading further.

These barrages quickly silted up, causing the water level to rise and flood large areas with a high content of radioactive material in the soil. As a result, even more radioactive material washed out into the rivers.

"In addition, it turned out that absorbent material **in** the dams only soaked up a small quantity of nuclides, **and** most of them were dismantled after the spring of 1987", reported Oleg Voyrsekhovitch, of the Ukrainian Hydrometeorological Institute.

Four traps were constructed in the Pripyat river, to catch suspended radioactive particles

from the stream of water, which were supposed to be deposited in the bottom.

"Unfortunately, the traps were not fine enough to catch the mobile particles, and at best only caught about ten percent of them", Voytsekhovitch said in his presentation. In the end, natural river pools and stagnation zones accumulated far larger quantities of radioactive material than the traps.

The work of limiting the damage was hampered by the lack of sufficiently accurate methods of modeling and forecasting the state of water systems. The ways radionuclides move between soil, water, sediments, surface water and ground water are not known well enough, suited a report by the Russian National Committee for the International Hydrological Programme.

The workshop was arranged by UNESCO's International Hydrological Programme, the Commission of European Communities, the International Atomic Energy Agency and the United Nations Environment Programme

Nucleo Rats Quit the Fast Sinking Breeder

This news item appeared in the November/December issue of Atom which was the official journal of the U.K. Atomic Energy Agency and is now, in the era of privatization, brought out by AEA Technologies which is a major supplier of nuclear industry technologies. (Of course, the heading in the Atom was different.) The news is of special interest to us in India, since the Indian nuclear dreams are all based on the 'success' of the breeder. The fact, that the breeder has proved to be a technological mirage in other parts of the world has yet to dissuade our blinkered nucleomules.

The British government has decided to cease at the end of this financial year its £12.87 million annual funding for R&D in support of the European Fast

Reactor (EFR), a multinational development programme to commercialise fast reactor technology, effectively putting an end to fast reactor R&D in the UK.

Earlier this year the government confirmed it would not **support operation** of Prototype Fast Reactor (PFR) at Dounreay beyond March 1994. (PER is

now scheduled for restart early next year after a shutdown for repairs). The only fast reactor funding it is now prepared to countenance is a small programme of experiments related to the closure of PFR.

The UK nuclear industry was not prepared to accede to a government request that it become solely responsible for funding fast reactor R&D. According to Nuclear Electric: The request was made more difficult because it came a year earlier than expected, long before the EPR Phase II development work—on which the promised 1993 review of fast reactors was to be based—had been completed."

Britain's nuclear utilities, Nuclear Electric and Scottish Nu-

clear, which have always seen the EFR programme as a joint effort between government and industry, will not continue to fund design work once the government ceases to fund the supporting R&D.

EFR on hold?

With commercialisation of the fast reactor not anticipated before about 2030, neither France nor Germany are particularly anxious to press ahead with EFR at this time; although equally, neither wishes to abandon fast reactor development. In France, experience with the 1200 MW Superphoenix fast reactor has been a salutary indication of the problems that can be encountered; while the relicensing process for the reactor fol-

lowing criticisms by the French safety body IPSN (See *Amu-mukti* vol6 No1) which has only just begun, is expected to last many months.

In Germany, where a 300 MW prototype fast reactor was built but never allowed to operate, government spending is increasingly focussed on the economic problems in the east of the country.

It is therefore considered unlikely that France or Germany would wish to carry on work towards construction of a large commercial demonstration fast reactor alone.

Atom
Nov / Dec 1992

Only Financial Ingenuity Can Now Save The Indian Nuclear Programme

The following article appeared in The Times of India on 24th of October, 1992. It presents the thinking within the nuclear establishment in times when the usual government largess has become somewhat scanty due to financial strain and there are some muted calls for 'accountability'.

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geopolitical
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equations have ruined India's chances of expanding the nuclear power programme with Russian help. But the country is by no means in a hopeless position. With financial resourcefulness more than technological savvy, it can retrieve the situation.

In the footsteps of France, which recently balked at supplying enriched uranium for the Tarapur atomic power station to a non-NPT regime, Russia is having second thoughts about its turnkey project to supply a pair of 1,000 MW reactors at Kudankulam in Tamilnadu.

The inter-governmental agreement for the Kudankulam project was signed with the erstwhile Soviet Union during President Gorbachev's visit to New Delhi in 1988. It provided for a steady supply of enriched uranium and the return of spent fuel.

What sweetened the deal for India was the soft loan of 3.2 billion roubles—worth Rs 5,000 crores then—at a 2.5 percent interest. This was to be repaid in 14 equal installments, starting three years after commissioning the plant in 1998. The foreign exchange outflow - imports of some components worth a few million dollars - was minimal since the plant was to be re-de-

signed for tougher safety standards and was to be made with Indian manpower and facilities, payable in Rupees.

The sweetener has turned sour in the economic crisis following the break-up of the Soviet Union. The Russians reportedly want to renegotiate the agreement to supply most components rather than a turn-key project. More important, they would like dollar repayments with higher rates of interest.

What are India's options under the circumstances? An inside source, insisting on anonymity states, like Barkis, Boris may be willing, but can he fulfil the partnership? Even

if India accedes to the Russian demands, our problems will not necessarily end.

With central authority gone, except for a large corporation like Atommach, the performance of their smaller companies, scattered across the former Soviet Union, is a big question mark.

Editor's Note: In the meanwhile President Yeltsin has come and gone and there was no mention of Koodankulam in the newspapers. Therefore, it would not be wrong to assume that both sides have given-up the project and diplomatically kept silent about it.

The alternative is to build indigenously designed pressurised heavy water reactors. The design for 500 MW units is ready for implementation. The site can also take a quartet of proven 220 MW units. The main advantage of these reactors is that the fuel, natural uranium, moderated and cooled by heavy water, would be readily available within the country.

The strategic and economic importance of such self-reliance cannot be over-emphasised, says one expert. Nor does large-scale import of atomic fuel make financial sense for a country with a balance of payments problem, he adds, particularly when it has domestic reserves of 700 billion tonnes of coal equivalent of thorium and recycled uranium. By contrast, India's coal, gas and oil reserves together add up to 152 billion tonnes of coal equivalent.

The caveat is that the extraction of all that atomic energy depends upon the how successfully the country can meet the challenge of developing the entire three stage nuclear technology, the do it yourself option. Even at the first stage of extraction of energy from natural uranium, this option places a massive financial burden on India. The in-

vestment at Kudankulam envisaged Rs 2,500 crore for two units of 220 MW or Rs 5,000 crore for two 500 MW units with a gestation period of six to seven years. At 1991-92 prices, without escalation or interest during construction, this works out to Rs 30,000 per kilowatt.

Editor's Note: It is statements like those above which reveal that the nuclear establishment in the country still does not want to give up its old habitual devious ways. Half-truths are mixed with fantasies and outright lies. Words like "strategic importance" and "self-reliance" are a much repeated mantra the moment the deal becomes sour, how come we forget them when offered a little "sweetener" in the form of a low interest easy repayment loan. Is the strategic and economic importance of self-reliance pertinent only now and was not so important while the deal was being struck? In fact, the previous chairman of the Department of Atomic Energy, Dr P.K.lyengar is on record having said in March 1992 that India wants help from the World Bank and other international financial institutions for the development of the nuclear programme.

Of course, it is only in the nucleocrats' arithmetic that Rs 5,000 crores for 1,000 megawatts works out to Rs 30,000 per kilowatt. Ordinarily it comes to Rs 50,000 per kilowatt

Originally, Kudankulam accounted for Rs 6,494 crore, out of the total planned outlay of Rs 14,400 crore proposed for the eighth plan. The goal was to set up a nuclear power capacity of 7,700 MW by the year 2002 AD. Even after leaving Kudankulam out, the Planning Commission, has agreed for an amount of Rs 4,119 crore. Even this sum has to be split between open market borrowings, internal resource generation, by the Nuclear Power Corporation and govern-

ment equity which is barely Rs 619 crore.

At the time of setting up of the Nuclear Power Corporation, the governments commitment was for a debt to equity ratio of 1:1. The government has not been able to stick to this figure. The ratio is now as high as 4:1. This means that the Nuclear Power Corporation has to borrow four rupees from the market by floating bonds for getting one rupee from the government as equity.

Public sector unit bonds have few takers today, however, thanks to developments like the banking shares scam. And borrowings from the open market at anything between 17 to 20 percent interest is counter-productive for atomic power projects which have long gestation periods. The inhibiting factor is the high interest during construction which can jack up the total cost of the project by more than half.

Editor's Note: It is interesting to note that despite these counter-productively high interest rates and some of the longest gestation periods in the world, Indian nuclear reactors, still turn out to be, according to Dr. P.K.Iyengar, the cheapest reactors in the world. Financial ingenuity in the form of creative book-keeping has always been the hallmark of the Indian nuclear programme.

Nor is the NPC like other public sector units. Given the nature of its operations, involving strategic materia] and high tech inputs which only government has been able to sustain so far, the privatisation of atomic energy has certain in-built limitations.

One way out is to seek creative resource management like preferential equity participation (without voting rights) and the other is to involve energy strapped state governments or even private companies in a sort

of assured power supply programme in exchange for equity.

Would all these problems be resolved by signing the Nuclear Non-proliferation Treaty and accepting full-scope safeguards? Not really. The days of soft loans, especially for nuclear power, are gone, says one expert. With safeguards we could perhaps be free to go to France rather than Russia for the Kunkulam project. But we would still have to pay for the technol-

ogy in addition to being dependent for enriched fuel on them.

The best option then is to build reactors using India's own natural uranium. The only countries besides Canada which have the expertise are Korea, Argentina and India,

That brings the country back to square one. Even after signing the patently discriminatory NPT — which puts the facilities of the weapons-have countries of

pre-1969 vintage beyond the pale of inspection — India will still have to find the finance to pay its own home-grown technology. That is not such an insuperable task for a nation that has mastered the far more arduous technological path.

Vithal C Nadkarni
The Times of India October 24, 1992

The Militaries' War On The Environment

That humans make war on the environment is a widely used metaphor, which becomes literally true when nations make war on each other. From Vietnam to Central America and Afghanistan to the Persian Gulf, warfare has had grave ecological consequences that affect not only the environment, but the health and security of the people who depend on it. And the negative impact of the world's armies on the environment neither begins nor ends with a shooting war. Every day militaries use up non-renewable resources, pollute water sources, and contribute to ozone depletion.

Images from the Gulf War of the smoke-darkened Kuwaiti desert with oil wells burning out of control was a stark reminder of the environmental damage of war. Ongoing revelations of radioactive pollution from nuclear weapons sites in the United States and the former Soviet Union point to the costs of peacetime military activity. More recently communities are becoming aware of the environmental impacts of military bases and the numerous toxic chemicals they use. All of these revelations have helped lift the veil from the myriad of ways that militaries wage war on the environment (and all of us), even

when they are not waging war on each other.

The Gulf war is vivid case study in the damage that war can cause the environment. While the hundreds of oil fires have been extinguished, oil lakes still cover the Kuwaiti desert. Oil still contaminates the Gulf and little has been done to clean the hundreds of miles of coastline. Studies to determine the full extent of the damage to important and fragile ecosystems critical to a range of animal and plant species have only begun. Heavy military vehicles and military fortifications have dug up and packed down the deserts of the region that, lacking water, will take years to recover. A year and half after the end of the war little is known about the full extent of environmental damage caused by the bombing of Iraq's nuclear and chemical weapons facilities and petrochemical and other industrial sites. The bombing of Iraq's electrical system caused widespread disruption of sewage and other critical systems polluting water supplies and spreading disease. Throughout the developing world, immigrant workers in the Persian Gulf fled home as Gulf War refugees increasing stress on rural ecosystems and urban areas.

Resource Use

Like the Gulf War, many wars are about access to resources. Michael Renner of Worldwatch Institute estimates that the world's armies use as much energy as the economy of Japan, about six percent of total use worldwide. An F-16 fighter burns more fuel in an hour than the average U.S. car does in one year. Militaries account for nine percent of the iron and steel consumed each year. They also use a large proportion of such minerals as beryllium, cobalt, and titanium. In a self-perpetuating cycle, nations create armies to gain access to resources that their armies must consume in order to function.

Militaries have a seemingly insatiable appetite for land to train on. This need has risen steadily as armies have grown larger and weapons have become more technologically advanced. Modern artillery can shoot farther. Up to one percent of land worldwide is directly used by militaries. Every year additional land is damaged or made unsuitable for civilian use. Unbearably loud noises from overflights by jets can cause health and other problems for residents and wildlife below

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training areas. In recent years protests against low-flying jets in Europe and across the United States are beginning to curb the impunity with which western air forces disturb those below.

Large tracts of land are also destroyed during war. Operation Ranch Hand sprayed 18 million gallons of herbicides on more than six million acres in Vietnam and a lesser area in Laos and Cambodia. That land is only beginning to recover. Track marks can still be seen in the deserts of North Africa, reminders of the massive tank battles of World War II.

One of the longest lived legacies from many wars is the thousands of rounds of unexploded bombs and mines left over from many wars. These bombs can maim and kill and

unless thoroughly cleared they make use of the land dangerous for decades. German mustard gas shells, lobbed during World War I, are still occasionally uncovered. Unexploded ordnance is still a major problem in Vietnam, sending numerous children and farmers to the hospital 17 years after the war. Mine clearing is a big and dangerous business now, with companies vying for contracts to remove mines in Angola, Kuwait, and Cambodia.

Toxic Chemicals and Hazardous Waste

While negotiations on a treaty to ban the possession of chemical weapons recently ended, militaries wage chemical warfare daily on their own citizens by using some of the most lethal

chemicals known—not to wage war but to prepare for it. Solvents, PCBs, pesticides, heavy metals, alkalies, propellants and explosives then need to be disposed of safely. According to Pentagon's Defense Environmental Restoration Programme, 17,482 toxic hot spots have been found at the 1,855 domestic installations. (The U.S. does not provide figures for its overseas military bases.) A toxic hot spot is a place where hazardous waste contamination poses a potential threat. Areas around many conventional and nuclear production facilities are also contaminated. The costs of cleaning up these sites are astronomical and estimates vary widely, anywhere from \$50 billion to \$200 billion.

As a number of militaries begin post-Cold War reductions,

Missile Testing range coming up in Hunsur taluk

The defence ministry has decided to establish a "missile-testing range" in Kuppekollagatta area of Hunsur taluk about 82 km from Mysore and construction work at the site is in full swing under the supervision of the army engineers.

The army has acquired about 5,800 acres of land belonging to the revenue and forest departments and initiated measures for acquisition of 925 acres of agricultural land belonging to farmers of Hosaramanahalli village in Hunsur taluk. Even the state government has appointed a special land acquisition officer for the task.

The Kuppekollagatta area — a hilly terrain selected for the purpose, is situated on the left side of the Mysore-Mangalore state highway. The authorities have kept the news of the missile testing range a closely guarded secret. Information gathered from various sources indicates that the construction work will take about 2 years. Even before the completion of the land acquisition process, the military authorities have started construction of compound wall of the range and a Hyderabad-based construction company has been given the contract.

The range was earlier proposed in Bijapur district, but strong opposition from the public forced the defence ministry to shift the range from there to Mysore district. This was one of the reasons why the authorities have kept the estab-

lishment of the range such a secret," according to an official. Even the Assistant Commissioner of Hunsur, M.Kumara Naik said that he was unaware of what exactly was proposed. There is a proposal for the establishment of some kind of a defense project but I don't know the details," he said,

The news of the establishment of the range seems to have bewildered villagers of the surrounding villages. Particularly worried are the residents of Hosaramanahalli, who are losing all their land for this development project. As the name of the village suggests, they had originally belonged to Ramanahalli village which was submerged in the waters of the Krishnaraj Sagar Dam. Mr Linga Naik, an eighty year old farmer, related the story of how it had required years of efforts before the government had allotted land in compensation for the land they had lost in submergence.

Meanwhile, activists of the Karnataka Vimochana Ranga who have come to know of the project, were trying to educate the people about the I-effects of the project and mobilise the people against it. Mr Puttaswamy, an activist said the union government was converting Mysore into an arsenal. "First came the uranium enrichment plant at Rathnahalli, now the missile testing range and what is more in store for Mysoreans is not known," he exclaimed

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the need to isolate and clean up chemical pollutants will delay alternative uses at many military bases. Also delayed will be the economic recovery of communities around the bases open or conduct shoddy clean ups.

— Contamination of U.S. nuclear weapons facilities alone may cost \$200-\$300 billion to clean up

There is every reason to believe that contamination at the bases of other militaries is as bad or worse. Germany recently put former Soviet soldiers awaiting repatriation to Russia to work locating dumps created in East Germany. No oversight from host governments and poor record-keeping or a lack of any records mean that an unknown number of toxic time bombs are seattered throughout eastern Europe.

The disposal of chemical weapons poses a number of special environmental hazards. After World War II, stocks of chemical weapons were haphazardly dumped in several ocean areas. Now the U.S. and Russia have adopted incineration as the preferred disposal method, ignoring and inadequately researching safer alternatives. The U.S. moved chemical weapons from Okinawa and Germany to Johnston Island in the Pacific in 1972 and 1990. Pacific Islanders now fear that the U.S. will incinerate its entire stockpile of chemical weapons at Johnston, ignoring their wishes and well-being.

Nuclear Contamination

Toxic and nuclear contamination from nuclear weapons production and testing have created life-threatening conditions in many parts of the world. Nuclear tests have spread deadly radioactive isotopes world-wide. Contamination from test sites,

military nuclear reactors, war-head assembly plants, and haphazardly created waste sites is migrating into water supplies and the air, threatening the communities and ecosystems around them. Safe ways to clean up and dispose of millions of tons of radioactive waste produced by uranium mining, weapons production, and now, the dismantling of nuclear war-heads remain elusive. Contamination of U.S. nuclear weapons facilities alone may cost \$200-\$300 billion to clean up over the next 30 years. Nuclear hot spots in the South Pacific, U.S., former USSR, China and elsewhere will threaten the health of many for years to come.

Indigenous people have especially suffered from the nuclear arms race. Their lands and waters in North America, the Pacific, North Africa, former USSR, Australia, and elsewhere have been irradiated by nuclear tests by the major nuclear powers. It is still not safe for Marshall Islanders to remhabit their original islands. In Australia, the aborigines received little or no warning before the British tests contaminated them in the 1950s.

Above ground nuclear testing contaminated the atmosphere, but many underground nuclear test leak radiation as well. Other military activities are affecting the atmosphere as well. The military is responsible for over two-thirds of U.S. use of the ozone depleting chemical CFC-113. While the Pentagon is moving away from CFC use, the high cost of changing military specifications is stalling the conversion to safer chemicals in the U.S. and abroad. Because many other nations follow the U.S. lead when it comes to technical requirements in weapons production. Exhausts from solid fueled rockets and missiles inject large amounts of ozone harming hydrochloric acid directly into the upper atmosphere.

National Security

Militaries citing "National Security have hidden their environmental crimes behind a veil of secrecy. In many nations, the military is often exempt from environmental rules and regulations either by law or by custom. In recent years, Congress and grassroots protest have increasingly brought military activities under environmental laws and regulations that apply to others, but the Pentagon and the Department of Energy continue to resist efforts to treat them like any other polluter. And most environmental laws contain loopholes that allow the President to cite a national emergency to exempt the military.

— The military is responsible for over two-thirds of U.S. use of the ozone depleting chemical CFC-113.

The military harm to the environment is not confined to its direct impacts. Hundreds of billions of dollars worldwide are spent preparing for war. Military spending continues to consume monetary, human and other resources short-changing environmental protection, development and other social needs. Billions more must now be spent on cleaning up military messes.

Many politically involved militaries protect, promote, and often directly benefit from environmentally destructive projects and activities. They are used to suppress opposition to harmful projects, stifling any environmental debate. The wholesale destruction of the Amazon began under the military dictatorship in Brazil. Burma's military is cutting down its teak forests, trading the wood for arms and cash to support its dictatorship. In the name of anti-communism, the Philippine army suppressed dissent against environmentally, de-

structive forestry, hydroelectric and other projects during and after the Marcos regime.

New Image

Many of the world's militaries, seeing which way the public opinion winds are blowing, are working to improve their environmental practice and image. In the United States, the Pentagon regularly proclaims this or that environmental innovation. Several years ago, the Senate passed the Strategic Environmental Initiative: the proposal to fund the military to release environmental data and do environmentally useful work. But the military mindset on this matter was revealed when, after a long delay, the Pentagon proposed the first project under SEI find a more environmentally benign way to produce plutonium triggers for nuclear weapons.

At Pentagon conferences during the build up toward the Gulf War, Secretary of Defense Richard Cheney put best face on military environmental practice, admitting the need to remedy past mistakes and championing efforts to recycle, substitute non-toxic materials for harmful ones, and preserve nature on military bases. But Admiral David Jeremiah, vice chair of the Joint Chiefs of Staff, made clear that there are limits to how gently armies can adapt to the environment. When forced to choose, the military's mission comes before environmental protection. War and preparation for war are "always inherently destructive and inefficient," he said.

A major international opportunity to deal with impacts of the military on the environment was lost last spring when the UN Conference on the Environ-

ment and Development (UNCED) sidestepped these problems. The US delegation worked hard to keep military matters off the agenda and proposals holding nations accountable for how their militaries handle their hazardous waste and contaminate the environment with their weapons of mass destruction were watered down or deleted.

Many things can be done to alleviate some of the most environmentally harmful practices of militaries measures that must be taken as steps toward disarmament regardless of whether bases remain open or are closed. But in the end militaries will have to be eliminated to finally bring an end to their war on nature and on us.

John Miller
Nonviolent Activist Nov./Dec.
1992

Wall Street Blues

In March, 1992, Lehman Brothers, the Wall Street investment house, held a half-day conference titled "Are Older Nuclear Plants Still Economic?" Last week an Oregon utility announced plans to shut a plant that is just 16 years old, the third such retirement announcement in U.S. this year. Paul C. Parshkey, the organizer of the March conference, said that perhaps he had misnamed his event. The question is not whether the older reactors are economically sensible to operate, he said, but whether any are?

When is a reactor old? If Trojan, the Rainier, Oregm, plant, is indeed closed in 1996, it would be only halfway through its anticipated 40-years life span. Reactors seem to age on some accelerated calendar. Trojan's steam generator is dete-

riorating. Steam generators, which transfer heat energy out of the reactor, are common to one type of plant, but each design has a characteristic weak spot that grows worse with age?.

The nuclear industry was well on its way to extinction, even before the announcement by Portland General Electric, which owns and operates Trojan Nuclear Power Plant. There are few replacements in sight for Trojan and 109 other commercial operating plants in the U.S.

"The question is not whether the older reactors are economically sensible to operate, but whether any are?"

Throwing in the towel on a plant like Trojan is a painful decision. In the era of "not in my backyard", it means giving up operating permits that will be hard to replace. And running it longer would give more time to accumulate money for tearing it down and disposing of nuclear wastes; so far there is \$25 million in the company's piggy bank against a cost it has estimated to be at anywhere from \$200 million to nearly \$500 million.

But the world has turned nasty for Trojan, in ways the builders never expected. When Trojan entered service, Congress made it illegal to build new gas-fired power plants, because the accepted theory was that North America was running out of gas. Now Canadian gas supplies glut the West Coast,

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making gas a cheaper power source than a wheezing reactor.

And in the early years of Trojan's life, demand for power was galloping ahead by as much as 7 per cent a year. But today, a refrigerator bought at an appliance store uses half the electricity of an average model bought when Trojan was new.

Those factors affect many plants, but not all are threatened. "You're looking at a universe of 110 reactors", said Carl Goldstein, a spokesman for, the nuclear industry's public relations arm. "It doesn't seem startling to me that you have some defection". Trojan, he said, faced politically stiffer opposition than most plants. It survived statewide referendums in 1986 and 1990; another is due this November. It was in a region with so much hydroelectricity that it was not needed year-round, a disadvantage for a capital-intensive technology.

Political Challenges

Some detrimental factors can change, said Mr. Goldstein. The price of gas will rise someday, and the Clean Air Act will make coal, which is the main source of electricity, more expensive.

And some reactors may be able to run much longer. Those that are well-maintained could continue for a long time, said Mr. Parshley, the Lehman Brothers executive who organized the March conference. But their overall durability will only be proven plant by plant. Last year the Nuclear Regulatory Com-

mission approved a procedure for utilities to apply for 20-years extensions to their plants 40-year licenses. The plant that was widely expected to apply first, however, Yankee Rowe in Rowe, Massachusetts quit at age 32 earlier this year.

Not every piece of machinery wears out early. "You have children of B-52 pilots flying B-52's now", Mr.Parshley said.

Utilities and regulations are scrutinizing the alternatives to reactors more closely. A company might choose to spend \$50 million on subsidies to customers who replace their old, inefficient refrigerators and air conditioners, because that will do more to solve the power problem than spending the money on building, fueling and staffing a new plant. Or the company might find it cheaper to buy power from independent generators. Two days after its Trojan an-

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