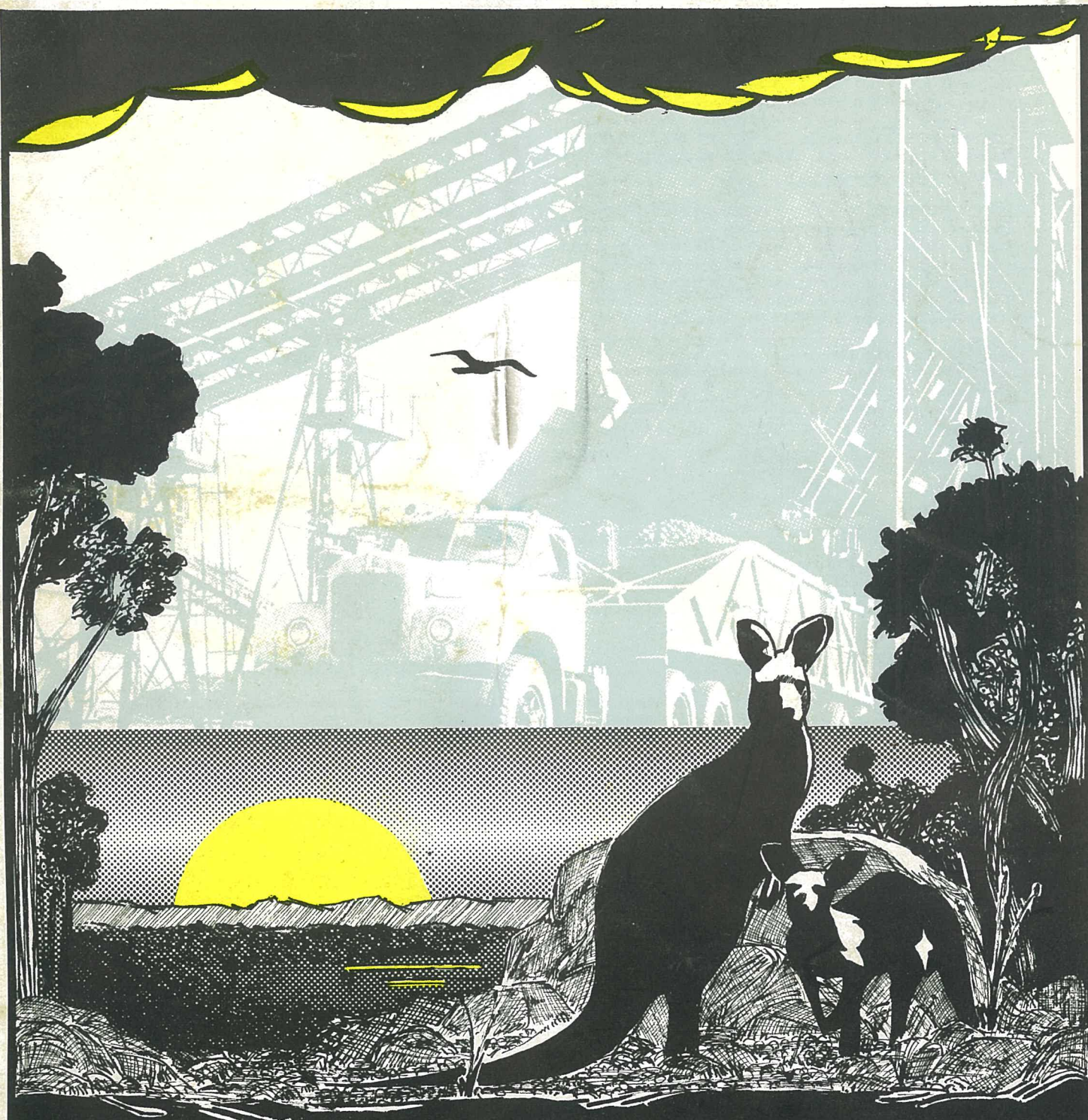


# CHAIN~REACTION



**THE RANGER URANIUM BLUES.....**

**autumn 1976**

**vol.2 no.1**

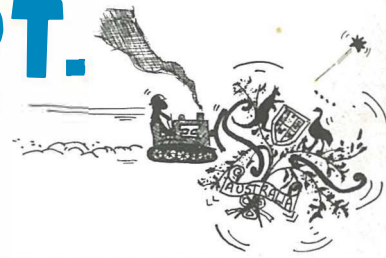
**friends of the earth australia**

**\$1.00\***



# BITS & PIECES DEPT.

DEPARTMENT OF ENVIRONMENT, HOUSING  
AND COMMUNITY DEVELOPMENT



## POISON IVOR

The latest in what is now a relatively long list of Ministers in charge of environment is Senator Greenwood. Greenwood's "portfolio of bits and pieces" includes Environment, Housing and Community Development. It is a combination of three former Departments, Environment, Urban and Regional Development, and Housing and Construction.

Greenwood's background is far from encouraging: support for the aggressive police forays into Melbourne University on a hunt for draft dodgers, efforts to retain the death penalty in the ACT, attacks on the Vietnam moratoriums, support for Springbok tours and alleged softness on Croatia terrorists. According to a Country Party colleague quoted in the 'Age' 1/1/76, Greenwood - "would have been right at home in the Bruce Page Government!"

Some observers have seen Greenwood's role as one of presiding over the emasculation of "quality of life" initiatives of the former government. Greenwood of course doesn't agree with this view. But already there are strong moves to cut off technical assistance grants to voluntary environment groups . . .



## OUR VERY OWN FBI REVELATION

The Editor of Not Man Apart, FOE's International newspaper, Tom Turner, recently wrote the FBI, asking for "information regarding Friends of the Earth" that the FBI had collected. What they sent back is edifying, if not particularly illuminating.

The FBI admitted to possessing four references to FOE. The first three were mere mentions of our name and address (wrong in two cases). The final mention is worth quoting for the light it inadvertently sheds on the FBI, President Nixon, and the quality of federal government in general. The FBI said:

"(Reference Deleted) indicated that (reference deleted) is convinced that the SST was defeated by those individuals and groups who are hostile toward President Nixon and will do anything to thwart the Administration no matter how worthy the project. (Reference deleted) indicated that (reference deleted) had recently met one (reference deleted) who heads up an organization known as 'Friends of the Earth', as well as (reference deleted) of the Sierra Club, who told (reference deleted) they had 100,000 people in their organizations, were recruiting more all the time, that they had defeated the SST, and that they were going to defeat President Nixon in the next election."



## THE FOE LEAK BUREAU

Given the way things are in government and industry, a great deal of information vital to the interests of the community never gets out. Some of it is simply not noticed by interested people because of limited circulation and some of it is, of course, purposely withheld.

FOE believes that those who anonymously leak relevant information perform a public service of the first rank. In their absence, bureaucratic secretiveness and corporate self-interest too often succeeds in suppressing essential information, frustrating the process of informed and democratic decision-making.

We believe that many employees of the AAEC, of "independent" national laboratories, of private companies, of government departments, of equipment manufacturers, of utility companies, have more than once thought "the public really ought to know about this". But it is sometimes pretty hard to know how to reach the public. A major obstacle is the difficulty of identifying individuals and groups who will be interested, responsible and effective in using the information.

Friends of the Earth hereby volunteers to serve as a conduit for information - a Leak Bureau.

Informants will be guaranteed anonymity and the utmost in discretion. Any information received will be responsibly used and shared with other groups (preserving the anonymity of the informant) which might make good use of it.

Our address is: Friends of the Earth  
51 Nicholson Street  
Carlton, Victoria 3053

In case of an emergency or information that must get out quickly, telephone collect: (03) 347 6630

We look forward to hearing from you.



# EDITORIAL

CHAIN REACTION AUTUMN 1976: VOLUME 2 NUMBER 1

**1976** - will mark a turning point in history. The press have called '76 'The year of the nuclear showdown', with an 'agenda of profound significance to the Western World, and of crucial importance to Australia as a uranium supplier . . . ' A referendum in the American state of California, in June, on a nuclear moratorium for the State, followed by the report of the Ranger Uranium Environmental Inquiry, in Australia, will set the pace of the '76 showdown.

Around the world there is growing concern about the environmental and social costs of Nuclear Power. People are realising that decisions being made now will seriously affect the lives of future generations. We either face a move to a more equitable society based on real human needs or the hardship of global pollution caused by a high energy lifestyle.

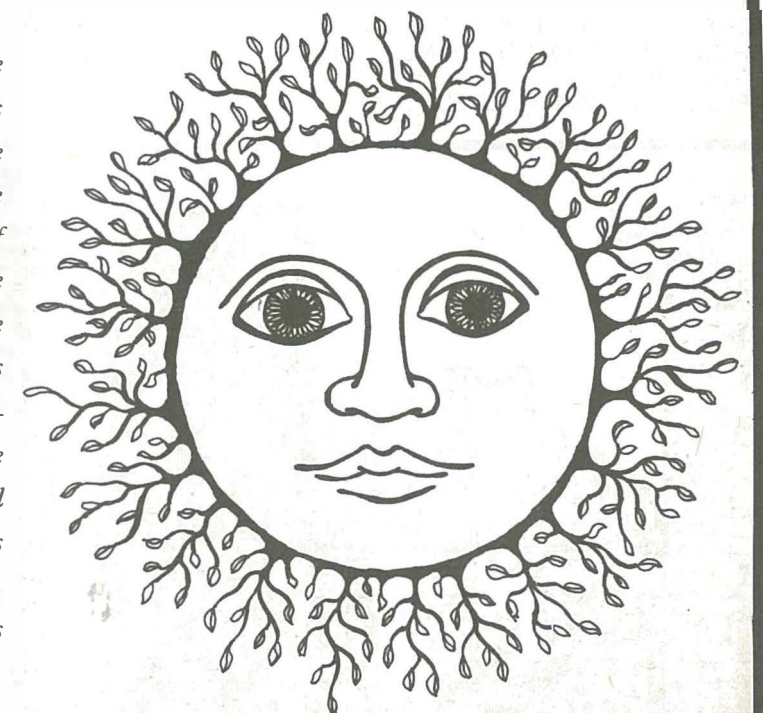
The events of the next few months are crucial to the decisions being made in Australia and overseas. We urge your support in any way that is possible, for every individual has the basic right to participate in these decisions.



## AUTUMNS GOLDEN EQUINOX

*"The dimming of the sunlight after the brave shining summer; the coming of the quiet days when the leaves become coloured; the joys of the fall: these things are always a little sad. We are aware that we are not part of the eternal round of the material world. Change is the key to it all, the orderly sequence of events, the reaping and the sowing, the growing and the declining. There has always been a hope of renewal and an understanding that the rhythm of the earthly life is but one aspect of all manner of rhythms in nature. The old astrological identification with the sun has always been mingled with the pictures of the inner mind. The sun of autumn is always glorious and always sad."*

-C.A. Burland . . . Myths of Life and Death





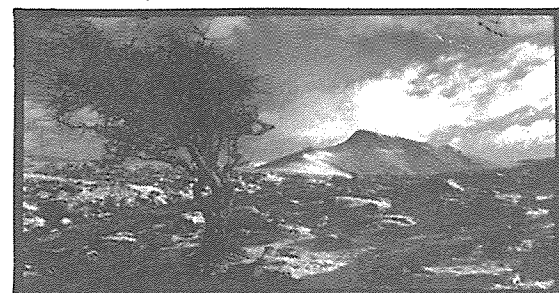
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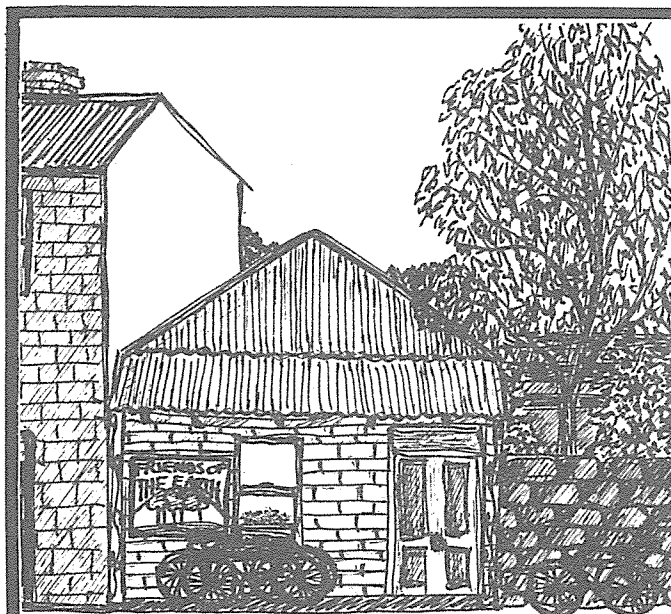
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"It is only a little planet  
but how beautiful it is."  
Robinson Jeffers

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## CREDITS:

This first issue of *Chain Reaction* for 1976 is the result of FOE's decision at our national meeting in December last year to change *Chain Reaction* from a rather sophisticated member's newsletter into a national activist, oriented environmental magazine, for general distribution.

As part of this transformation, we have changed from bi-monthly to quarterly. We intend to supplement our communications to members with in-between news bulletins.

This issue has been edited by Richard Nankin and Stephen Myers, but just as much blame could be levelled at the large but disorderly collection of people who helped in so many ways.

Thanks to: Ray Edwards, Emma Young, Neil Barrett, Peter Hayes, Don Seimans: Mike, Chris and Barney for all their incredible food and countless cups of coffee, Paul Marshall, Bicycle Mick, David Matthews, ever-tolerant Judy, Terry, Andy Bevin, Jason Alexandra, Pat and Hillary, Herb Fenn, Wieslaw Lichacz, Mark, Strider, John Price, Spike, Clair and Steve for the transport, and the indomitable Jedda, Kundi.

Thanks to Sue at Rabelais and Joy at Outback Press for the type-setting, Jak and the Walker press crowd for all sorts of things, Graham and Waverly Offsett for printing the body of this issue and Stockland for the cover.

Original graphics from: Jingle-Jangle Jill, Roy, Steve, Jason, Ray and Emma.

Photos from: Eugene W. Smith, Sreten Bozic, Peter Hayes, Terry, Richard, Jan Roberts, Suzanne Anderson, the U.N., and the A.C.F.

Special thanx to the Colong Committee for their information on Kakadu.

To all who conspire to reproduce any of the material contained herein — we ask only that you acknowledge your sources!

# EARTH NEWS...



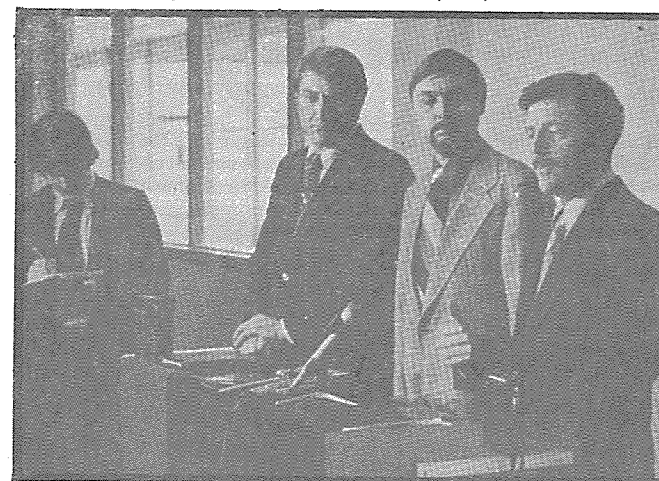
## G.E. ENGINEERS RESIGN

"Nuclear power is a technological monster that threatens all future generations."

Three top managing engineers, Dale Bridenbaugh, Gregory Minor and Richard Hubbard resigned from General Electric's nuclear energy division leave on Monday February 2nd, to join the campaign to pass the Nuclear Safeguards Initiative in California (by a coalition of citizen groups). Between them they had amassed 22, 16 and 16 years Service for the company.

Minor's concern came to a head with the Brown Ferry Fire last March. Hubbard said, "It's a tunnel vision kind of thing. I was responsible for making sure that neutron signals get converted into amperes. That's all you look at. People talk about radioactive waste storage, reprocessing, and proliferation, and you say that's my responsibility. Even G.E. says some of those things aren't our responsibility . . . looking at the broader picture, I conclude that nuclear power is neither safe, clean, or economical."

Bridenbaugh added his concern for what he called the grandfather clause. "After you build 20 nuclear plants, and you find some basic design flaw, you say you won't build any new plants with the same problem. But what do you do with the existing plants? Do you go back and re-design them? That's not N.R.C.'s policy."



Left to right: Bridenbaugh, Hubbard and Minor talk to the press. Photo courtesy Project Survival.

## FAILING SAFEGUARDS

Over the last few months a number of reports on nuclear safeguards have been carried out either by, or for, U.S. government agencies. Two of these reports which were carried out for the Nuclear Regulatory Commission were published in November last year. Each report emphasised the enormous dangers of illegal use of nuclear materials such as plutonium by organized crime, terrorists, and disaffected nuclear industry employees.

The latest study has been carried out by the U.S. General Accounting Office and was requested by Congress. A newspaper report of the study, noted that "international safeguards to prevent nuclear materials being stolen or turned into weapons left much to be desired."

Of course we've known this for a long time. For example, conservative

U.S. Senator, Stuart Symington, last year visited the Headquarters of the International Atomic Energy Agency (IAEA). On return to the U.S., Symington, who is the Chairman of the U.S. Senate subcommittee on Arms Control, noted that the "IAEA is a farce" maintaining a dangerous illusion of regulation which does not exist.

Sources: Nucleonics Week 21st August, 4th December, 1975  
Melbourne "Age" 31st January 1976,

## THE NUCLEAR FORD

President Ford recently delivered his State of the Union address. The speech was a kick in the pants for those who are endeavouring to move western societies towards a saner energy policy.

The total energy budget has risen about 30% to 10.4% billion. And, you guessed it, a large proportion of this is for nuclear development. \$2 billion goes to the Tennessee Valley Authority which plans to have 20 reactors by 1985 and \$1.2 billion is for uranium enrichment activities. And there is much more: of the \$2.4 billion for 'energy research, development and administration, \$990.9 million is for nuclear fission.

\$304.5 million is for fusion

\$698.5 million is for all other energy sources.  
solar, geothermal, fossil fuels, and energy conservation.

Of the \$990 million fission allocation, a huge \$575 million (or nearly 60%) will be spent on the ultimate technological nightmare, the breeder reactor.

The solar allocation is a depressing \$116 million. And even more of a bummer, 63% of this will be spent on long range solar electric plans. The more immediately feasible solar heating and cooling (i.e. not electric) will receive only \$34.5 million.

As NMA noted, "the . . . budget furthers the heavy bias in the Administration in favour of centralized high technology, highly capital-intensive energy supply strategies, and continued reliance on electricity. It also illustrates the negative bias against low-cost, diffuse, middle technologies, which focus more on end-use needs, on renewable energy sources and on energy conservation."

Source: NMA March 1976 pp 16-17.

## CALIFORNIA — THE FIRST TO GO?

In June 1976, Californians go the polls. On the ballot paper is a referendum clause which may spell the beginning of the end for nuclear power in the U.S. and a large part of the rest of the world. People are asked to vote on whether further building of nuclear power stations should be banned until certain conditions are met. One of these conditions is that the liability for damages in case of a serious accident should be borne by the utilities or if they will accept the risk, the private insurance companies. At present under the Price-Anderson Act people are only covered for a minor proportion of potential damages due to the insurance companies' apparent lack of confidence in the industry. Another condition relates to the state or progress of waste handling.

People on both sides of the debate admit that if the vote favours the opposition, it will result in a cessation of further N-plant building in California. This is because the utilities are not yet prepared to accept the risk of having to find many billions of dollars in the event of a major accident.

The California initiative is creating widespread interest. Both pro and anti-nuclear forces are engaging in a determined campaign. The pro-nuclear forces are being supported by at least one Federal govern-



ment body, the Federal Energy Administration.

However, the critics are very optimistic. At the annual Critical Mass conference in mid-November, the head of the California People's Lobby, brought the crowd of 1100 to its feet by vowing that "we're through testifying, we're through pamphleteering, we're through picketing. We're going to the ballot box and we're going to win." And of course the resignation of the "G.E. Three" has made victory much more likely.

Source: Nucleonics Week, Nov. 18th  
Oct. 16th, 1975.

## OUR NEW STATUS

Pan continental recently announced a doubling of its reserves from 115,000 to 228,600 short tons of uranium oxide, now worth around \$9.6 billion.

So now we have the biggest uranium mine in the World! This puts us in the same status bracket as Turkey, with the largest opium poppy fields, and the US with the largest number of nuclear weapons.

The chairperson of Pancon, Mr. Grey, now reputed to be the second richest person in Australia, has announced that he wants to look into the feasibility of enrichment, fuel fabrication and spent fuel reprocessing.

The recycling of spent fuel involves extracting plutonium, from the radioactive waste for later use in present day reactors of (in the future) breeder reactors. Plutonium is a highly toxic substance - dangerous for several million years, a lung cancer agent in quantities on one ten millionth of a gram, and perhaps most importantly, only 6 - 10 kg is necessary to make a nuclear bomb. One reactor produces 250 kg of the stuff per year!!

## DOUG'S DOUBLE SPEAK

Australia's Minister for National Resources, Mr. Anthony, has returned from Japan. Whilst his tail was very definitely between his legs, it was still lashing out in an aggressive though confused manner.

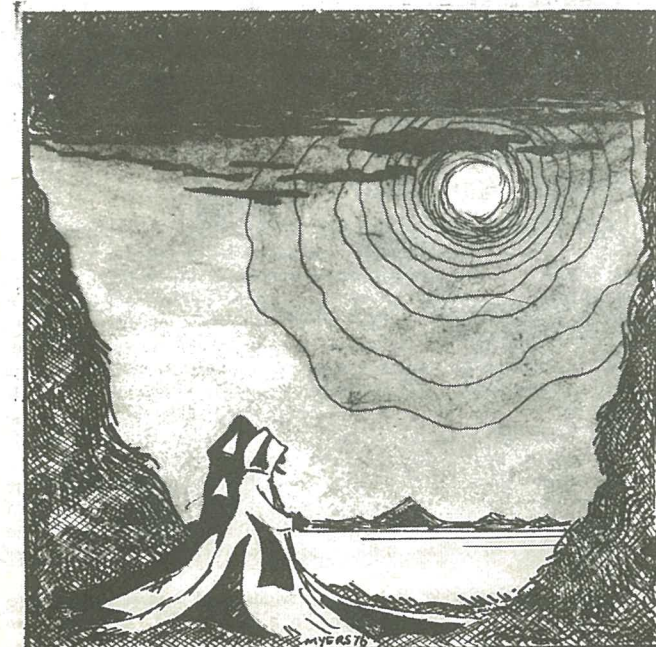
You see, he went there largely to sell uranium. He came back saying they don't need it until after 1985. This must have been a disappointment to the moguls who had been led to believe that 'uranium is the basic ingredient, of Japan's energy future' (to quote a 1974 speech by Mr. Anthony).

Around 1972/73, Japan signed contracts for uranium to ensure supply through to the mid-eighties. However these contracts (which were signed with Canada, South Africa, and to a lesser extent, Australia) were based on two assumptions which no longer hold.

One is that by 1985, nuclear capacity would be 60 million KW. In fact due to widespread and growing opposition to nuclear power, the industry will be lucky to achieve 30 million KW.

The other is that plants would operate at an 80% capacity factor. In fact, the existing 9 plants have achieved a dismal operating record. They have over the last 2 years produced only one-third of their potential output. Although this may improve in the future, it must be remembered that the U.S. average is only 55%.

Accordingly, a conservative view is that the 88,000 tonnes of uranium oxide contracted for in the early seventies will last well beyond 1985, and perhaps up to the year 2000. FOE's view is that because of strong opposition to nuclear power, Japan is likely to cease building nukes within a few years. If so, it may be in the uranium market as a seller, not a buyer



We attempted to publicise these facts at the time Anthony's statements were major news. However, only the ABC's A.M. - which had checked out our story and found it to be correct - showed any interest.

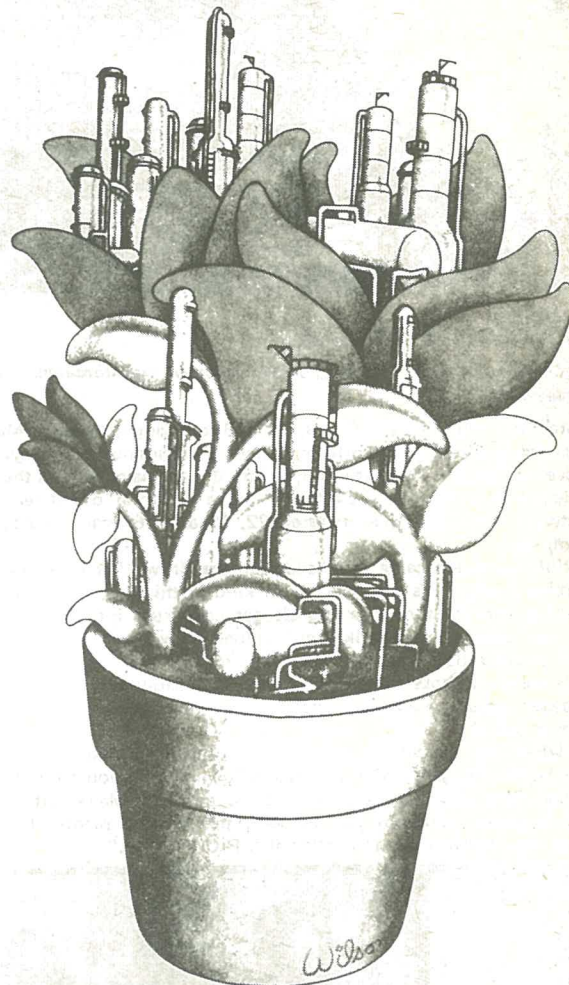
Sources: Nucleonics Week 27th Nov. 1975

Energy in Japan (published by the Institute of Energy Economics in Tokyo) June 1976.

Melbourne "Age" 16th Feb. 1976.

## CHLORDANE & HEPTACHLOR BANNED IN US

\*The US Environmental Protection Agency has ordered an immediate ban on most uses of the pesticides chlordane and heptachlor on the ground that continued use would create "imminent hazard" of cancer



for humans. The chemicals are used mainly in control of household pests and lawn insects ('Age' 26th Dec. 1975). In August 1974, the same Agency moved to ban the use of two other pesticides, aldrin and dieldrin, because of their threat to human health.

In Australia the National Health and Medical Research Council is responsible for licensing pesticides. So far it appears that the Council has made no move to follow the US EPA. Perhaps a few letters to the Council C/- Albemarle Buildings, Phillip, Canberra, ACT may get some action - ?

## PEDAL POWER

A British local government council is considering giving 100,000 bicycles to children so that they can end an expensive bus system. A proponent on the Council says that scrapping the buses will save \$18 m. whilst the bicycles will cost only \$8m. "Besides cycling is jolly healthy for youngsters" he added. Under the plan children aged eight or more would be given bicycles.

And in the US bikes are still in the news. Though the US bicycle boom which took place in the early seventies was arrested as people began to realize that they couldn't compete against cars unless proper provision was made, there are still good things happening. One of these will take place in mid-1976 when an estimated 10,000 cyclists from all over the world will take part in *Bikecentennial/76*. This ride will open the 5600km. Trans America Bike Trail from Oregon on the West Coast to Maryland on the East Coast. Some people will ride the whole way, others only part of the way. The ride should give major publicity to the bicycle.

In Australia bicycle sales are booming and as yet, no end is in sight. In Victoria alone 400,000 bicycles are expected to be sold this year.

However, continued inaction by governments in providing bikeways and in facilitating the integration of bikes and public transport may soon spell an end to the boom. In Victoria, the Minister for Sport and Recreation, former football champ, Brian Dixon, has recently admitted that plans for a major bikeway from Hawthorn right into the city have been scrapped. In any case, the Minister sees bikes only as a fitness tool, not as a major part of any sane solution to the urban transport problem.

FOE is attempting to ensure that the cyclists in Australia are not forced to concede defeat to private motor cars. We believe there is a sound case for the integration of bicycles and public transport. Clearly however, a lot of work is required.

## LOVEJOY'S NUCLEAR WAR

'LOVEJOY'S NUCLEAR WAR' IS A NEW TYPE OF ANTINUCLEAR FILM which attempts to defend the notion that it is morally right to destroy others' property as an act of "self defense" against nuclear power. Described by its makers as "a film about the citizen, our environment, the law, and nuclear power," the production covers the actions of Samuel H. Lovejoy who last year (in real life), toppled a 500ft. observation tower erected by North-east Utilities to gather meteorological data for the utility's proposed Montague nuclear plant in Massachusetts.

The maker, Green Mountain Post Films, of Montague, Mass., plans to promote the film to high schools and colleges. One nuclear industry source, student of the film medium, said this is an example of a "growing and alarming" practice: the spread of the antinuclear gospel to school and college students. He said that more and more schools are taking antinuclear films - often recycled TV shows like "The Plutonium Connection" which took what many critics thought was a totally one-sided view of the safeguards question. "The school systems don't go in for pro-nuclear films any more," he said. They reject industry films as distorted propaganda - "like the Tobacco Institute replying to the America Cancer Society," the source said.

"Lovejoy's Nuclear War", is a 60 minute color documentary directed by Charles Light and Dan Keller. It gives a brief history of nuclear power, beginning with The Bomb, discusses the current nuclear power issues, and then goes to the trial of Lovejoy for toppling the meteorological tower. A flyer for the film says that Lovejoy turned himself into the police after his action and gave them a statement "decrying the danger of nuclear power and accusing the government and the utility industry of conspiracy and despotism." Lovejoy was tried but acquitted on a technicality (whether the tower was "personal" or "real" property). The film includes conversations with Northeast Utilities personnel, local people the jury, and two nuclear opponents who testified at the trial: John Gofman and Howard Zinn. One of the film makers summed it up: "The film deals with nuclear power and civil disobedience."

-extract from *Nucleonics Week* (USA). 3rd July 1975.

Friends of the Earth has just purchased this film from the US. For bookings contact your local FOE group.

## AN EXPERT SPEAKS

A strong criticism of present trends in the nuclear world was made in January this year by the first Chairman of the former US Atomic Energy Commission, Mr. David Lilienthal. Mr. Lilienthal called for an immediate halt of all US exports of nuclear devices and materials. ".....the fact is," he said, "that the US, our public agencies and private manufacturers have been and are the world's major proliferators. Proliferation of capabilities to produce nuclear weapons of mass destruction is reaching terrifying proportions. This is compounded by the growth of terrorism and by the prospect of technological advances that will make it possible to refine wastes from scores of atomic reactors into bomb-grade material. I think most people would be shocked if they realized the extent to which the US has been putting into the hands of our own commercial interests and of foreign countries, quantities of bomb material whether plutonium of highly enriched uranium".

(Source: Melbourne Herald 20th January 1976)

## COMPANIES BEHIND EACH OTHER

The new regime in Canberra has wasted no time in giving every encouragement to the uranium miners. The latest is the decision to hand over the whole business to private industry; the Atomic Energy Commission will now withdraw from the arrangement with EZ and Peko to mine and mill the Ranger deposit. However, all is not rosy - the government is now worried that we've got too much uranium and that if all the reserves were to be quickly exploited, world prices may be depressed. So the word has gone out that a queue will have to be formed - and those companies which only act in the national interest won't have any trouble deciding who should go first, or will they?

The Australian Council of Trade Unions held an executive meeting over the week ended 20th February. The executive is treading rather carefully on the uranium issue. It deplored the recent decision by the Fraser government to take the government-owned Atomic Energy Commission out of direct involvement in the exploration, mining, and milling of uranium. It also congratulated Justice Fox for carrying on under the severe pressure which P.M. Fraser is attempting to place on him.

In September last year, the ACTU Congress passed a motion, which, while deploring the hazards involved in nuclear power, suggested that the forthcoming recommendations of the Ranger Inquiry be taken seriously.

It seems therefore that the ACTU will not move to block any preparation for uranium mining, at least until the Inquiry is completed. Not so a number of affiliated unions (such as the Watersiders, the AMWU, and the Storemen and Packers) which already have bans on mining and associated work.

The ACTU is expected however to make a strong submission to the Inquiry in Melbourne.

Sources: Melbourne "Age" 21st February 1976.  
ACTU Congress Report, 1975.

## NEWPORT

The SEC, like its counterparts interstate and overseas, is suffering from an acute attack of growthmania. For example, it continues to push the highly energy-inefficient electric hot water services when solar panels with electric boosters or even natural gas could do the job much better. And of course it really doesn't want to know about conservation of electricity - after all "electricity makes life easier!" doesn't it?

## TOO MANY PEOPLE?

Over most of Australia birth rates are falling rapidly - Victoria's fertility rate for example has now probably reached the ZPG level. In 1975 births fell by 6.5% from the 1974 figure - the birth rate has now fallen from 21.51 births per 1000 population in 1971 to only 16.88 per 1000 in 1975. Overall, the State's population growth rate dropped to 0.99% in 1974/75, a far cry from the roughly 2.0% growth of the 50s and 60s.

One organization which will not be pleased will be the State Electricity Commission of Victoria which has based its planning of future load growth on much higher population growth rate figures. In the 1960's SEC engineers were planning additions to generating capacity on the basis of an expected 2.0% population growth rate in the future. In 1975 despite all the evidence to the contrary according to an authoritative source within the SEC, the engineers were still planning on the basis that ZPG fertility rates will be attained at the earliest by 1982 and perhaps as far away as 1989. In contrast, Professor Borries' well publicised calculations indicate that 1978 is the year that will see ZPG fertility rates; these latest figures for 1975 suggest that if it hasn't happened already it may well happen before 1978.

## GREENPEACE NEWS

Rolf Heinman and 'La Flor' have returned to Australia and Melbourne. Rolf is presently up in Coff's Harbour preparing 'La Flor' for the journey down the coast to Melbourne. He will be writing about his experiences, discoveries, adventures in the South Pacific, when he returns.

Emma Young (Moodie) from the Nuclear Protest Yacht 'Fri', presently working at FOE (Vic), will be showing the film - 'Mururoa '73' to Rolf (who hasn't seen it yet) and to all interested members/non-members.

It will be an interesting evening, as Rolf was near the Mururoa Atoll a year later ('74) taking samples of water and marine life.

Time and place will be announced when Rolf returns.

## FAMINE 1976

In November last year the 137 member nations of the Food and Agricultural Organization met in Rome. The meeting was told that the world failed to replenish its depleted food stocks in 1975 and the outlook for the world's poor in 1976 is bleak. Bumper grain harvests in North America were offset by poor crops in USSR and Europe, so that in 1976 with little reserves to fall back on, bad harvests could be disastrous for the 500m. underfed people in the world. ('AGE' 27th Dec. 1975).

(According to FAO statistics, one third of the world's population consumes two-thirds of its food, 500m. people suffer chronic hunger, and 400m suffer from persistent undernourishment. None of the hungry are reported to live in China but plenty of them live in countries where the CIA has foiled attempts to gain land reform, expulsion of rich elites, and a new deal for the poor.)



# LETTERS



**BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS**  
 CNR CONSTITUTION AVENUE AND ANZAC PARADE, CANBERRA  
 Postal address: P.O. Box 378, Canberra City, A.C.T. 2601  
 Please address all communications to the Director

Telephone 499111  
 Telegrams: BURGMIN  
 Telex: 62109  
 In reply please quote  
 5 December 1975

Friends of the Earth  
 59 McArthur Place  
 CARLTON Vic 3053

Dear Sirs,

An accusation by your organisation contained in your bulletin 'Chain Reaction' (Summer, 1975 p14), involving 'men of the Bureau of Mineral Resources' in the desecration of aboriginal burial sites has been brought to my attention recently, namely by a quote of part of the relevant passage contained in the Australia Party NSW Branch submission to the Ranger Uranium Environmental Inquiry. In an effort to test the validity of the accusation I have subsequently obtained a copy of the complete article from which the quote was taken. It was in my interest as well as that of the BMR as an organisation to do so, as I have been intimately involved in BMR field work in the Alligator Rivers region since 1970 and to my knowledge no desecration of aboriginal sites has been caused by BMR operations or any of its employees.

Having studied the quote in detail and in context, I am now able to offer the following comments. Toby Becker's name immediately moves the period under discussion from the 1970's (as suggested by the previous paragraphs in your article) back to the 1950's. Furthermore, as far as I can ascertain, Mr Becker was at no time employed by the BMR. He was in fact a manager of the 'North Australian Uranium Corporation' and involved in the discovery of the Sleight uranium deposit. The reference to 'Toby Becker and his men' therefore in no way implicates my organisation. The denial of the accusation I gave under cross-examination at the Ranger Inquiry therefore stands, and in view of the additional evidence provided in this letter I ask that you correct the accusation insofar as the BMR is implicated, perhaps by a short statement in the next edition of 'Chain Reaction'.

The BMR obviously has its main aim assistance to the mining and minerals industry in Australia but this does not mean we are oblivious to the environment or to the preservation of important relics - aboriginal or other. However, many of our geologists work in a remote area for several years and become well acquainted with the area and of course the environment of that area. Efforts are taken to minimise or delete any effect our operations might have on the environment and in some areas we have prepared reports for environmental studies, and informed relevant authorities of the location of aboriginal sites not already known to them.

I have found some of the views expressed in your bulletin of interest and would appreciate being included on your mailing list.

Yours faithfully,

R.S. Neeham

## Editor's comment:

Ms. (or Mr.) Neeham is correct - the 'skulls' incident was meant to refer to the 1950's not the 1970's. Whilst we are unable to verify whether or not Toby Becker was employed by the BMR, the incident which took place in the 1950's is referred to on p.108 of Ross Anabell's book 'The Uranium Hunters' published by Rigby in 1971. Annabell wrote: "Men of the Bureau of Mineral Resource working on a radio-metric survey of the new field had a grim mascot on their mess table - a grinning Aboriginal skull removed from a burial cave. The area was full of signs of the original stone-age inhabitants, but no live Aborigines had been seen. One look at what Toby Becker and his men had done to their hunting grounds was probably enough to send them scurrying deep into Arnhem Land. What self-respecting witch doctor would tolerate a petrol bowser alongside his burial caves?" (There is even a photograph of the proud wife of one of the exploration team holding the skull in her sweet hands!)

FOE does not accept that the Bureau is an avid guardian of the environment. If it were, it wouldn't be in the uranium business helping to pollute the planet with radioactive wastes which will outlive not only the aboriginal skulls but the Bureau of Mineral Resources as well.

Dear Sir,

I am a Japanese citizen, resident in Australia (during the last 10 years) and concerned with environmental and technological problems. I have just read the long entitled "Japan's Uranium Follies" in *Chain Reaction* November 1975 issue and am greatly impressed by the depth in which you have dealt with the Japanese scene. What is described there is quite accurate and not exaggerated and need not be supplemented very much to represent reality. I applaud the efforts made by you to grasp the situation in Japan despite the various barriers to obtaining information. I fully endorse the conclusion reached which is relevant to the decision to be made by Australians on uranium mining and export.

Yours sincerely,  
 (Dr.) Atuhiro Sibatani,  
 Lyndfield,  
 NSW 2070

January 10th

Dear Richard,

Received your info (much thanks) and associated FOE materials with much enthusiasm after returning from my forced isolation from society, and will try to take a few minutes to explain what FOE/FNQ is up to, where it is headed etc.

I, myself, have left the Cape York Environment Centre and am now situation in Kuranda, where I'm designing and building my long planned 'alternative energy-lifestyle' house and garden. FOE is alive and well, blossoming now and then after a temporary sleep whilst I was away. Anyway our heads are now screwed on tighter and our direction much more positive.

To us, FOE is part of our way of life, not just an organisation to belong to, and thus meetings are rare, head sessions and raves common, and work sessions when necessary.

Alternative sources of energy are more then talk here and a half. dozen are operating and dozens being worked on, (mine included).

FOE/Far North Queensland is doing something quite unique, I believe, in making its one, major project, an environmentally conscious town in every way it can. It is taking (without their notice) a small semi urbanized town - namely Kuranda, and working with and thru the ordinary folk, to make this town a 'safe' and 'good' town, with respect to the ecology. FOE has many members here, thru the large alternate society that lives here and by working thru existing structures etc., we will revise and create our ecological 'dream town'.

Anyhow, that's our second priority, this year, second to the anti-nuclear project.

By next issue, we will have an article or two (completely ready for offsetting) to give to you, but sorry not this issue.

Thanks,  
 Alan Carle  
 (FOE/FNQ,  
 Box 21 Edge Hill, 4870)

## Congress of the United States

House of Representatives

Washington, D.C. 20515

July 24, 1975

Ms. Patricia Joralgmon  
 81 Irving Avenue  
 Livingston, New Jersey 07039

Dear Ms. Joralgmon:

Why should this nation deprive itself of the one source of energy that can make it self-sufficient?

Plutonium is far safer than cigarette smoke, safer than having animals around the house, and you could live your entire life beside a nuclear power plant using plutonium and be safer than taking a single bath.

Sincerely,

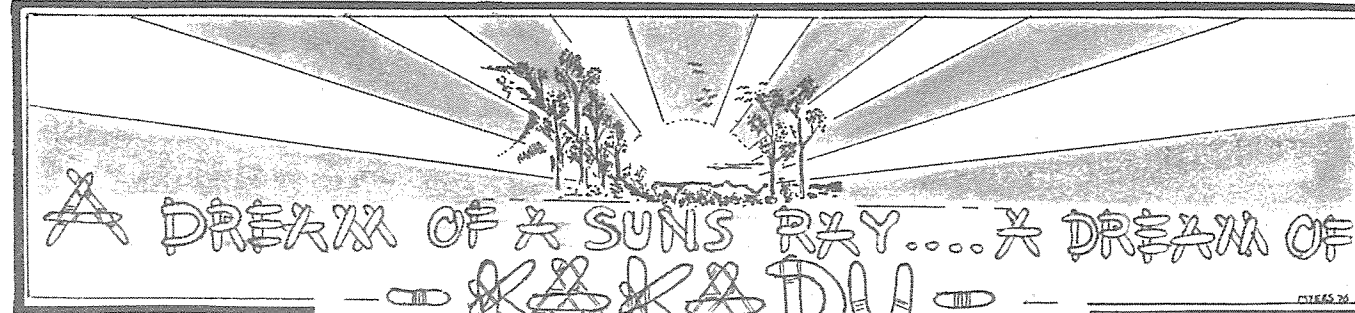
*Mike McCormack*

Mike McCormack  
 Member of Congress

MM/gmi

*Know Up!*

This letter was received by a FOE member in the states. The author, Mike McCormack, prides himself on being Congress's only scientist!



Hi friends,

just a few lines to convey an image of life at camp concern.

I am happy, looks as if everyone is. People come and go a lot, shuttle into Darwin to shop or do a few days work. Seem to have a few stayers here; bob, tom, roach and tone actually in camp this week. floyd and tabby away interstate recruiting. 3 big tents, one to 3 households depending on circumstances. 2 houses under construction and ready to start work on the calico office, an imposing stone structure, and on a roadside "hitch-hikers rest" for waiting for lifts in the rain.

Gardening vibe is a bit dormant right now but the original plantings are maturing. roach has some new seeds up this week. need to use high ground gardens for the wet season but the rain has not really come yet so our gardens are not waterlogged. bananas and sweet potato look like the staples, backed up with paw paws, snap beans, mung beans, tomato and egg plant. reminds me that no chooks have happened yet, one day I hope.

Exploring will be great fun, when we score a bicycle, walking is hot, but we walked down to the South Alligator wildlife ranger station for xmas dinner with gordon (the ranger) and betty his wife. Me and tom and greta and tone, good rave, gordon drove us home and stayed on for a few rums. We are "getting it on" with the locals. As soon as we get a kero fridge we will be able to get meat from gordon, surplus buffalo. plenty of those.

Plenty animals around camp. ants, lizards, water birds, emu, kingfishers, coucal pheasants, owls, satanellas, and so on. I like that.

There are 2 lagoons, each about as big as a sporting oval, one full of paperbark trees, one open water, I live half way between the two. have "adopted" an erosion gully and am trying to arrest it. country is badly damaged by buffalo, lots of scope for repairs.

there is no "routine" and each day is markedly unique, its a lot like no worries, no hassles. have lasted 2 months now without a meeting to discuss anything, see no reason to break our good record.

think we have found a site for the june festival/expositon, a quarry at book book hill (1 km from home) but will have to check that out with the aboriginies and the quarry proprietors first. may not sound like a very good idea but is in fact a good place, even water there.

by and large we are a curiosity, but the locals who have met us hitching etc know that there is a bit more too it than that, they seem to have decided that we are "here to stay" and so resolved to assimilate us into their community.

no contact with oenpelli, creeks are up, will not see those people again until the dry season.

mosquitoes are savage for a time but have now eased off. I plan on getting a loom to produce mosquito netting and tent cloth on site from fibre plantings, kanace probably. i am happy with a tent, mosquito netting is essential (if you want to live here). So i am going in for a bit of the cheap, local and self sufficient in my thinking.

the common sense and environmental awareness of my friends here is a source of constant pleasure to me, all hippies, but that is not a bad word in my book. the wildlife rangers are pretty blown out too, they had not previously realised that hippy = conservationist, and they are buzzed and bemused by the near discovery.

what else is there to say. I am having 2 days in Darwin, just for fun, forgot to go to sleep last night.

talked to Terry McGee at nimbin on the telephone just now. says that another radical ecology conference is planned for this easter. nimbin and darwin may stage simultaneous meetings and are looking for telephone or telex links at the time to bond the 3 meetings, the good offices of 2JJ were mentioned, if that station still exists.

feel tired.

love to all

strider



CHAIN REACTION NO. 1 1976



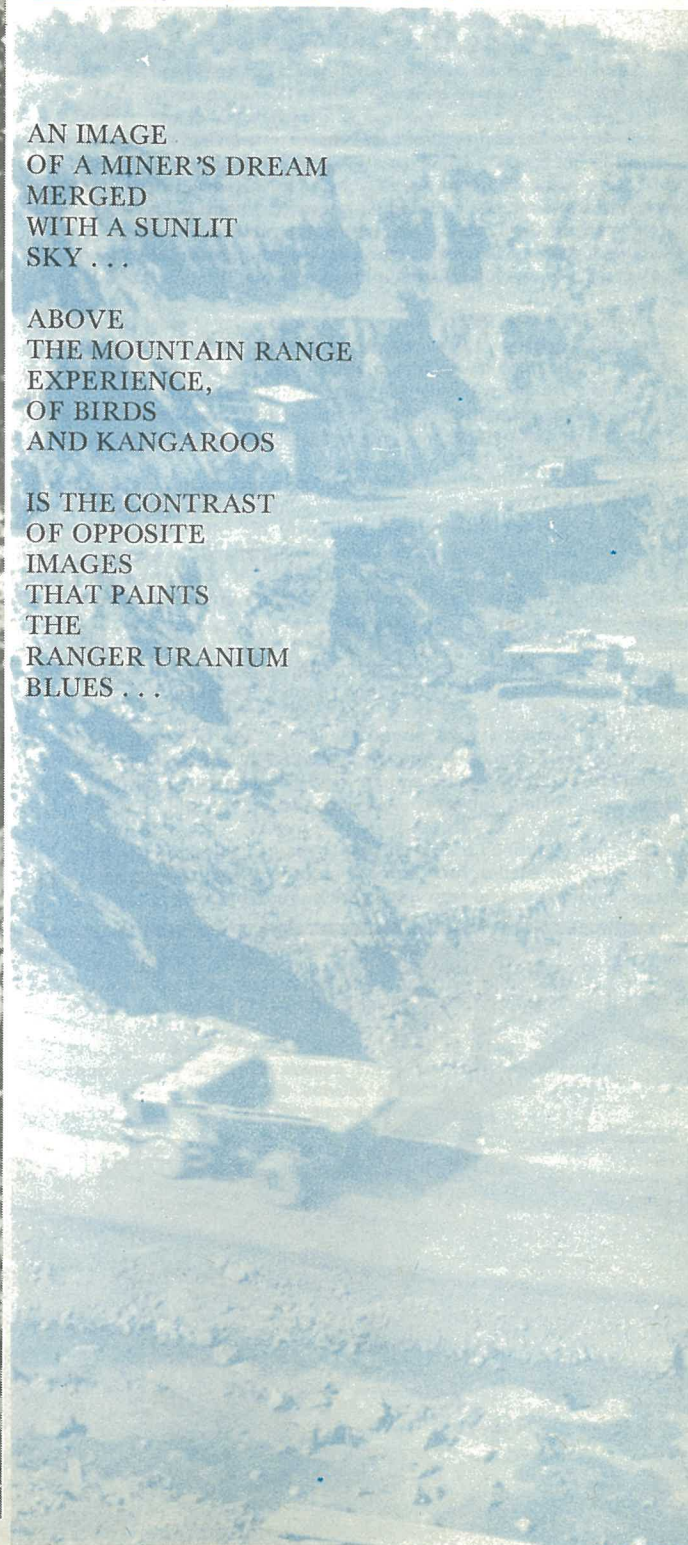


# THE RANGER URANIUM BLUES.....

AN IMAGE  
OF A MINER'S DREAM  
MERGED  
WITH A SUNLIT  
SKY...

ABOVE  
THE MOUNTAIN RANGE  
EXPERIENCE,  
OF BIRDS  
AND KANGAROOS

IS THE CONTRAST  
OF OPPOSITE  
IMAGES  
THAT PAINTS  
THE  
RANGER URANIUM  
BLUES...



The Ranger Uranium mine site lies below Mount Brockman's weeping tears. The native aboriginal population lived in harmony with Mount Brockman, and the surrounding Alligator River's Region, for 25,000 years. The introduction of the buffalo and wild pig by British settlers, in the 1820's, upset this natural harmony. Today, the Region is facing the even more daunting prospect of becoming the world's largest 'Uranium Province'.

The region comprises the catchments of the South and East Alligator Rivers. In the south and the east lies a rugged, largely untrafficable plateau. Its steep edges form the spectacular Arnhem Land escarpment that rises 50 - 250m above the undulating plains of the lowlands. Streams dividing these plains lead either to one or the other of the Alligator Rivers or to extensive flood-plain areas between them. The flood-plains, which are inundated annually by fresh water, begin where the stream systems leave the lowland country and extend east and west to the Alligator Rivers, along the rivers in wide bands, and north to the tidal flats of the river estuaries.

The year is made up of the 'wet', from November to March, and the 'dry' from May to September, with April and October as transitional months. The water over the majestic wetlands gradually disappears, as the dry approaches. Virtually no rain falls in the dry.

To experience the first rays of sunlight rising over Mount Brockman or the dance of a thousand native birds over a flooded billabong is to experience but a small part of the Alligator River's Region. The rich diversity of habitat, ranging from rocky escarpment country to packets of lush monsoon rainforest, makes the Alligator River's region a delicate and irreplaceable heritage.

This diversity gives rise to its rich fauna and flora. About 51 species of native mammals, 75 of reptiles, and at least 230 of birds are known. 'Among the plant groups are scarce relic communities of dense evergreen, non-eucalypt rainforest and of semi-deciduous forest-survivors from another age and climate.'

## THE CENTRAL QUESTION

The immediate breakup of the Region would be caused by a proposed townsite of 15,000 people to service the 'province'. This townsite will not avoid the social problems that other mining towns have evolved. And the attitude of the miners, who said 'uranium mining will benefit everyone in the world' to the aboriginal community will be multiplied a thousand fold. The potential risk of radioactive release into the Region, is too great a risk for us to take.

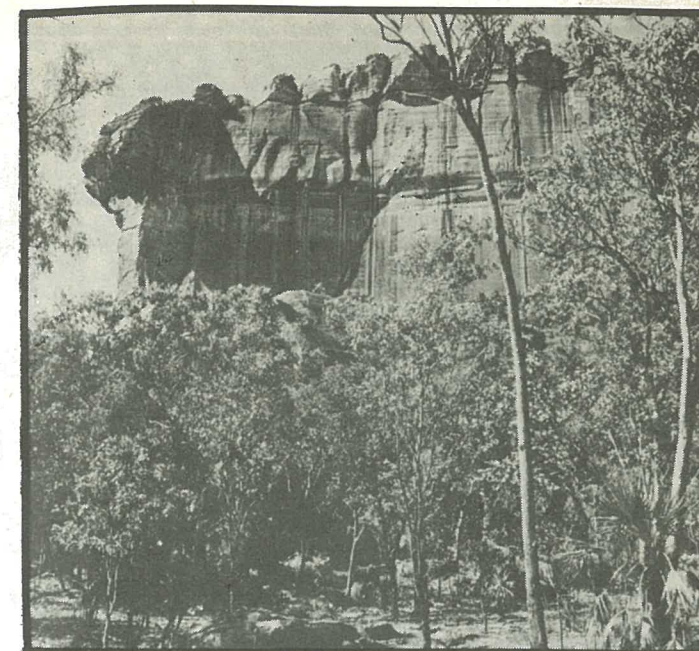
The issue of uranium mining, and its subsequent use in the nuclear fuel cycle, is not a mere technical question, but an ethical question. On a local, and global level. Industrial society has two paths to follow: we can continue our present course as a high environmental impact society, with centralised political control and complex technology, or we can take the alternative path to a decentralised society and a softer life style based on real human needs. The central question of the nuclear debate is simply, which is more important money or life. Uranium mining and Nuclear Power represent money, not life. There are adequate alternatives to nuclear power available, that are based on the clean energy of the sun. Yet, they are not implemented because they would reduce the profits of multinational companies. The answer to this central question must come from every member of society and not from those whose interests are at stake. This answer will decide the fate of our tiny planet.

## KAKADU NATIONAL PARK

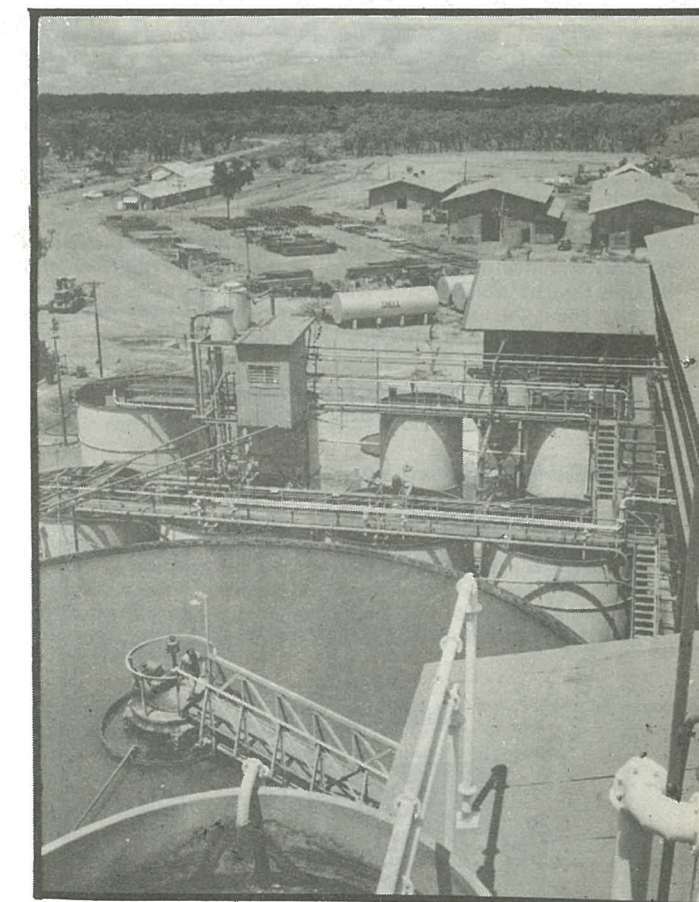
In its publication "Notes on a Proposal for a National Park in the Alligator Rivers Area", the Northern Territory Reserves Board commences by stating that it administers National Parks in the Territory. Then follows the apt sentence "There are not many." In 1965 the Board proposed to the Commonwealth Government the establishment of a national park to consist of most of the land between the East and the South Alligator Rivers and bounded on the east by the Arnhem Land Reserve. The area was about 2,475 Square miles. The Board stated that it was anxious to acquire a large tract of country in the Northern Territory while it is still available."

The subsequent history of the Park is one paralleled in most other potential wilderness reservations throughout Australia - the excision from the reservation of all areas of proved or possible commercial value. Senator Gorton, representing the Minister for Territories, said that "the Government is sympathetic to the creation of more national parks, but in this case the Reservation is complicated by an Aboriginal Reserve, a wildlife sanctuary and mining 'activities'!" In July 1966 and April 1967 the Reserves Board again submitted the proposal, but "in desperation" submitted alternatives for a park greatly reduced in area. In January, 1968, the Acting Administrator recommended a reservation of 1,000 square miles, stating that there were "no barriers to this reservation."

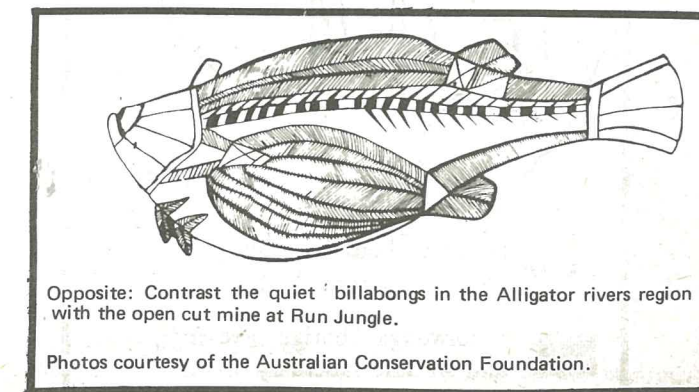
In November 1968, Mr. Sam Weems, Parks Advisor to the U.S. Department of the Interior, stated that "The Northern Territory could be the site for one of the best national wildlife parks in the world." He added "that there is no time to waste in getting the area set aside".



The weeping tears of Mount Brockman, overlooking the Ranger site.



Part of the uranium ore treatment plant at Rum Jungle.



Opposite: Contrast the quiet billabongs in the Alligator rivers region with the open cut mine at Run Jungle.

Photos courtesy of the Australian Conservation Foundation.



Subsequently the following concessions were made to commercial interests:

- January 1969: Pastoral lease granted over Mudginberri area (427 sq. miles) and Munmarlary (396 sq. miles).
- March 1969: Authority to prospect granted to Noranda Australia Pty Ltd.
- August 1969: Authority to prospect granted to Air Navigators P/L
- November 1969: Authorities to prospect granted to Geopeko Ltd. and Project Development Corporation Ltd.
- December 1969: Further authority to prospect granted to Project Development.
- January 1970: Further authority to prospect granted to Noranda.
- July 1971: Noranda Australia applied for five mineral leases close to Nourlangie Rock. The applications were withdrawn after the Northern Territory Reserves Board, The Northern Territory Museums and Art Galleries Board and the Australian Conservation Foundation lodged objections.
- October 1971: Government decided to renew prospecting authorities.

## THE DEPOSITIS

In 1969 no minerals of commercial value were known in the area. In the early '70's, following the issue of authorities to prospect, major uranium deposits were discovered in five localities. A number of localities were known to be prospective. Virtually the whole of the area between the East and South Alligator Rivers together with a substantial area to the east within the Arnhem Land Reserve, was covered by exploration licences.

The four major deposits, Ranger, Jabiluka, Koongarra and Nabarlek, are all on lowland country. The Ranger deposit, held by a joint venture of Peko Mines N.L. and Electrolytic Zinc Co. of Australasia Ltd, lies at the end of the Arnhem Highway. Tributaries of Magela Creek pass through there and the deposit may extend to both the alluvial land system in Magela Creek and to a small area of the escarpment land system just to the North of the Mount Brockman sandstone massif. The Ranger site lies close to aboriginal Sacred Sites. The Jabiluka deposit, about 24 km north of Ranger, is held by Pancontinental Mining Ltd.

Aboriginal archaeological and art sites occur in the adjacent sandstone residuals within a distance of 1 km of the deposit. The Koongarra deposit, held by Noranda Australia Ltd, occurs on a strip of lowland country about 24 km south - south-west of Ranger. The Aboriginal rock art sites associated with Nourlangie rock are 4 km west of the

deposit. The Nabarlek deposit, in the Arnhem Land Aboriginal Reserve, is held by Queensland Mines. The ore body is less than 200 m from an area known to the Aboriginals as Gabo Djang - the dreaming place of the Green Ants. The Aboriginals believe that the 1cm long insects that give the sight its name are descendants of the Great Green Ant. They revere the great ant as one of the spiritual beings who established all the patterns of human life. They also believe that, if the hallowed ground is desecrated, the green ants will turn into monsters that will ravage the world. If the proposal to mine the uranium goes ahead the Aboriginals fear of ensuing catastrophe could well be justified.

## RUN JUNGLE EXPERIENCE

The Rum Jungle uranium mine, south of Darwin, operated by Northern Territory Enterprises Pty Ltd (Conzinc Rio Tinto of Australia), during the late 50's and early 60's ended in disaster. An ore body filled with mine tailing overflowed into the Finiss River. The river is dead for at least 13 miles down stream. The Rum Jungle plant is still seeping heavy metals and other pollutants into the Finiss. The effects of this seepage on the foodchains and ecosystems down river will not be known for many years. The Government is well aware of this continuing pollution, and as yet has made no efforts to stop it.

## THE JABILUKA LEASES

On the 12th October, 1973, Pan continental and Getty Oil applied for a Special Mineral Lease (SML) covering 12 sq. miles, and on the 29th November 1974, applied for another covering 2 square miles over the Jabiluka area. Both SML's are still pending Australian Government approval. Both SML's are outside the boundary of the proposed Kakadu National Park. However, it was only early 1974 that the boundary was 'slightly modified' to specifically exclude the Jabiluka find.

In December 1975, Pan Continental Mining Ltd and Getty Oil Co. Ltd., joint holders of Exploration Lease No. 12, applied for 64 mineral lease applications over the Jabiluka Uranium sites. Northern Territory environmentalists Friends of the Earth and the Australian Conservation Foundation have lodged objections to these lease applications, to the Northern Territory Mining Wardens Court. Aboriginal communities were prevented from lodging objections because of the lack of time to get together and discuss the matter. There are at least seven archaeological sites within the escarpment in close proximity to the Pan Continental reserves. Two sites are within the boundaries of the mineral leases applied for by the company. An overburdened Wardens Court was forced to adjourn twice in two weeks, before the hearings were postponed until 18 - 19 and 24 - 28 May.

It has been announced since the hearings that the Jabiluka deposit is now the largest in the world.

The company has one of two choices to follow. The first is to withdraw their local mineral leases from the N.T. Administration and await the granting of the SML by the Federal Government. This would preclude public interest in the development unless pressure is exerted the Government to hold an inquiry. Neither the Government nor the company would want another investigation on the scale of the Ranger Inquiry. The second choice, which will save face and reduce hostilities of a public outcry, is to proceed with the Warden's Court Scenario. The limitations of the N.T. Mining Ordinance virtually exclude environmental factors being considered, but do allow some public recourse. However, the Court has no power to refuse lease applications and it only recommends one way or the other to the Administrator-in-council, which is a predominantly Country-Liberal Party excuse for Northern Territory democratic administration. The council then determines the granting of Mineral Leases.

## INTERNATIONAL IMPORTANCE

On the 19th January the Australian Conservation Foundation received a cable from the International Union for the Conservation of Nature and Natural Resources confirming the international importance of the Kakadu area. The cable said:

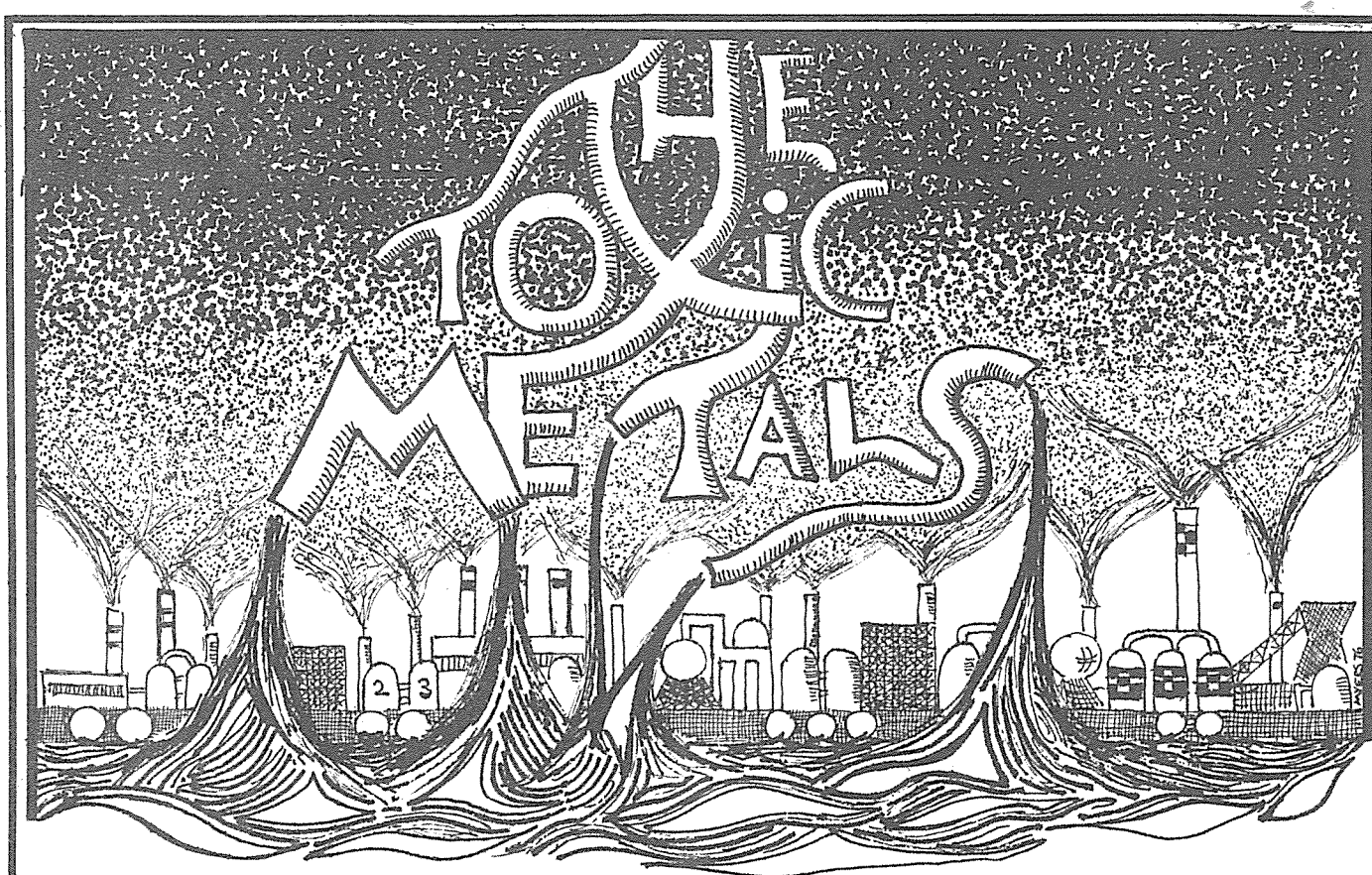
"The International Union for the Conservation of Nature and Natural Resources considers the proposed Kakadu National Park of international importance.

"It will provide protection to a unique area of special interest to science and world conservation combining wildlife, scenic and Aboriginal cultural values.

"It is one of a limited number of areas under consideration as part of the World Heritage under the Convention concerning the protection of the World Cultural and Natural Heritage which Australia has ratified.

ICUN is disturbed to learn that the area is threatened by mining and is making representations to the Australian Government asking that no mining or other development take place in the area."

The cultural history of the aboriginal community in the area should never be forgotten. For it is kept in the legends of the sacred places and painted in the caves and rocky outcroppings . . . Around the world the nuclear debate continues. The energy consumption of a billion air conditioners lies buried in the Northern Territory. Only time will tell if the yellowcake folly continues. For if it does it will be remembered, as the rush for fools gold.



## MINAMATA -- A PRELUDE

The history of heavy metal pollution in the modern, industrial world shows how little humans know about the effects of the disposal of heavy metals on the environment. However, the disposal of toxic materials with no regard for the consequences, is not an unusual occurrence, as we all well know. In fact it is not uncommon for such disposal to continue even when events in other growth centres indicate that such disposal endangers the health and well being of a certain section of the population (who usually wield very little political influence) and of other members of the biosphere.

The awakening to such detrimental effects really began in the village of Minamata, Japan, in 1953. For some time prior to this date, the Chisso Chemical Company, located in Minamata, had been releasing large quantities of mercury directly into Minamata Bay. In the sediments of the bay this mercury was converted into the extremely toxic methyl form by biological processes and was subsequently accumulated in the fish and shellfish of the bay. The economic deprivation of the villagers dictated that they derive a large amount of their food from the bay, and as a result, many were poisoned. Death or permanent disablement followed in many cases.

The bureaucratic evasion that followed indicated how subservient the government was to a powerful company such as Chisso. This evasion also prevented the surviving sufferers of this poisoning from receiving satisfactory action and compensation; not that any compensation could be considered satisfactory for an affliction such as methyl mercury poisoning.

## APATHY AND INACTION

No companies or governments involved in the cases of heavy metal poisoning that followed the Minamata tragedy can be excused for their apathy and inaction. The first official case of mass poisoning following the release of mercury had been recorded, yet the lesson to be learned from it was not heeded.

Just four years after the first outbreak of so-called "Minamata disease" had been contained, a fresh outbreak occurred in Niigata City in the same country. The circumstances surrounding this outbreak were the same as those in Minamata; a chemical company had been releasing mercury into coastal waters for many years prior to the appearance of the disease.

In North America some years later, this familiar pattern of mercury contamination was repeated. Mercury was released into freshwater systems in Canada, and two separate Indian tribes, living in the same vicinity of the Great Lakes, were found to have dangerously high levels of methyl mercury in their bodies. (It is important to note at this point that although methyl mercury poisoning can be fatal, people exposed to smaller, sublethal doses may suffer physical deformities, mental impair-

ment and personality changes. So although victims may show symptoms that are difficult to ascribe to the effects of this metal. Thus the visible results of the intake of methyl mercury appear to be much less serious than they actually are.)

Government evasion in this case lasted for two years, and an alternative lifestyle was not offered to the Indians to prevent them from consuming contaminated fish, a major item in their diet. Compensation was again slow in coming and was still not satisfactory.

More recently, in the northeastern Brazilian city of Salvador, it was found that mercury releases by the Recovicavo Factory had produced elevated levels of mercury in the shellfish and fish inhabiting the Tainheiros Creek. Government secrecy persisted for 3 months following the initial discovery. When a ban was imposed on the taking of such fish, the people living in the Lobato slum (along the creek) were deprived of important items in their diet and significant source of income. It is also suspected that some of these creekside dwellers are suffering from methylmercury poisoning.

The real extent of the mercury problem was indicated when directors of the Reconcavo Factory stated that 70% of the world chloride production still follows the same mercury-utilizing process.

## METHYL MERCURY FUNGICIDES

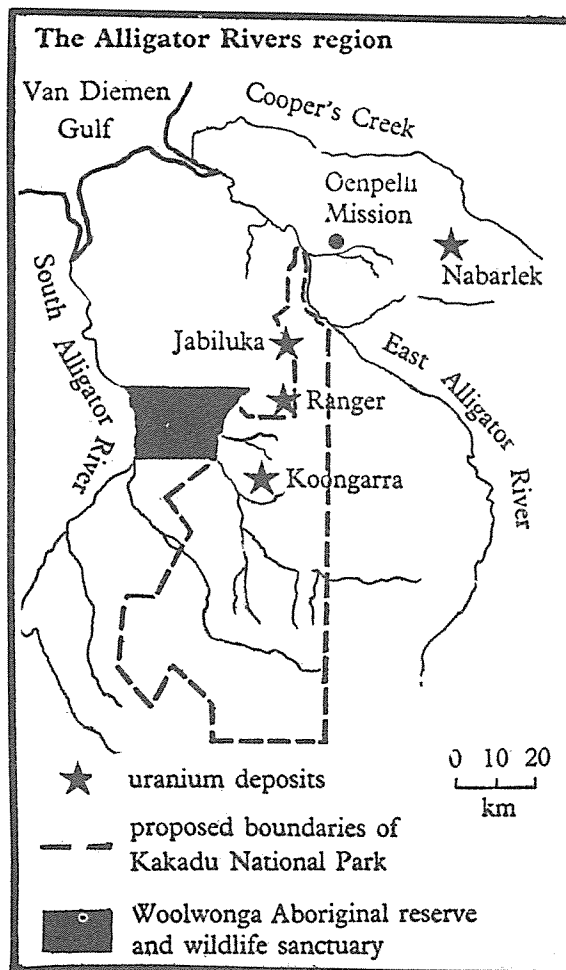
Another means by which methyl mercury may enter people's diets is through the use of methyl mercury fungicides on seed grain. Although evidence indicates that the use of these fungicides does not improve yields significantly over nonmercury fungicides (J. Environ. Qual., Vol.4, No. 1), they have been used extensively in various countries of the world and are still in use in Australia.

Ignorance, poverty and methyl mercury fungicides combined to cause the tragic poisoning epidemics in Iraq, Pakistan and Guatemala. In these countries farmers and their families living on the poverty line, consumed seed grain or the meat from pigs which had been fed seed grain treated with these fungicides. Such occurrences could easily have been prevented.

In Sweden, the widespread use of such fungicides led to the accumulation of high residues of methyl mercury all over the country. Dangerously high levels were found in Swedish people, however, this government was also very slow in acting. The knowledge gained from previous experiences with methyl mercury in other countries showed that these fungicides should never have been used.

## OTHER HEAVY METALS

Two years after the villagers of Minamata began to show signs of methyl mercury poisoning, the world learned of a new and terrible disease, cadmium poisoning. The disease was named "Itai-Itai - Byo" (Ouch Ouch)





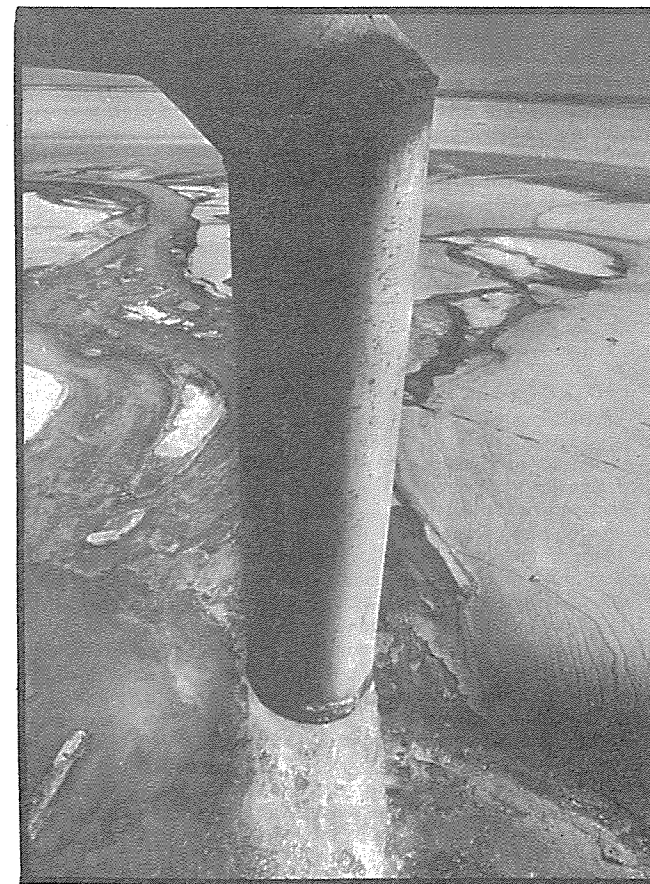


# THE PAIN OF MINAMATA....

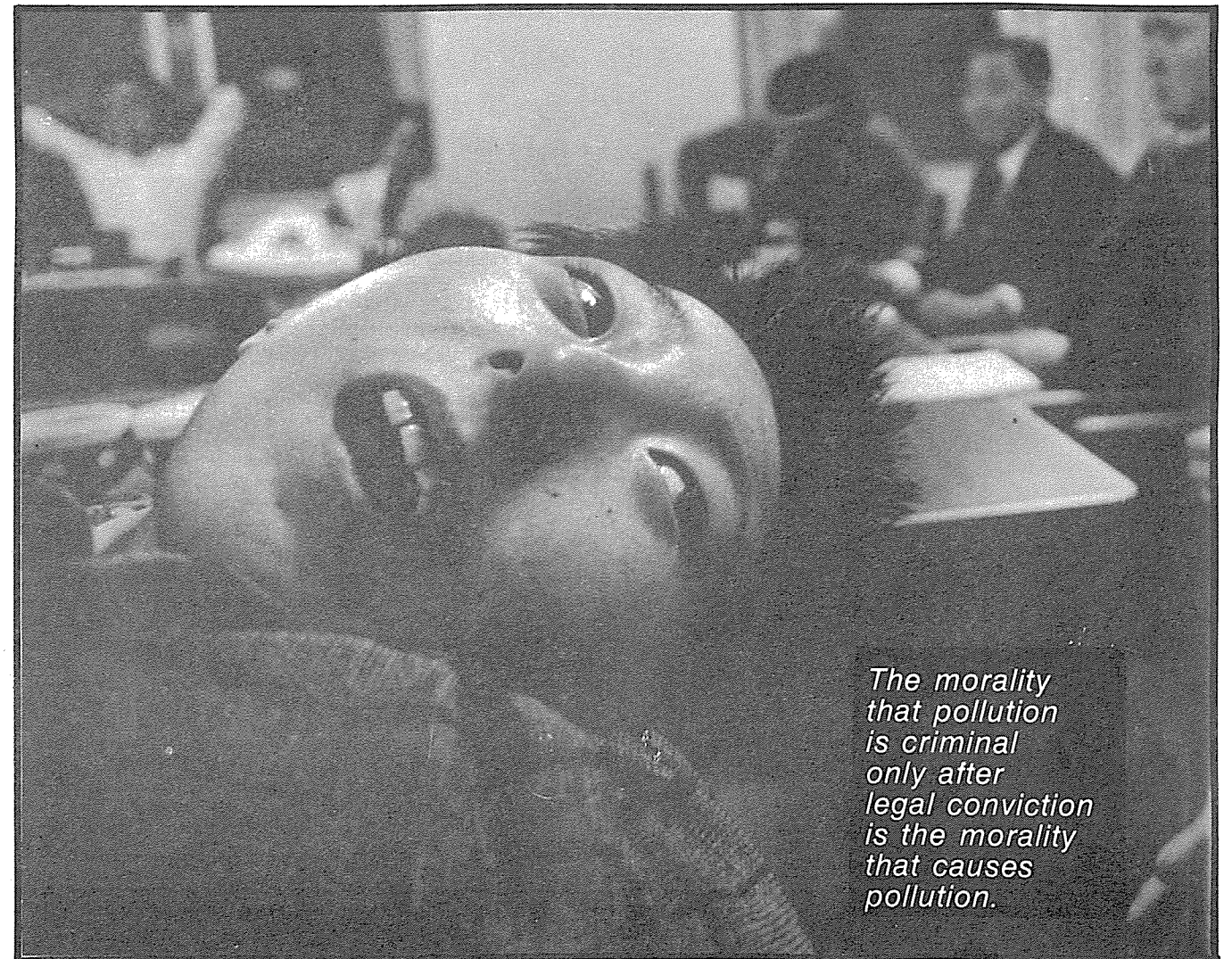


*Tomoko Uemura was taken to the Central Pollution Board for the benefit of others. The patients demanded that the board members look, touch, hold this child, and remember the experience as they evaluated human beings in dollars and cents.*

Photographs from "Minamata" by W. Eugene Smith and Aileen M. Smith.



*The pain of Minamata . . . The hands of Iwazo Fanato, two days before his death from the effects of mercury poisoning - it took Iwazo's body twelve painful years to be destroyed . . . The drain spewing forth from the Chisso Chemical Company factory in Minamoto Bay . . . The journey of the mercury effluent from discharge pipe to the dinner table . . .*

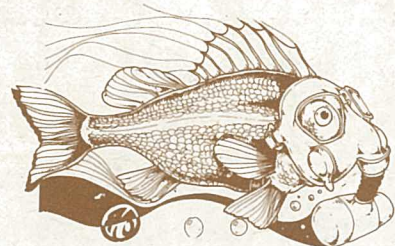


*The morality that pollution is criminal only after legal conviction is the morality that causes pollution.*



disease), a name which reflects the diseased victims agony. Grain had become contaminated in ricefields when the discharges from mining and zinc smelting overflowed onto agricultural land near Toyama City in Japan. Yet events dating back some 26 years showed how harmful cadmium could be if present in measurable amounts.

It is known through experiences with industrial workers that the intake of sub-toxic levels of cadmium is correlated with hypertension, heart disease, kidney damage, cirrhosis of the liver and lung damage. It is also known to be carcinogenic and teratogenic (Ambio, Vol. 3, No. 2.). Despite the fact that people living in industrialized countries are being exposed to increasing amounts of cadmium, there is inadequate knowledge regarding the effects of very low levels of intake of this metal.



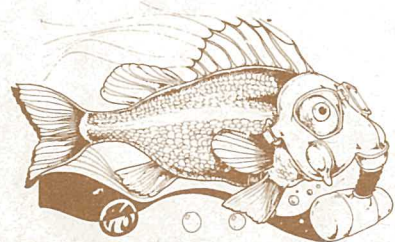
Lead is another heavy metal that is known to constitute a danger to people's health, yet it enters our bodies through the air we breathe, the water we drink and the food we eat. The level of exposure to lead being correlated with the degree of industrial and automotive activity in the surrounding environment. Sub-lethal doses are known to cause mental disorders and behavioural changes.

There are also other heavy metals, such as zinc, chromium and nickel, which are entering our environment in increasingly large amounts. Little is known regarding their effects on humans or on other members of the biosphere.

#### AUSTRALIA CATCHES UP (ONE STEP FORWARD, TWO STEPS BACK)

With the warnings spelled out by the events in other countries, Australia was in a position to avoid the problems associated with the release of heavy metals into the environment. However, it is now obvious that large releases by industry into our aquatic environments have occurred. Governmental secrecy surrounded the accumulation of these metals in marine organisms the same pattern of deceit that occurred in other parts of the world. Victorian people were given a clue to the level of heavy metals in coastal fish when the State Government raised the maximum allowable level of mercury in fish from 0.1 parts per million (ppm) to 0.5ppm in 1972, and banned the taking of school shark longer than 28 inches. Despite the fact that the World Health Organization's recommended safe limit of methyl mercury in fish is 0.5 ppm, a Swedish committee meeting on the subject of mercury in foods, stated that the average adult's diet should not exceed 410 grams (14.47 ounces) of fish containing 0.5 ppm of methyl mercury per week.

In October, 1975, following questions relating to the mercury content of fish in Victoria, Mr Scanlan, the Victorian Minister for Health, released the results of a study which was carried out in 1972, following the imposition of the ban on school shark. It was found that out of a sample of 400 people in Melbourne, 3 per cent showed blood concentrations of methyl mercury which exceeded the level of 0.02ppm (this being the recommended maximum level of the World Health Organisation) and 8 per cent exceeded the corresponding safe hair level of 6ppm. A significant correlation was found between fish intake and hair content of methyl mercury. The highest levels were found in inner suburban school children (Hansard, no 27, Oct 25, 1975, p 7931.).



In September, 1975, the extent of heavy metal contamination of Victorian marine environments was revealed to the public. David Phillips, a Master of Science student at Melbourne University, had been analyzing the levels of certain heavy metals in saltwater mussels for many months (his findings appeared in the Melbourne Herald on the 30th of Septem-

ber). Mussels are known accumulators of heavy metals and thus act as indicators of high environmental levels of these metals. His results showed that cadmium levels in mussels taken from Corio Bay (near Geelong) were the highest yet documented in the world (the taking of mussels from certain areas of Corio Bay was banned in 1974); lead levels were the second highest yet documented in the world, the main contamination being found off Sandringham; and the world's second highest levels of zinc yet documented were found in mussels in the vicinity of the Yarra River.

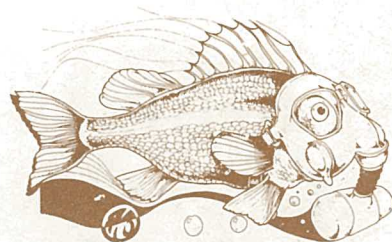
#### BUREAUCRATIC EVASION

Following these disclosures, Mr Borthwick, the Minister for Conservation, denied that there had been any suppression of information, and the Premier, Mr Hamer, said that Port Phillip Bay was "alive and well" (Melbourne Herald, September 30, and October 1). Previous statements by Mr Rossiter and Mr Scanlan (both representing the Health Department) were denials that the figures for mercury levels in fish in the bay and other areas exceeded the safe limit of 0.5 ppm.

The conspiracy of silence maintained by at least 3 State Government bodies, the Health Department, and both the Fisheries and Wildlife and the Environment Protection Authority (sic) divisions of the Ministry for Conservation, was brought to an end when Mr Borthwick was forced to table relevant documents in Parliament in October. The level and extent of pollution became alarmingly clear. The safe limit for methyl mercury in fish was exceeded for 12 out of 21 species of fish tested. Species well over the limit included some commonly taken fish such as snapper and flathead from Port Phillip Bay and black bream from the Gippsland Lakes. It was also found that rainbow trout from Lake Colongulac and Murray cod from the Goulburn and Murray Rivers were above the limit for methyl mercury (this probably being caused by the contamination of runoff from agricultural land with methyl mercury fungicides.)

The level of cadmium in scallops from Lakes Entrance and Corio Bay exceeded the limit of 2 ppm, as did the mussels from Corio Bay. Zinc levels were also exceeded in scallops and mussels from some parts of Port Phillip Bay.

These Government departments have been sitting on such information for some time and results would not have been released for quite a while had it not been for David Phillips. Amateur fishermen and their families



have for several years undoubtedly been consuming fish and molluscs (such as scallops and mussels) which contain dangerously high levels of certain heavy metals.

Despite the ban, a Federal Health Authority survey carried out late in 1974, showed that 40 per cent of fish sold in Victoria contained levels of methyl mercury in excess of 0.5ppm. Following this survey, further investigation by State Government Authorities on the wholesale Fish Market showed that large quantities of oversized shark and sharks with mercury levels in excess of 0.5ppm were being marketed (Hansard, no. 27).

How long must the residents of Victoria (in fact those of all 3 southern states) wait before effective action is taken to curtail this heavy metal contamination of their diets and of the environment. Once again I stress that the release of heavy metals into an aquatic environment should never have occurred in Australia as the consequences of such discharges are well known. The blind subservience to industry shown by past and present governments, as reflected in their unwillingness to restrict industrial discharges, parallels the "genocide by neglect" that other governments have been branded with. The announcement of a special task force to determine the nature of heavy metal pollution in Port Phillip Bay (Melbourne Age January 19) should be viewed for what it is; a step taken far too late to learn about a problem that has clear origins and solutions (if one is willing to treat the problem at the source) and is aimed at regaining lost prestige by an incompetent, authoritarian, so-called representative of the people.

Beware of political parties bearing election promises pertaining to problems of which they are basically the cause in the first place.

## The Verdict

An Excerpt

"...It must be said that a chemical plant, in discharging the waste water out of the plant, incurs an obligation to be highly diligent; to confirm safety through researches and studies regarding the presence of dangerous substances mixed in the waste water as well as their possible effects upon the animal, the plant, and the human body, always availing itself of the highest skill and knowledge; to provide necessary and maximum preventive measures such as immediate suspension of operation if a case should arise where there be some doubts as to safety...in the final analysis...no plant can be permitted to infringe on and run at the sacrifice of the lives and health of the regional residents....

"The defendant's plant discharged acetaldehyde waste water with negligence at all times, and even though the quality and content of the waste water of the defendant's plant satisfied statutory limitations and administrative standards, and even if the treatment methods it employed were superior to those taken at the work yards of other companies in the same industry, these are not enough to upset the said assumption...the defendant cannot escape from the liability of negligence"

Kumamoto District Court  
March 20, 1973

Underlay: Photo taken early 1975 of the Dutson Downs sewerage outfall, which discharges pulp mill effluent into the Gippsland Lakes. The effluent comes from the Australian Paper Manufacturer's Maryvale papermill, which is licensed to discharge about one metric tonne a year of mercury in its wastes. As well as being laced with mercury, the effluent is so heavily loaded with lignacious wastes from the mill that the water from Lake Coleman (into which the wastes are discharged) is stained blackish-brown throughout the lake.

Concern over heavy metal and general pollution in Gippsland is growing... from both the public and within the Victorian EPA. The mill at Maryvale uses the same process as the Chisso plant in Minimata.



# GOVE: BEYOND MINAMATA

The recent effects of the mining and refining of bauxite are plainly set out in a recent article in Black News Service (February, 1976).

## NABALCO MINING THREATENS HEALTH OF YIRRKALA PEOPLE

The bauxite mining operations of the Swiss-controlled multinational company Nabalco, on the Gove Peninsula, are seriously endangering the health of the Yirrkala aboriginal population (as well as that of the white workers).

Due to the spillage of waste products, particularly that known as "red mud", many people in the area have been hospitalized with serious fish poisoning. It is acknowledged that within one Km radius of the major discharge point there is a chemical sludge between two and three metres covering the bottom of Melville Bay.

This mud is left over when the raw bauxite earth is mixed with caustic soda under intense heat and pressure to dissolve the alumina. It is pumped into swamps where it seeps into the sea and contaminates fish mussels and other seafood. It is becoming a threat to the survival and development of the Aboriginal community at Yirrkala.

It deprives them of one of their most important sources of nutrition. The Aborigines have for centuries relied on sea food caught in Melville Bay. They are now reluctant to eat anything caught within a 20 Km radius of the mine.

In a two month period in 1975 over 20 Aborigines were hospitalised or received treatment for fish poisoning. Nabalco workers have also been affected, as have one of the doctors and his family. For some individuals this has meant having to give up eating fish altogether.

Yirrkala clans especially affected by the poisoning are the Gumatj, whose area extends around Melville Bay, the Rinnatjingu, whose land includes Brema Island; and the Djambarpuyngis who are starting an outstation on Bremer Island.

It is clear that the mining companies lack of respect for the Yirrkala people not only endangers their culture and their way of life, but their very health.

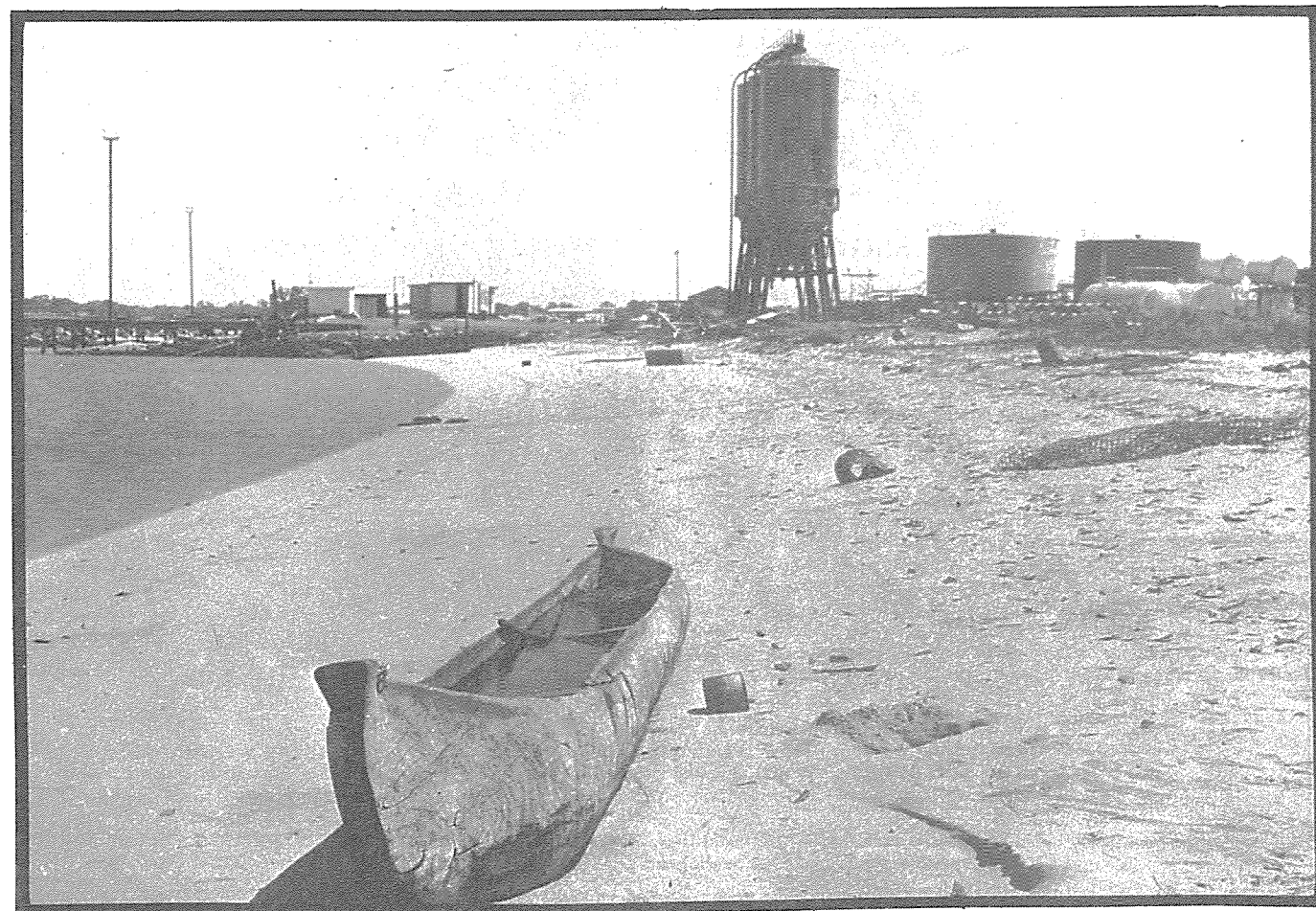
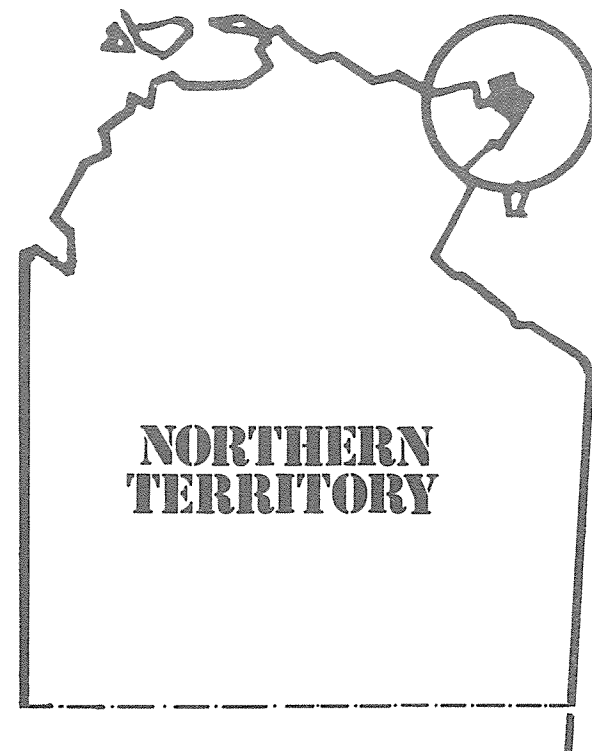


Photo: Sreten Bozic

# BEHOLD: THE BALL BEARING!



BICYCLES ARE NOT ONLY THERMODYNAMICALLY EFFICIENT, THEY ARE ALSO CHEAP. WITH THEIR MUCH LOWER SALARY, THE CHINESE ACQUIRE THEIR DURABLE BICYCLE IN A FRACTION OF THE WORKING HOURS AN AMERICAN DEVOTES TO THE PURCHASE OF THEIR OBSOLESCENT CAR



A century ago, the ball-bearing was invented. It reduced the coefficient of friction by a factor of a thousand. By applying a well-calibrated ball-bearing between two neolithic millstones, a man could now grind in a day what took his ancestors a week. The ball-bearing also made possible the bicycle, allowing the wheel — probably the last of the great neolithic inventions — finally to become useful for self-powered mobility.

Man, unaided by any tool, gets around quite efficiently. He carries one gram of his weight over a kilometer in ten minutes by expending 0.75 calories. Man on his feet is thermodynamically more efficient than any motorized vehicle and most animals. For his weight, he performs more work in locomotion than rats or oxen, less than horses or sturgeon. At this rate of efficiency man settled the world and made its history. At this rate, peasant societies spend less than five per cent and nomads less than eight per cent of their respective social time budgets outside the home or the encampment.



Man on a bicycle can go three or four times faster than a pedestrian, but uses five times less energy in the process. He carries one gram of his weight over a kilometer of flat road at an expense of only 0.15 calories. The bicycle is the perfect transducer of locomotion. Equipped with this tool, man outstrips the efficiency of not only all machines, but all other animals as well.

The invention of the ball-bearing, the tangent-spoked wheel and the pneumatic tire taken together can be compared to only three other events in the history of transportation. The invention of the wheel at the dawn of civilization took the load off man's back and put it onto the barrow. The invention and simultaneous application, during the European Middle Ages of a stirrup, shoulder harness and horseshoe increased the thermodynamic efficiency of the horse by a factor of up to five, and changed the economy of medieval Europe; it made frequent ploughing possible and thus introduced rotation agriculture; it brought more distant fields into the reach of the peasant, and thus permitted landowners to move from six-family hamlets into 100-family villages, where they could live around the church, the square, the jail and — later — the school; it allowed the cultivation of northern soils and shifted the center of power into cold climates. The building of the first ocean-going vessels by the Portuguese in the fifteenth century, under the aegis of developing European capitalism, laid the solid foundations for a globe-spanning culture and market.

The invention of the ball-bearing signalled a fourth revolution. It created an option between more freedom in equity and more speed. The bearing is an equally fundamental ingredient of two new types of locomotion, respectively symbolized by the bicycle and the car. The bicycle lifted man's automobility into a new order, beyond which progress is theoretically not possible. In contrast, the accelerating individual capsule enabled societies to engage in a ritual of progressively paralyzing speed.

The monopoly of a ritual application over a potentially useful device is nothing new. Thousands of years ago, the wheel took the load of the carrier-slave, but it did so only on the Eurasian landmass. In Mexico, the wheel was well-known, but never applied to transport. It served exclusively for the construction of carriages for toy gods. The taboo on wheelbarrows in America before Cortes is no more puzzling than the taboo on bicycles in modern traffic.

It is by no means necessary that the invention of the ball-bearing continue to serve the increase of energy use, and thereby produce time scarcity, space consumption and class privilege. If the new order of self-powered mobility offered by the bicycle were protected against devaluation, paralysis and risk of the limbs of the rider, it would be possible to guarantee optimal shared mobility to all people and put an end to the

imposition of maximum privilege and exploitation. It would be possible to control the patterns of urbanization if the organization of space were constrained by the power man has to move through it.

Bicycles are not only thermodynamically efficient, they are also cheap. With his much lower salary the Chinese acquires his durable bicycle in a fraction of the working hours an American devotes to the purchase of his obsolescent car. The cost of public utilities needed to facilitate bicycle traffic versus the price of an infrastructure tailored to high speeds is proportionately even less than the price differential of the vehicles used in the two systems. In the bicycle system, engineered roads are necessary only at certain points of dense traffic, and people who live far from the surfaced path are not thereby automatically isolated as they would be if they depended on cars or trains. The bicycle has extended man's radius without shunting him onto roads he cannot walk. Where he cannot ride his bike he can usually push it.

The bicycle also uses little space. Eighteen bikes can be parked in the place of one car, thirty of them can move along in the space devoured by a single automobile. It takes two lanes of a given size to move 40,000 people across a bridge in one hour by using modern trains, four to move them on buses, 12 to move them in their cars, and only one lane for them to pedal across on bicycles. Of all these vehicles, only the bicycle really allows people to go from door to door without walking. The cyclist can reach new destinations of his choice without his tool creating new locations from which he is barred.

Bicycles let people move with greater speed without taking up significant amounts of scarce space, energy or time. They can spend fewer hours on each mile and still travel more miles in a year. They can get the benefit of technological breakthroughs without putting undue claims on the schedules, energy or space of others. They become masters of their own movements without blocking those of their fellows. Their new tool creates only those demands which it can also satisfy. Every increase in motorized speed creates new demands on space and time. The use of the bicycle is self-limiting. It allows people to create a new relationship between their life-space and their life-time, between their territory and the pulse of their being, without destroying their inherited balance. The advantages of modern self-powered traffic are obvious, and ignored. That better traffic runs faster is asserted, but never proved. Before they ask people to pay for it, those who propose acceleration should try to display the evidence for their claim.



A grizzly contest between bicycles and motors has just come to an end. In Vietnam, a hyperindustrialized army tried to conquer, but could not overcome, a people organized around bicycle speed. The lesson should be clear. High energy armies can annihilate people — both those they defend and those against whom they are launched, but they are of very limited use to people which defends itself. It remains to be seen if the Vietnamese will apply what they learned in war to an economy of peace, if they will be willing to protect the values that made their victory possible. The dismal likelihood is that the victors, for the sake of industrial progress and increased energy consumption, will tend to defeat themselves by destroying that structure of equity, rationality and autonomy into which American bombers had forced them by depriving them of fuels, motors and roads.

The text for this article is excerpted from Ivan Illich's Energy and Equity Harper & Row, New York, softcover, \$95.



# CONSERVATION IN CHINA



Peking - trees, pushbikes, trolley buses, "rush hour".

"Our great leader Chairman Mao and the comrades of the Central Committee have always paid great attention to the work of environmental conservation. At the same time along with the development of industry and the economy, we are required to pay attention to protect the environment and the people's health. During the twenty or more years since the founding of the People's Republic of China, we have changed our country from a poor backward country, to a socialist state with initial prosperity."

Mr. Miao Tu Sung

The main preoccupation of the Chinese people and government is undoubtedly development, the overcoming of the pollution of poverty which cripples most of the under-developed world. But when an environmental issue is taken up in China it is not merely paid lip-service. The conservation, recovery and maintenance of the environment, formerly devastated by war and by centuries of exploitation, is a serious commitment in China.

It is rather easy to return with glowing reports and eulogistic impressions of the energetic and even feverish reconstruction of China, and fail to communicate either the Chinese reality, or its implications. Chinese communists are not angels; people scribble on historical monuments, and to my mind drive very dangerously. There are more serious problems of erosion, and the simple fact that for five hundred million Chinese peasants, each day means grinding manual labor beneath the boiling sun. It is also impossible to generalise about China from a three-week visit. Although some of the verbatim quotations are long, it is important to allow our Chinese hosts to explain themselves.

## APPROACH TO ENVIRONMENTAL CONSERVATION

Mr. Miao Tu Sung, the leading member of the Environmental Preservation Group responsible to the State Council, explained the approach to development and environmental protection upon our arrival in Peking. "We have the general policy of overall planning and national distribution, multipurpose use, turning the harmful into the beneficial, relying on the masses, everybody taking a part and protecting the environment and benefiting the people." Environmental protection action per se seems to spring from two concerns: public health, and recovery and conservation of the rural environment. As Mr. Miao said, "To improve and protect the environment is of interest directly to the people."

There is a driving optimism in China about development, in deep contrast with the pessimism which underlies much of the propaganda of the ecologues of the West. Environmental concern is one aspect of socialism, the people's livelihood. "The idea that 'man can conquer nature' has struck increasingly deep roots in people's minds ... Peasants in new China look upon nature from the materialist-dialectical viewpoint ... Chinese peasants began to take hold of the initiative in dealing with nature after they became masters of the country. They have faith in their own strength, confident that they are able, step by step, to conquer towering mountains and turbulent rivers, no matter how unfavourable

the conditions are." (Special issue for National Day, October 1974, Hsinhua News Agency). We pressed for a further explanation of man's superiority over nature, etc. 'Man conquering Nature' was explained as follows. Man investigates, understands and establishes the laws of nature. Man does not transcend the laws of nature, but turns them to good use. The notion of man dominating nature which is equated in the west with 'conquering' nature was explained within this framework. Our Chinese host was most dogmatic that man **does not** transcend the laws of nature.

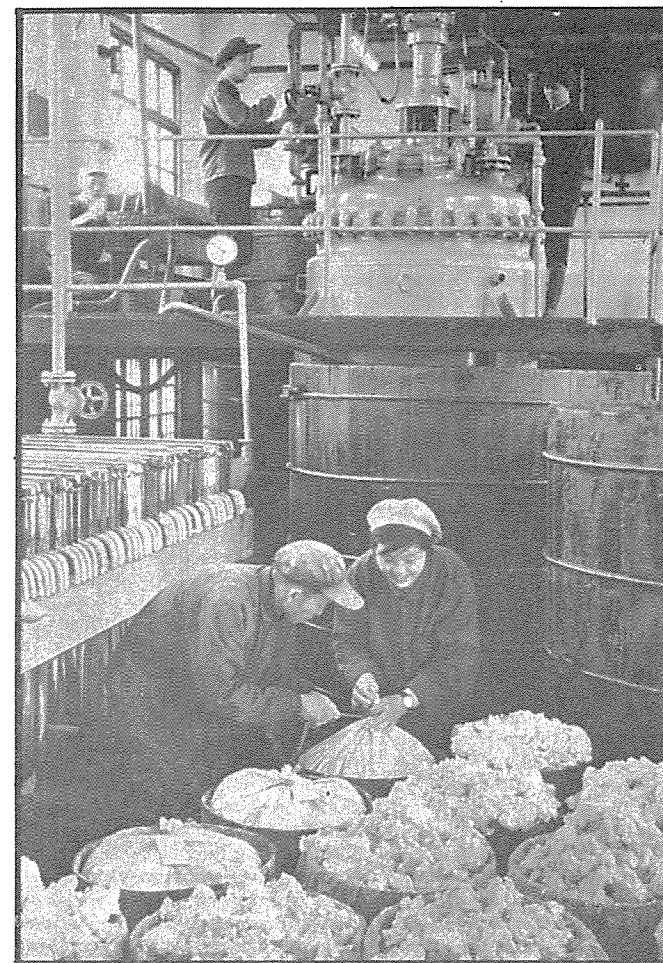
Let's see now what Mr. Miao meant in greater detail.

## OVERALL PLANNING

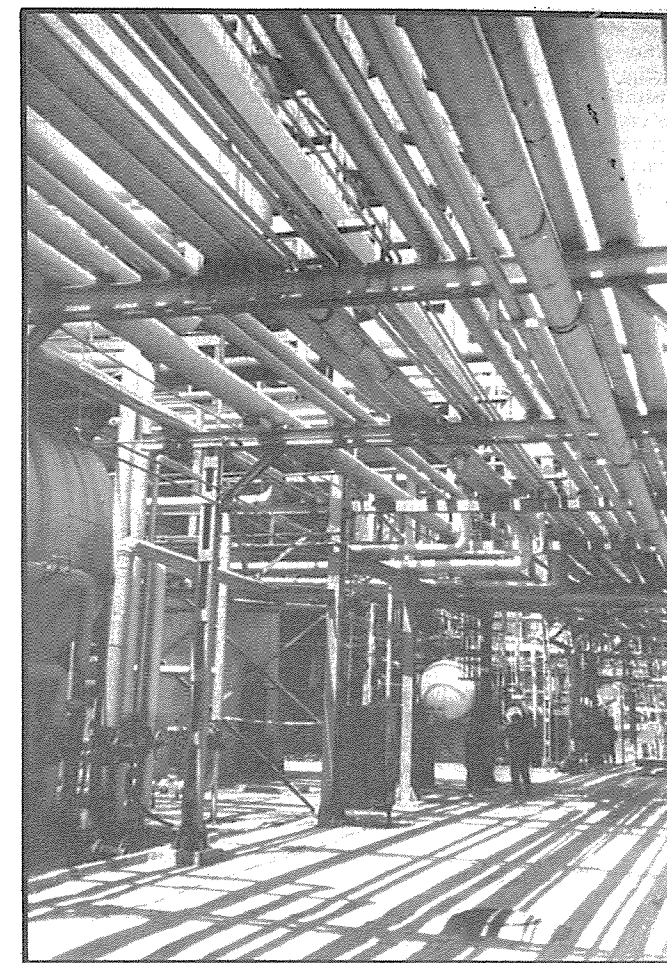
Our hosts emphasized that overall planning has been made possible in China by the abolition of the private ownership of land and the means of production. The State can thus regulate both the pace and place of development of industry and agriculture. The Chinese say 'Agriculture is the Foundation and Industry is the leading factor.' Unlike most underdeveloped countries where capital investment is centralized in industrialized enclaves China promotes agriculture first, complemented by light and, more recently, by heavy industry. The director of the Peking Petrochemical Complex explained to us that "In China, the whole development of our economy is carried out in a proportionate way. So the degree of automation and mechanisation of our industry has also been developed in a proportionate way." A great debate and political revolution occurred in China over this principle in the 1960's and the 'Lui Shao-Chi Revisionist Line' in development and environmental protection has been decisively rejected. The Chinese believe that in order for light and heavy industry to proceed, agriculture must first advance in order to increase the output of grain and raw materials.

Thus incentive is provided by maintaining a constant (and as rural production increases, proportionately smaller) rate of taxation on communal rural production. In environmental affairs the 'capitalist roadster' - Lui Shao Chi line of 'profits in command' was also rejected during the Cultural Revolution. Mr. Li, head of the Shen Yang Chemical Works Environmental Protection Section explained that "To do our work well, we regard environmental protection as a very important part of Chairman Mao's revolutionary line....We must put politics in command when doing this work."

Environmental Protection in China is put into effect on the principle of 'democratic centralism'. Mr. Miao explains: "We should strengthen the work of management and regulate, supervise and inspect all this work. from the central level to the grassroots level, and even in some of the large and medium-sized enterprises. In the State Council there is the leading group of environmental protection, and under the leading group of environmental protection some of the ministries of the State Council have also set up offices in charge of this work, and also in some of the provinces. Their task is overall planning, to co-ordinate the work, to inspect and supervise the work. At the central level as well as at the provincial level, some of the regulations and standards are being formul-



Pollution control: Workers of the Shanghai Printing-ink factory pack aluminium hydroxide, one of the 10 useful substances recovered from waste liquid.



At the Peking Petro-Chemical Works waste water containing oil, sulphur, phenol, alkali etc. is carefully treated and purified. It is then used to irrigate farmland and raise fish and ducks. The photograph shows a section of the aeration tanks.



Country Bicycles: Peng Pu commune ... the humble bicycle is the basis for transport in China.

CHAIN REACTION NO. 1 1976



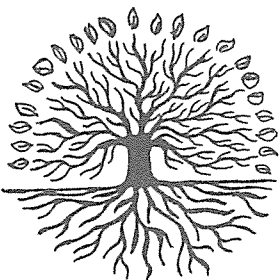
ated according to the situation there... The environmental protection office of the State Council is only responsible for the policies and to co-ordinate the work of the different industries. In each province we have an environment protection office. They are in charge of their own work in each area... Because our country is very vast, for the different places we have different local standards. But in any place, their own standards must be strict. Because the time has been very short, the standards are only provisional...."

RATIONAL DISTRIBUTION

Other than effluent regulation, overall planning has allowed the Chinese to challenge the economic and social distortion of centralized industrialization. At the national level a redistribution of industry inland from the formerly industrially dominant coastal cities has been implemented. Industry is thus widely dispersed within the northern industrial provinces. At the same time, this policy has grappled with the problems of large consumer cities such as Peking and Shanghai. The agricultural counties of these cities now provide their sustenance, and a decentralization of industry has been actively promoted. Since the Cultural Revolution, 600,000 people and 1000 small and medium-sized industries have departed from Shanghai to the interior countryside. Industry has been relocated to the windward of residential areas, and factories such as the Peking Petrochemical Complex (producing phenol, acetone, polystyrene, polypropylene, synthetic ammonia and ethylene) have been purposefully located in a remote ( and beautiful) mountain valley outside Peking. Shanghai, formerly 'Paradise for Adventures' comparable to Calcutta, has stabilized its population growth (natural increase 0.24% in 1974) and relocated noxious industry to satellite towns. As Mr Miao put it, "In the small towns, small in size and population, the waste from industry can be easily treated and properly dealt with. In the big cities, there are a lot of problems - power, water supply and transport." Decentralization also has political implications as it reinforces local democracy with material means for independence and thus strengthens the whole polity. "In this way we can properly solve the contradictions of developing industry and the achievement of environment protection. It is also beneficial and convenient for preparation against war, and it is also good for the contradiction of industry and agriculture, and city and countryside, and convenient for life and good for production."

CONSERVATION V.S. DEVELOPMENT

Before proceeding with capital construction, it is necessary for local authorities to incorporate environmental protection in design work, and to seek permission from the Bureau of National Relics. If the area is of potential historical value, then possible costs of exploratory excavations must be included in the allocation of development funds. To avoid land-use conflicts, industry tries to avoid fertile agricultural land and industrial construction also reclaims as much land as possible for agricultural use. Mr. Tsai Shuei Chang of the Bureau of National Relics gave us a number of examples where conservation had taken precedence over development. The Yun Yang Caves in Shansi Province are located above extensive coal deposits for nearly one kilometre. The final decision was to avoid working the coal for a ten kilometre distance around the caves. One 1400 year old bridge was preserved, and served to provide important information on design for many contemporary bridges - an example of 'the ancient serving the modern'.



AFFORESTATION

Reafforestation plays a major role in Chinese environmental protection in a way which is of directly perceived social benefit. In the Peking urban area, some 80 million trees have been planted on 2 million hectares, since liberation. Each year, 10,000 students are mobilized to plant an additional million trees. Nanking ('The Furnace') has the most dense tree cover I have seen in any urban area. Two hundred thousand trees line some 640 kilometres of main roads and millions of trees cover the parks. The road side cover is only possible because there are no private cars running off the roads and hitting trees as in the overdeveloped countries. Our interpreter called this process 'the-greenification of Nanking'. Roads often have six rows of trees providing shelter for pedestrians and bicycle ways which line the main roads. At Peng Pu Commune 35 Kilometres west of Kwang Chou (Canton), nearly two-thirds of the 40 square kilometres has been reafforested to stabilize the commune's reservoir catchment. The Chang Gu Tai Experimental Station in the far north-west of Liaoning Province was a highlight of the tour. The forestry project is on the edge of the shifting sand dunes of Inner Mongolia. Formerly, sand

dunes shifted 2.4 metres a year in this semi-arid region. Average mean annual rainfall was 450 - 500 mm mostly in July - August, with 20-30mm of snow and an evaporation rate of 1900 mm per year. With the sand plumbing a depth of 100 metres, stabilisation of the dunes was difficult for the peasants. The research team arrived in 1952. They first studied the movements of the shifting sands, and wind patterns (predominantly NW and SW, shifting the sands east) and consulted with the peasants on indigenous control techniques. Using the shrub, Salix flavida and the trees Pinus sylvestris and Pinus tabulaeformis, the researchers and peasants gradually stabilized the dunes. The cultivated land growing wheat, sunflower, peanuts, soybean and many other crops is now protected by poplar windbreaks (along the SW axes) which cover 22.6% of the area. We were the first Westerners to visit the area since Liberation, and were overwhelmed by the warm hospitality of our hosts - which included beer for breakfast!

BIOLOGICAL CONTROL

We had previously been advised of the preference in forestry for the biological method of pest control. Here a minute parasitic wasp of the variety Trichogramma used to control many pests, but especially Dendrolimus sibiricus attacking Pinus sylvestri, Pinus koraiensis, Pinus thunbergi and Pinus massonia. The wasp is bred on small cards of silk worm eggs and placed in the pine forests. It then protects the forests against the pest from April to October. Mr. Kao Tzing Kyah, head of the Brigade of Forestry at Changchun, said "surely" when asked if biological control is preferred. We noticed the use of Trichogramma at Chang Go Tai, and also further south at Nanking. The bird Parus major is also purposefully introduced into forests to control Deddrolimus. The Chang Go Tai Experimental Forestry Farm is also investigating the use of pheromones and the release of sterile females to achieve biological control of pests. We saw no productive forestry operations except for one mountainous region from the air where clear felling was obviously in progress. We were assured at Nanking Industrial Forestry College that logging is usually selective. We found little or no evidence of a wilderness ethic in China. The physical environment most people perceive is rural and localized. Since the 1956 reservation of natural areas has been administered by the Central Government, there are huge areas such as the Chang Pai mountain forest in the north-east of Kirin Province covering thousands of square miles. Access is controlled, habitats for rare species such as the tiger are preserved, and vertical vegetation zonation was mentioned as a criteria for management. We had many questions on imports (such as ivory) and exports (mainly to Hong Kong) of rare species, but there was no opportunity to pursue the matter. Wildlife films are shown at public cinemas. Rare species are consciously managed as an economic resource. For instance, Sika deer antlers are cropped bi-annually at Chang Chun Experimental Forestry and Deer Farm for a traditional Chinese medicine.

TRANSFORMING THE HARMFUL INTO THE BENEFICIAL

At Peking Petrochemical complex, the leading member explained the philosophy of industrial waste management:

*"In treating the three wastes (gaseous, liquid and toxic residues) we should transform the technology and the facilities and try to get rid of the wastes in the process of production. If some of the wastes must be emptied out then we must first think of ways of multipurpose use and turning the harmful into the beneficial. If some of the wastes can't be treated properly at present, then we will try and purify and dilute the three wastes."*

*At the petrochemical plant, the waste gas from the catalytic cracking plant is used as boiler fuel. Under routine operation, no waste gases are flared. Thermal pollution is further used for household heating. Process effluents were treated in a sewerage plant employing an oil skimmer, and an oxidation and a percolation process. Some 1,300 hectares are irrigated for agriculture. Heavy metals in crops are monitored, and may become a problem in vegetables. In the electroplating industry, cyanide has been phased out. At the Shen Yang Chemical Plant, mercury electrodes in the distillation process have been phased out after workers suffered poisoning. Many 'wastes' are extracted and used elsewhere in production. Other examples include a paper factory which recovered caustic soda equivalent to the initial state investment in the plant, metallurgy factories which recover materials for fertiliser and cement production and dye factory wastes being used in paper making. The leading member at the Shenyang Chemical Factory explained to us that 'the costs are considered part of the production costs - because it not only improves the environment, but it produced more for the State, more products, and reduced the production costs.'*

RESOURCES AND ENERGY

Two aspects most striking from the environmental and social viewpoint were transportation and rural energization. As I regard the motor car as a public enemy, it was truly thrilling to watch traffic jams of thousands and thousands of bicycles packed around public transport vehicles. The number of lorries surprised us, and there were a few taxis and land-rover type vehicles. But there are no private motor cars in China, and the idea is not promoted as a material incentive. One of Peking's town planners explained that Peking's two million bicycles keep people fit, allow people maximum flexibility, save energy, and avoid air pollution. Undoubtably bicycles are used out of necessity as much as from preference. But the sturdy black Chinese bicycle is universal for personal transport. The

Peng Pu Commune had 15,000 bicycles for 61,000 people; the machine costs nearly two months labor equivalent (about \$US 70). There are many electric trolley buses in the cities, and the fare is nominal (Peking also has a subway system and suburban trains). At Chang Chun Train Carriage Factory, we found that the factory pays for public transport and pays compensation to workers who use bicycles to commute!

Whilst motor vehicles were alarmingly liberal in their use of the horn, the Chinese city at night is silent, and there are no parking problems for thousands of bicycles on the pavement in properly organised bicycle racks. People in China are not intimidated by roads. At night in Peking, when most traffic is off the road, we found children playing on the hubs of major intersections and people using the streets as living space complete with tables and chairs. In Nanking, the people actually sleep out on the roads and on bridges above canals to catch the cool air. Asleep, a family dosed down in the middle of a main road on stretchers!

RURAL ENERGIZATION

Unlike most developing countries where electricity is the privilege of urbanites and centralized industry, the Chinese have implemented a policy of rural energization remarkably similar to that advocated in UNEP's March 1975 Review of Energy Use. The Chinese have built some 50,000 small hydro-electric stations, with the consequent relief of peak-loading from the major base - load stations. The Peng Pu Commune had three tiny hydro-electric plants integrated with a complicated system of reservoirs and irrigation canals. A fourth hydro-electric scheme is under construction. The commune is 60% self sufficient in electricity. Figures for energy usage on the commune are tabulated below. The leading member of the commune explained to us that "As for fertiliser, we mainly use composts. We get the manure from raising pigs. More pigs give more manure."

Some evidence emerged of investigation of alternate sources of energy. At Peking University research on geothermal power, solar water heating and an experimental solar 'furnace' were mentioned. A tidal power station with a generating capacity 'of thousands of kilowatts' was mentioned at Kwang Chou.

At Shanghai, we were asked to talk on the three wastes to Shanghai waste specialists. Accordingly, atomic wastes were given a full expose'. I was told by a Peking town planner that China does not envisage utilising China's military atomic technology for electricity production. The stated reason was the capital investment required. Enquiries at Shanghai, China's main ship-building yard, on a New Scientist report of a nuclear powered ship also met with a negative reply.

We hoped to find evidence of concern over the rate of extraction of China's petroleum reserves. We did not have the opportunity to discuss socialist resource allocation. But perhaps the reply to this question put to the Peking Petrochemical Complex leading member is revealing of the prominent role of the notion of historical progress in Marxist thinking:

Question:

'China is a socialist planned economy. We wonder if there is an ultimate future production quota or amount for the whole of China, which, once achieved, would lead to the end of the growth of production? Is there a final objective for the amount of overall growth?'

Reply:

"We think production is never-ending. Our aim is also without limit or an ending. Generally speaking, our material forces have not yet reached their extremity."

PEOPLE - A PRECIOUS RESOURCE

Anyone who has seen Calcutta and Shanghai will admit that Chinese communism has made an almost unparalleled modern achievement in reconciling the political social economic and ecological aspects of human existence. There are negative aspects, as our hosts showed us and continually emphasized. But the criteria for the magnitude of the achievement is not a comparison with the over-developed countries, but rather the poverty and suffering from which China emerged, and which embroil South-East Asia and under-developed countries everywhere.

It is probable that the Chinese have a knack of cheerfully making a virtue out of necessity. In China, people are regarded as the greatest and most precious resource. It is obvious that intelligent application of human labor to grinding necessity has resulted in a vast creative output. Also obvious is the fact that it is the social system which determines the level of environment protection and concern. Only with all-round development in all fields, education, physical health and political awareness, has environmental conservation been properly incorporated into the development process. For instance, at Shanghai Hospital we were told that abortion is free upon demand. But because family planning is universal, there is little demand. So, the Chinese claim, population growth is socially determined.

Perhaps we should give the last word to our Chinese counterpart, Mr. Wu, responsible member in Shanghai for environmental protection:

"In industrial development, we are able to pay attention to pollution and the environment. I may say this is due to the superiority of socialism."

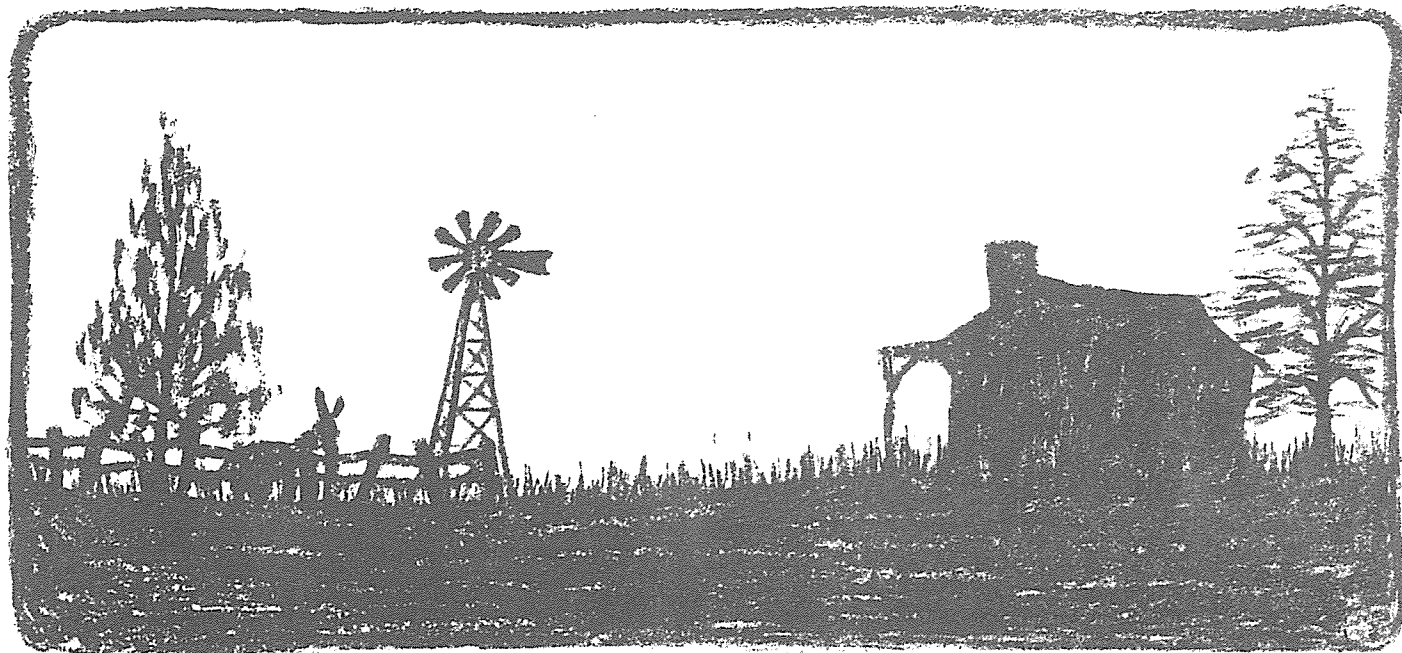
Peter Hayes  
FOE Australia

ENERGY USEAGE	
Energy Usage on the Peng Pu Commune 30 kilometres west of Kwang Chou (Canton).	
POPULATION AND LAND	
Population	61,100
Households	12,200
Cultivated land	4,750 hectares
	Hilly land under forestry approx- imately two thirds commune area
Per Family Income	1957 -290 yuan 1974 -584 yuan
Total savings in commune	350,000 yuan
CAPITAL EQUIPMENT	
Small Workshops (including foundry using, 70 m. ton coal per year, lathing equipment, etc.)	15
Stonework in 17 kilometres of irrigation and flood control dykes	220,000 cu.m.
Dams (the main reservoir. 17.3m. long, 5m. wide 32m. high)	2
Hydro-Electric generating stations	450 kw. 442 kw. 280 kw. ----- 1172 kw. presently available 425 kw. (under construction on Lui Chi river)
High tension wires	72 km.
Trucks	40 (at 20,000 yuan each)
Bicycles	15,000
Sowing machines	7,000
Tractors (medium & small sized from 10 - 45 h.p.)	373
Hospital	1
Schools (11 600 students)	3
PRODUCTIONAL INPUTS	
Rainfall - annual mean average	1600 -1800 mm.
Irrigation	3600 hectares
Electricity	60% self sufficient. Peak demand 1953 kw. drawing on Kwang Chou grid which is mainly hydro-electric. Breakdown usage: workshop 30% irrigation and construction 40% household (every house connected, metred by village or by household) 30%
Coal	Small mine on commune for local low grade coal. 3000m tons/year in commune industry. Small import from local government.
Diesel Fuel	300 - 400 m. tons/year (used mainly in tractors, 60% cultivated land under mechanization).
Gasoline	100 m. tons/year (used mainly in trucks
Timber	Mainly used in housing, (households mainly cook with rice straw, dead leaves and little coal used).
Water Buffalo (pull ploughs etc.)	4,200
Chemical fertilizer	approx. 300 kg/hectare (mainly use liquid ammonia.)
Manure	Mainly use pig manure (one of Chair- man Mao's sayings: 'A pig is a little fertilizer factory'.) Made from a cultivated grass. Is grown in paddies.
PRODUCTION OUTPUT	
Rice Crops	2 per year
Wheat Crop	1 per year
Short Grain Rice	pre Liberation 2175 kg/hectare 1974 8250 kg/hectare 27.5 million kg (11.5 million kg. sent to state)
Wheat	1975 2.1 million kg
Lychee	1974 500,000 kg
Peanuts	1974 1.25 million kg.
Pigs	1974 60 000 head
Poultry	1974 10 - 15 per household (min- imum total 122,000)



# CHAIN-REACTION INTERVIEW : JOHN PRICE

*"The values that make a high-energy society work are all too apparent today. The values that could make a lower-energy society work are not new. They are in the societal attic and could be recycled. They include thrift, simplicity, diversity neighborliness, craftsmanship, and humility."*



John Price is an Australian who has worked with FOE in England as an energy specialist. He co-authored "Non-Nuclear Futures" with Amory Lovins during 1974. John is now back in Australia and is working on the practical alternative energy systems he talks about here . . .

FOE: How did you get involved with FOE, John?

JP: When I was working with CSIRO, before I left Australia, one of my private concerns was that our type of society had become so dependent on oil that it might be very vulnerable if sharp discontinuities in the supply or the price of oil occurred. No-one was very concerned about long term energy problems, and yet to me they seemed quite crucial. My interest was raised further when discontinuity did occur with the abrupt oil price increase in October 1973, so when I reached London I was hoping that I might work for a time with an organisation concerned about energy policy. Fortunately there was a job at Friends of the Earth.

FOE: When was this?

JP: In about March 1974. Initially the project was going to look at the feasibility of following different energy policy courses or scenarios these were not to be predictive but rather illustrative of what could be done with what costs and advantages of society were to choose them. first of these we called the "Business as usual" scenario with energy supply continuing to follow the trends of the past. The second, the "Technical Fix" would have taken the business as usual case as a basis but examined the effect on energy demand of a conscientious application of energy conservation measures. These measures were only to be considered if they did not unduly affect the lifestyle. The third would have looked at what was entailed in setting a goal of a low energy society and would have included measures that would have affected settlement patterns and lifestyle. Initially the study involved a dozen or so experts from different fields but the project was exceedingly ambitious given the resources and time available. Also energy had become suddenly important and each of the people involved found themselves extraordinarily occupied for their own organisations.

However, one really interesting piece of work did emerge and that was Peter Chapman's (The Open University UK) energy analysis which was the basis of my "Dynamic Energy Analysis and Nuclear Power" which has subsequently been included in "Non-Nuclear Futures - The Case for an Ethical Energy Strategy", a book published by Ballinger.

I had always assumed that nuclear power was an amazing energy source. Side effects such as the spread of nuclear weapons, the possible use of stolen plutonium in terrorist atom bombs, and radiation induced illness worried me but I never doubted its capacity as a source of energy. But Chapman had shown that throughout periods of rapid growth in nuclear generating capacity a large proportion of the energy produced had to be offset against the energy required to construct a plant required to maintain the growth rate. For some of the proposed programmes

more energy was going to be required than would be produced by operating stations.

This occurs because the energy requirements for construction and the preparation of the initial fuel charge are comparatively high, the construction time is long compared with conventional electricity generating plant. At the rapid growth rates which were then relatively unquestioned, more nuclear reactors would have been under construction than in operation. These factors combined lead to an extraordinarily high energy demand by the energy producers themselves.

From an energy policy viewpoint this seemed very important because the "crash" programmes were being seen as a way to make electricity derived from nuclear power the dominant energy source as oil stocks diminished. Yet the programmes themselves were going to demand an appreciable oil subsidy. This was not only an energy problem as oil has important feed stock uses in plastic and fertiliser production.

FOE: How do you place the nuclear power issue in a social context?

JP: I think that is part of a more fundamental issue. We are continually trying to raise our living standards in a material sense - to produce more and more goods that have to be sold. Devices such as planned obsolescence and advertising are used to continually create needs, the satisfaction of which require large amounts of energy and other resources. There is no conception of adequacy - the word may as well not be in the language.

In a recent TV programme "Five Minutes to Midnight", President Nyerere of Tanzania made the point that needs in a Western society were incredibly real, though they seem crazy to people in Tanzania, India or Nepal. Yet people do need second cars, colour TV's and the like. Part of the problem is that we insist on measuring well-being with devices such as Gross National Product and cost of living indices. But many aspects of well-being cannot be measured. Job satisfaction, for example, is important but how can you devise a job satisfaction index? Measurable parameters are easy to compare, talk about and to use in the framing of policy. They are usually material yet many, perhaps most, factors which constitute well-being are not and tend to be forgotten. Money is a useful measure because costs can be equated whatever the difference in the goods or services being compared. Yet for all its convenience its use has hidden consequences. Its generation usually parallels the destruction of resources, so as we gain money wealth we are, in terms of resource availability, becoming poorer.

It is our energy "proverty" which has led to the "need" for a new abundant source. Hence the rush to develop nuclear power. In absolute terms there is an enormous reserve of oil left. It is not the quantity that is the problem - it is the incredibly fast rate at which we are using it.

Even if nuclear power was perfect, clean, cheap and perfectly safe it would not solve this problem. Other resources are becoming scarcer and we face the problem of substitution for them as well.

Either we have to find an adequate living standard or become conscious of resources. In Schumacher's book "Small Is Beautiful" a different kind of philosophical outlook on resource use is described. This would recognise both the finite nature of non-renewable resources and their usefulness. They would be used when essential and with great reluctance. By contrast we have used them as quickly as possible with the aim of generating "wealth". We have hoped (somewhat arrogantly) that the extra wealth and knowledge acquired would lead to substitutes when they were required. The first outlook may seem cautious but it is also prudent.

Consider an example: people like to be protected from cold and have devised a large number of ways to do it. Most people in the world use extra clothes, or burn firewood or dung. Clothes clearly are the best method in terms of resource consumption but trees grow and animals shit. We use coal, oil or gas either directly or through electricity generated from non-renewable resources. If we were guided by the principal we would use the latter with reluctance. But more often than not we will use electricity ignorant of the fact that for each unit of the heat that comforts us three units of heat have gone up the power station chimney. And for what? A little extra convenience - the magical flick of the switch. There is no more warmth in using the electricity that requires four tons of coal say, than in one ton burnt directly.

If we had a conception of adequacy with respect to warmth and were concerned to maintain our collective resource wealth then electricity would never be used - more likely we'd use clothes. We certainly wouldn't have ended up requiring enormous quantities of energy and having to contemplate the use of an incredible, complex and dangerous technology, like nuclear power.

FOE: On coming down to the economics of nuclear power what do you think of the trends in the stability of the world market and the fact that nuclear power is becoming more expensive due to pressure from groups such as Friends of The Earth. I am thinking of the economic effects of US plant construction delays of up to two years which have been caused by environmental hearings, the compulsory preparation of Environmental Impact Statements and the actions of a public tuned to the issue of nuclear power and the possibilities of alternate energy. Do you think that the nuclear industry would be able to stay above water economically?

JP: There is a recent paper produced by two MIT economists (Bapp and Darian) who were interested to find the reasons for the more rapidly escalating costs of nuclear power generation compared to those of conventional electricity generation. They concluded that these costs were a direct result of the response of the nuclear industry to increasing public awareness and anxiety about nuclear power. The use of more costly "redundant" safeguard measures were attributable to his response. They argued that when special legislation suppresses the usual market signals (such as insurance premiums and liability) which discourage activities publicly perceived as hazardous then the market will find such ways as reflecting perception of high social costs by making such activities cost more.

The capital costs of nuclear power are already extremely high. An estimate reported in "Nucleonics Week" was that the nuclear industry would need US\$1 - 1.5 million million by 1990. And those estimates were based on capital cost estimates which may well prove to be too low. The sums and rates involved are so large that the normal method of raising capital seem quite inadequate.

In the long run nuclear power will be crippled because of the enormous costs involved but a friend has expressed the fear that we may become so dependent on electricity that the industry would, for political reasons, have to be kept afloat through government subsidy.

Clearly if we don't like nuclear power then the public has to be made more aware of the issue; more anxious in an informed kind of way.

FOE: If change is to take place how will it and in what direction would it head in? How would we start the changes?

JP: No energy future is free of change least of all the 'business as usual' future. The change that has occurred since World War 2 has been extremely rapid and this future involves the continuance of this change. We have to ask what kind of future we want. Low energy societies can allow a great variety of lifestyles whilst high energy society tends to be restrictive and offers less scope for diversity.

The demand for capital and other resources will be much higher if we try to follow the 'business as usual' future. Almost invariably the costs of saving a kilowatt are less than supplying it. We need to examine what we want, how possible it is and how we best can achieve it with the minimum destruction of our resource wealth. To assume that economic growth will magically provide it is a folly. What is required is growth in things that count.

Low energy societies do exist - I saw some in remote areas in Nepal and elsewhere. The people had none of our gadgetry but were incredibly civilised, creative and artistic. Some used sophisticated but simple water mills and windmills to augment the energy of themselves and their animals. They were self-sufficient in food production and the people rarely moved to neighbouring villages. All this may seem intolerable to us but these people were happy. Our possession of labour saving gadgets and entertainment devices has made us more so. I would not suggest that we should or could live like Nepalese, but the costs as well as the benefits of material benefits have to be considered.

It seems most likely that we will abruptly become a more resource conscious society as we hit one of the limits to growth. But this would be unnecessary and would involve great personal and social hardship. An alternative course would be for our institutions to conscientiously work to cut out the waste from our systems. Insulation of houses would cut up to 50% from the energy demand for domestic heating, for example. Most of the methods for cutting waste are known. What is required is the will to see it as important. But this is only part of the solution. High technology solutions have enormous appeal because they are striking symbols of man's conquest of the environment.

Seasons need not exist nor the difference in day and night. But we have cut ourselves off from richness and diversity whilst continuing to use the "old" environment as a resource bank. To give up our quest for technological monuments to the dominance of our species would be a step towards a more humble, stable and satisfying relationship with our Earth and the life we share it with.

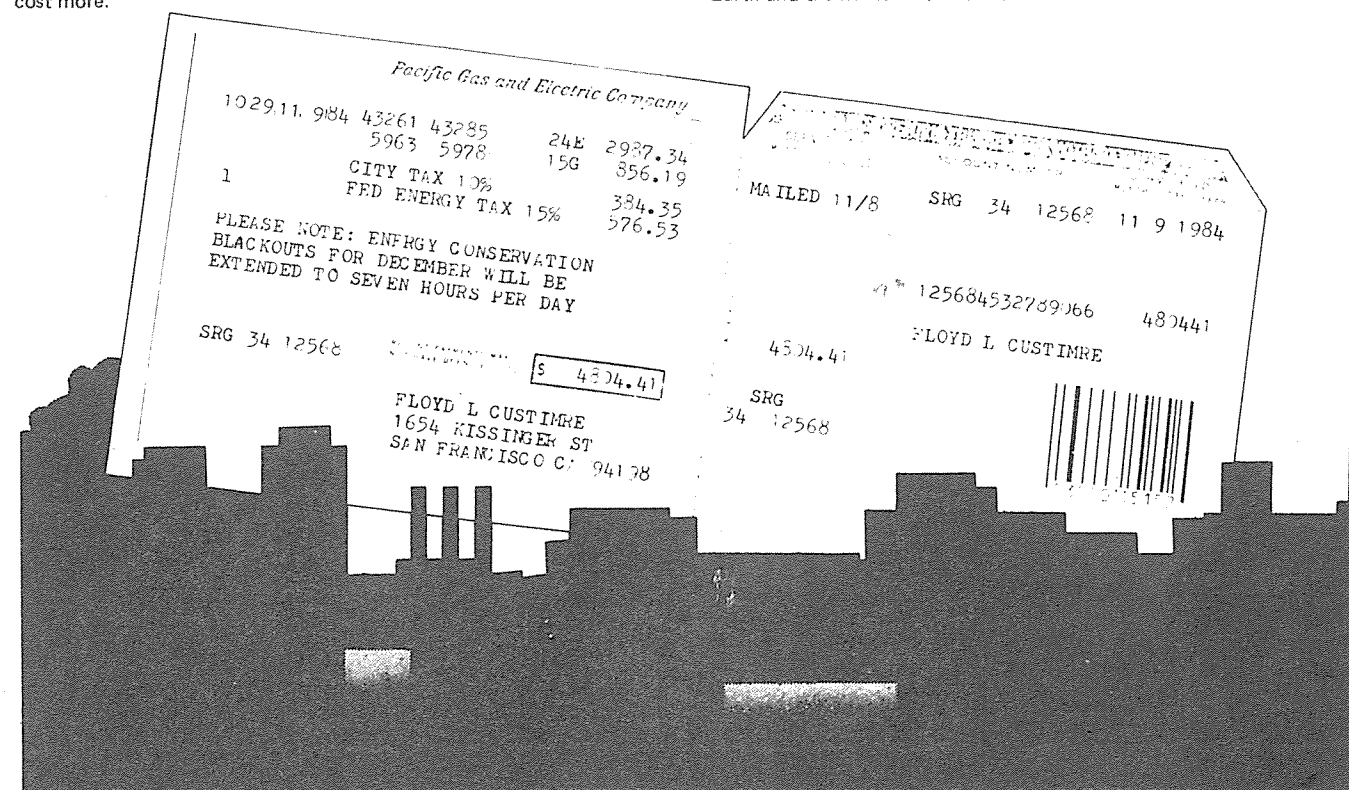
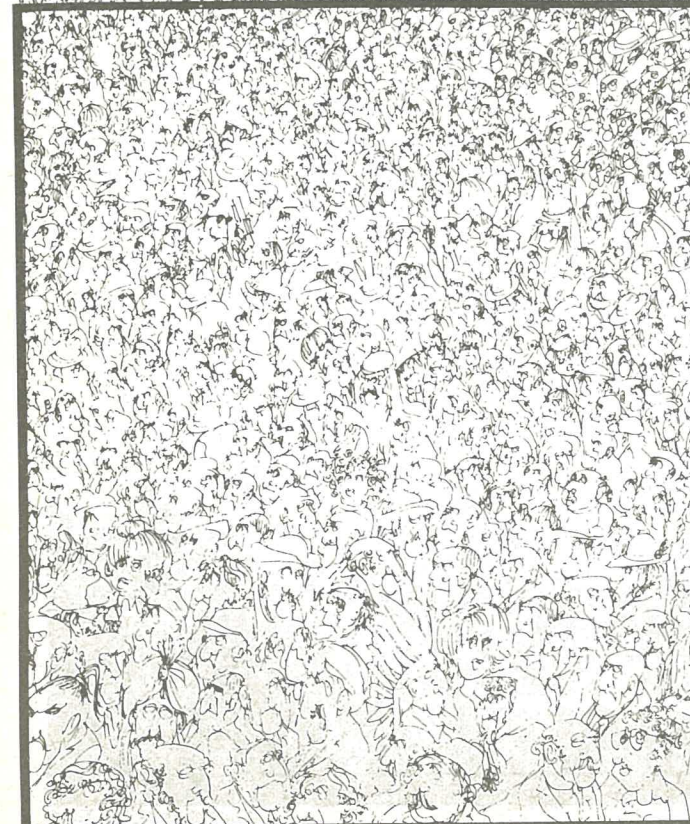
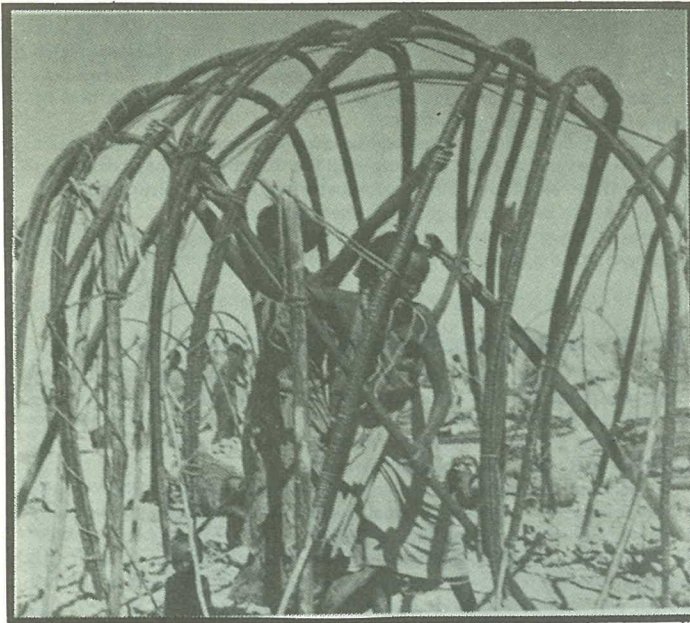


Illustration by Bill Yenne





## HABITAT

Focus on human settlements in developing countries

Habitat — an international conference on Human Settlements, under the auspices of the United Nations.  
Vancouver - May 27th to June 11th: 1976.

### The Conference Symbol

The symbol for Habitat: The United Nations Conference on Human Settlements combines three traditional forms, to re-affirm humanities belief that it can find answers to the problems of human settlements. The outer circle represents the global nature of the problem to the world wide search for answers which is being engendered by Habitat. The Greek triangular delta represents shelter. The human figure combines a sense of appealing for help with an attempt to burst out of the confinement of inadequate shelter. The rough graffiti treatment is to indicate that the problem is urgent and not yet finished.

Let us all hope that the policy-makers are sufficiently capable of drawing away the veil of their own verbiage.

We are not helpless. Far from reaching the end of our inventiveness, we could now be on the threshold of new renaissance.

Answers won't come easily. . . . But there is one thought that can steel our resolve - we cannot go on as we are today."

Enrique Penalosa  
Secretary-General of Habitat

Geoffrey Winthrop Young

"There are many ways of climbing; and almost anything that is not naturally flat or artificially smooth can be climbed. Who shall say upon what character of surface, inclined at what angle, and continued to what height, any human climber can find his ideal?

For each of us there is some appropriate kind of elevation, diverging at some suitable angle from the common place level, whereon we may be sure of coming face to face with the realization of our best selves as we struggle upward; and where we may note, if we have insight how little or how great a distance still separates that fulfilled realization of ourselves from the spiritual heights which imagination can detect beyond."

It is understood that the following subjects are likely to be selected for discussion:-

1. National Human Settlements Policies.
2. Participation in Planning and Implementation
3. Human Settlements and International Cooperation, the New International Economic order.
4. Human Settlements in Rural Areas
5. Community Involvement in Improving the Quality of Life.
6. Land Use and Ownership.
7. User Oriented Human Technologies
8. The Human Made and the Natural Environment.
9. Social Justice and the Question of Differing values and cultures.

Workshops of two or three sessions will take place on such subjects as:-

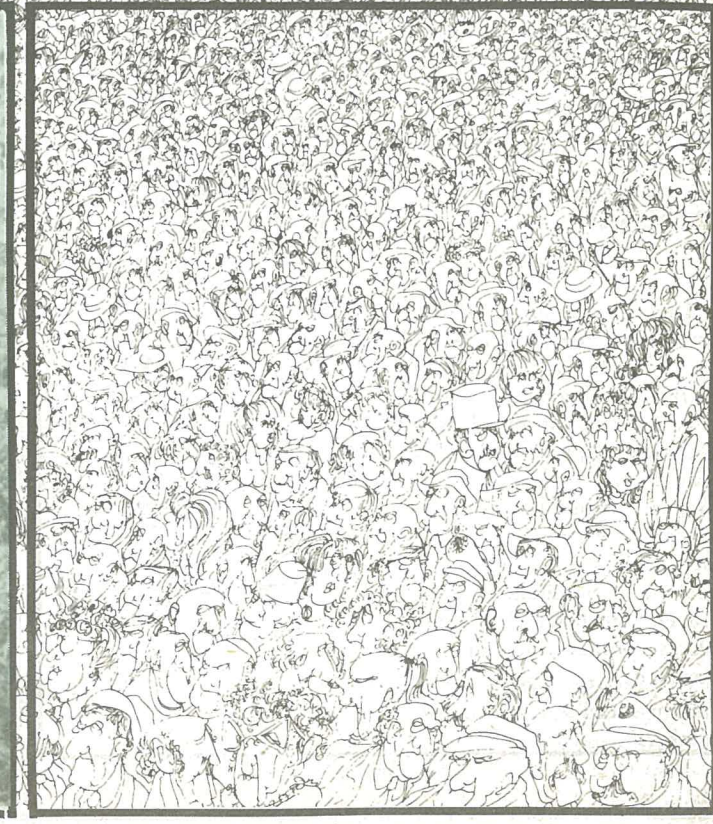
Low Cost and Self-Help Housing, Interdisciplinary Approaches to Human Settlements Problems, Transportation, Financing the Development of Human Settlements, Energy Conservation, Population Policies, The Role of Women, Employment Problems, The Building Industry and Economic Development, Metropolitan Areas.

Jose Ortega Y Gasset

"This thing we call "civilization" — all these physical and moral comforts, all these conveniences, all these shelters, all these virtues and disciplines which have become habit now, on which we count, and which in effect constitute a repertory or system of securities which humanity made for itself like a raft in the initial shipwreck which living always is — all in the twinkling of an eye, at the least carelessness, escape from humanities hands and vanish like phantoms . . .

The fate of culture, the destiny of man", depends upon our maintaining that dramatic consciousness ever alive in our inmost being, and upon our feeling, like a murmuring counterpoint in our entrails, that we are only sure of insecurity."

\* Sexist errata: humanity.





# FOOD

We've decided to include a few vegetarian recipes in our '76 issues of Chain Reaction.

For some, this may be the first attempt at trying a vegetarian diet, for others, more experienced, new combinations, ideas and recipes . .

What better way to start a new meal than with . . . breakfast!

Here is the famous 'crunchy granola' recipe.

\*\*\*\*

I have made it a very personal one, i.e. if you have a 'sweet tooth', the extra sweetener may be added. If you like a nutritious breakfast and have the time to eat it, you can add all the optional ingredients.

## CRUNCHY GRANOLA

### Dry Ingredients

4 cups rolled oats  
1½ cups wheat germ  
1 cup dessicated coconut  
¼ cup sesame seeds  
1 cup unprocessed bran  
or  
regular  
1 cup sunflower seeds

### Wet Ingredients

½ cup oil  
½ cup honey  
2 tabs. water

## LUNCH

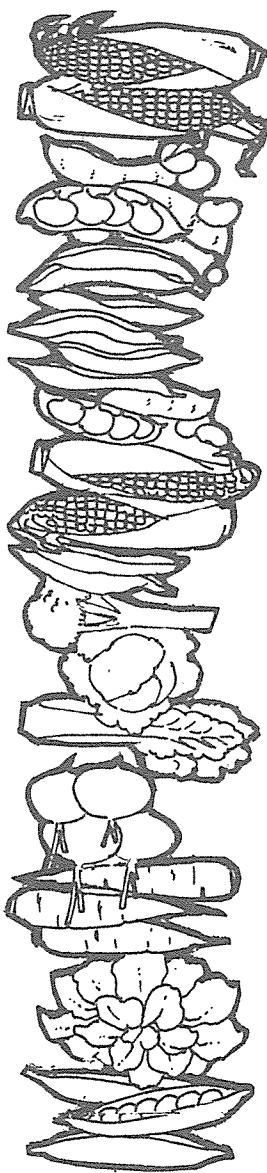
This is the most difficult meal time for FOE folk and it probably is for all other active working people as well. The most nutritious ideas we can think of, is: "semmitches" and fruit.

Salad semmitches: lettuce, cheese, tomato, grated carrot, sprouts.

Cheese semmitch: cottage cheese or cream cheese with dates, prunes dried apricots (soaked) tasty cheese with thinly sliced zucchini or cucumber.

Carrot semmitches: grated carrot, roasted sesame seeds (mixed together with a little oil), raisins or sultanas.

All semmitches are made with wholemeal or rye bread. 'Bite-sized' semmitches can be made using sesame, wheat rye, crackers (a bit crumbly though). Finish with 2 types of raw fruit.



## TEA TIME

Members in a household vary a great deal, therefore, we have listed only the ingredients for our salad, and not the amounts.

## COLOURFUL CRISPY SALAD

Place in a large glass bowl (so you can see the colours!): torn lettuce leaves - bite size, then sprinkle with carrot thinly sliced young zucchini sprinkle grated beet root and roasted sesame seeds another layer of lettuce or finely chopped cabbage bean sprouts

Top with alternate wedges of tomato, cheese strips, and chopped parsley.

Use your favourite dressing or

Dressing: 3 Tabs cider vinegar  
½ tsp. honey and  
½ tsp. mixed herbs

Serve with potatoes: steamed or baked in their skins and any vegetables in season: steamed corn on the cob or/and young zucchini slices. Sprinkle a few tabs. of sunflower seeds in the zucchini towards the end of cooking time.

Directions: Combine all the dry ingredients in a large bowl. Combine all the wet ingredients in a saucepan. Heat and stir until a smooth mixture develops, then pour over the dry ingredients. Stir until all ingredients have blended together. Spread on even layer of mixture onto a dry cookie tray and place in a 200o - 250o oven. Slowly bake until a golden brown.

Cool. Store in a covered glass jar or tin.

### Optional Ingredients:

Sweet granola - add ¼ cup raw sugar to dry ingredients

Protein granola - add 2 tbs soya compound  
2 tbs. skim milk powder  
2 tbs. lecithin granules

### Extra

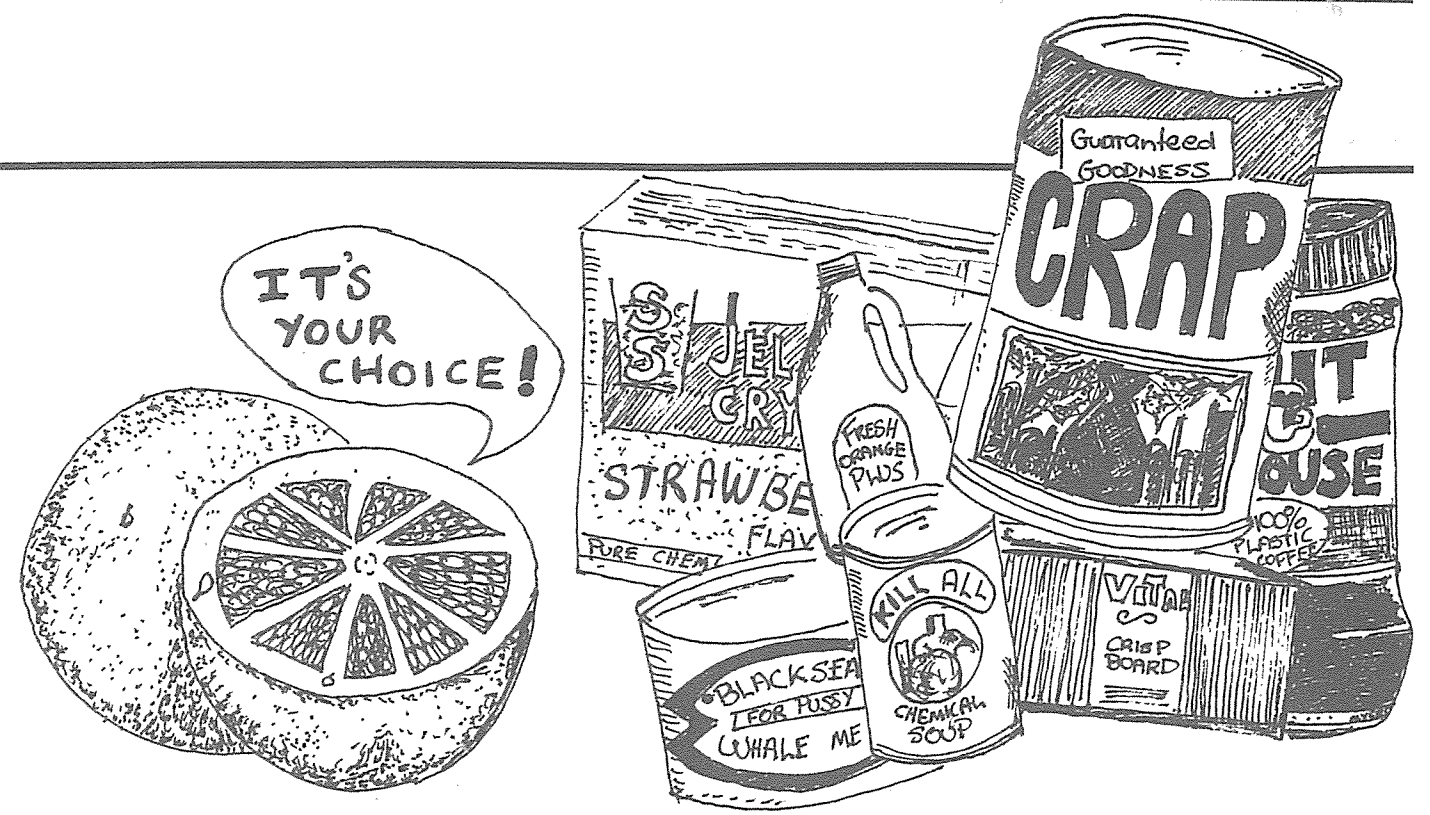
Nutritious granola add ½ cup crushed nuts  
½ cup chopped dried fruit.

A bowl of granola, a glass of freshly-squeezed orange juice, two pieces of wholemeal toast and a cup of cereal beverage (coffee substitute) should keep you feeling fit until lunch-time.

Friends of the Earth and Ballinger Books in the United States have produced a unique, information recipe book titled: *How to Enjoy a Rich Protein Harvest by Getting on Top of the Food Chain or DIET FOR A SMALL PLANET* by Frances Moore Lappe. This book is all about Protein. How it is used and wasted, why the body needs it, what non-meat combinations can be used and recipes incorporating these combinations.

In Melbourne, the RMIT Environment group and Food Co-Op have produced a book titled simply: *FOOD*. But the information inside is far from simple. The Australian reader is exposed to the enormous amounts of investments they give to the multi-national food companies each year by the products they buy every day. A section on packaging falls under the same exposure. On the healthier side, simple, clear directions on how to properly prepare the earth-giving foods, how to make bean sprouts, a few garden hints and of course, recipes.

"Food" is available from FOE (Victoria) - see Publications Page.



## FOOD WORKSHOP

The most energy-intensive food items in your kitchen are the throw-away aluminum-canned beverages, plastic-bottled milk, tv dinners, frozen-prepared foods, and aerosolized cooking oil sprays.

A considerable portion of the energy expenditure in food production occurs in packaging. For instance, to produce a 6-ounce aerosol spray of cooking oil requires over twice as much energy as an equal amount of bottled cooking oil or margarine requires.

The report *ENERGY AND FOOD*, authored by Albert Fritsch, Linda Dujack, and Doug Jimerson, is now available from CSPI. In this 80 page report, the amount of energy used to produce, process, deliver and market about 120 common foods has been calculated. A number of brand name items are listed in a summary chart that includes the amount of energy needed to produce both the food contents and container materials. From such data, conscientious consumers can choose foods low in energy and price, and high in nutrition.

Several practices emerge for reducing energy consumption while preserving high nutrition standards:

-Avoid non-returnable beverage containers. A 16 ounce non-returnable bottle used for RC Cola requires 1.76 KWH to produce. A 16-ounce returnable bottle requires 2.29 KWH to produce, but it can be reused 10 to 15 times.

-Avoid products with excessive packaging. Each supermarket plastic bag adds .055 KWH to the product's total energy expenditure. Increase your purchase of unpackaged and bulk food items, and avoid small containers.

-Eat more vegetable protein in place of meat dishes, e.g., whole wheat bread, macaroni, or dried beans. Four times as much energy is needed to produce and market a pound of meat protein as a pound of vegetable protein. This is because 80 - 90% of the food-energy consumed by animals is lost as metabolic heat.

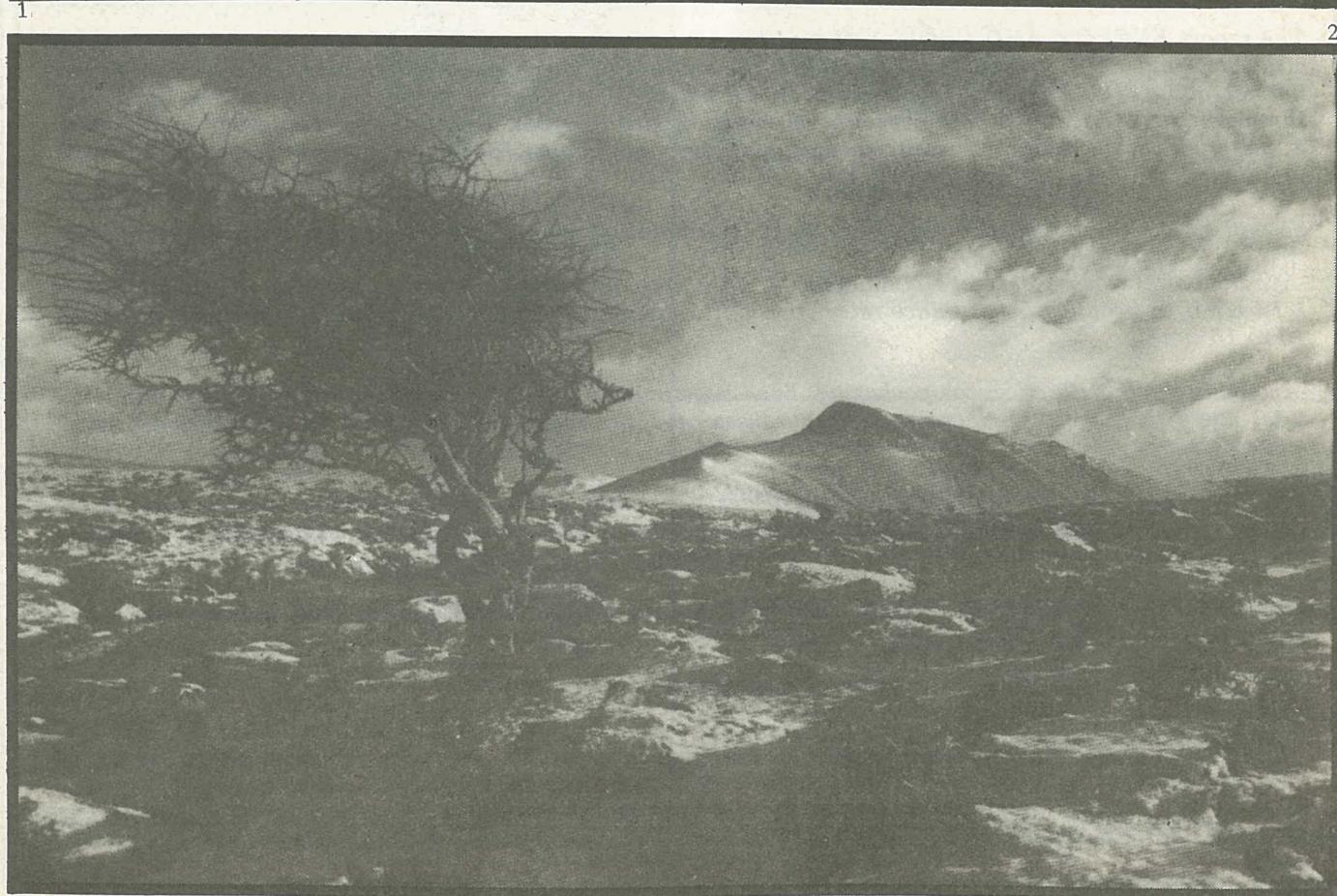
-Grow your own or buy fresh produce, instead of canned, frozen, or dehydrated fruit and vegetables. For example, one pound of white potatoes requires:

1.83 KWH - fresh, 2.629 KWH - canned, 4.38 KWH - frozen, 7.84 KWH - dehydrated (does not include packaging).

An economy guided by conservation entails converting to new and even more nutritious eating habits. In an era of resource scarcity, Australians will have to change many ingrained habits, including choice of diet. IF not made soon by personal preference, these changes will be forced later by high prices and economic necessity. Fortunately, changes in food habits can save resources, save money and provide a more nutritious diet.



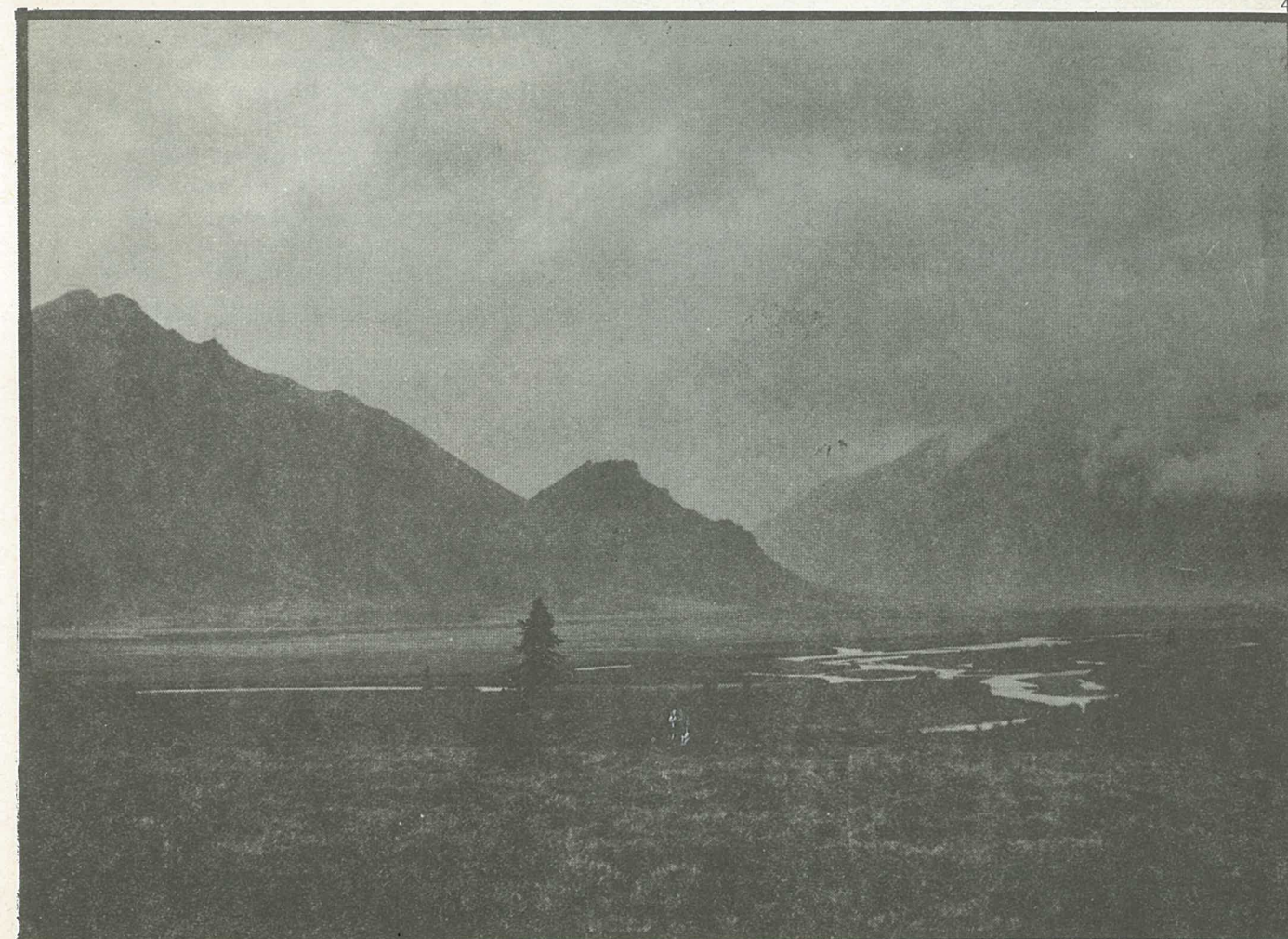
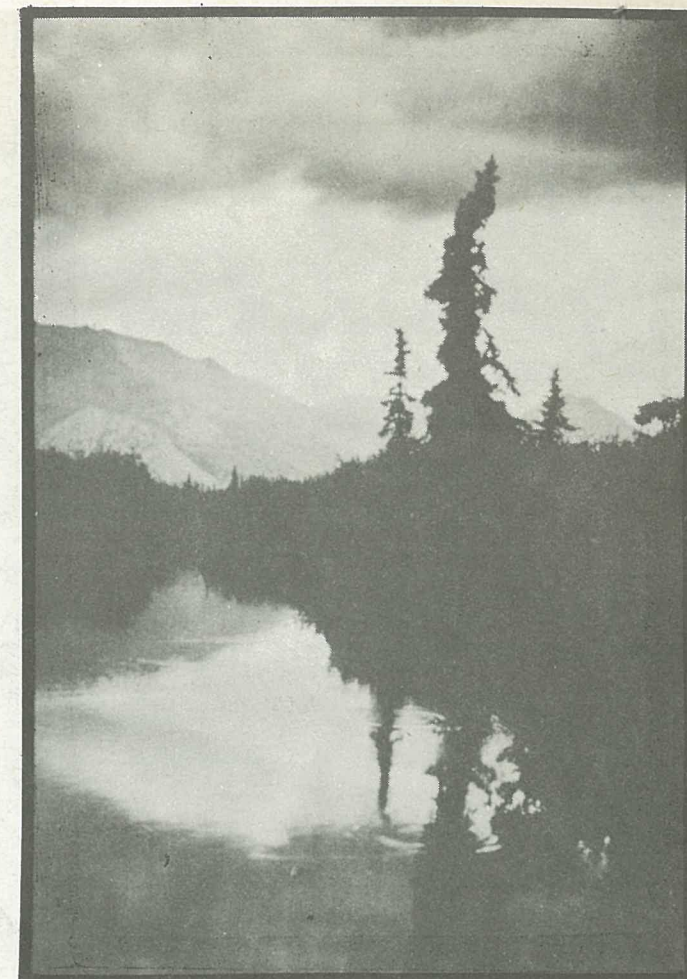
just down to earth ...



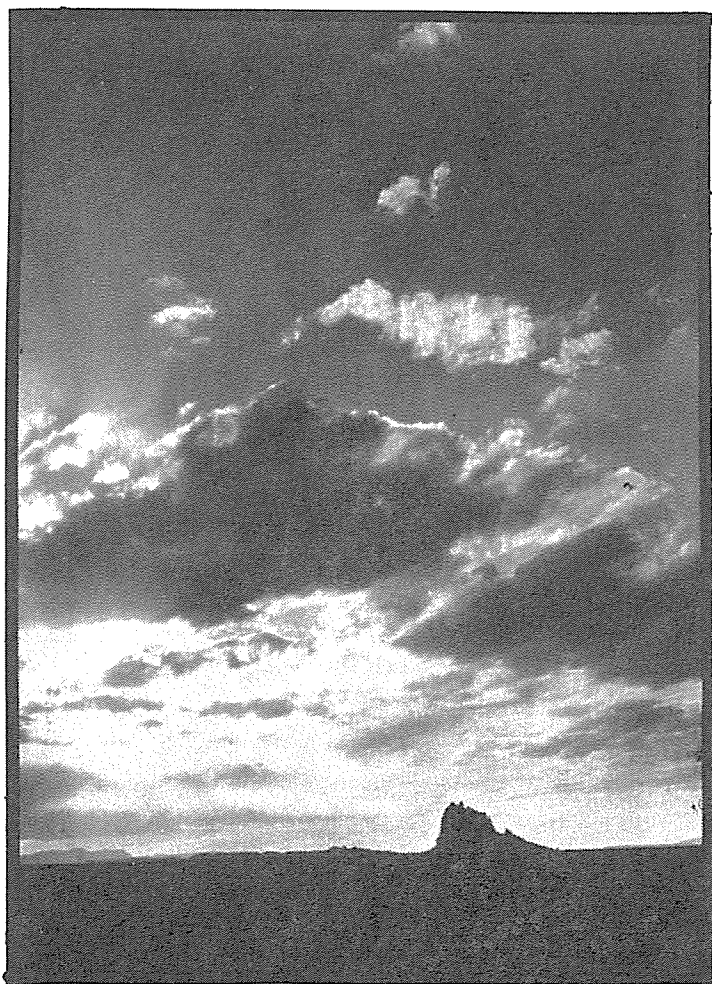
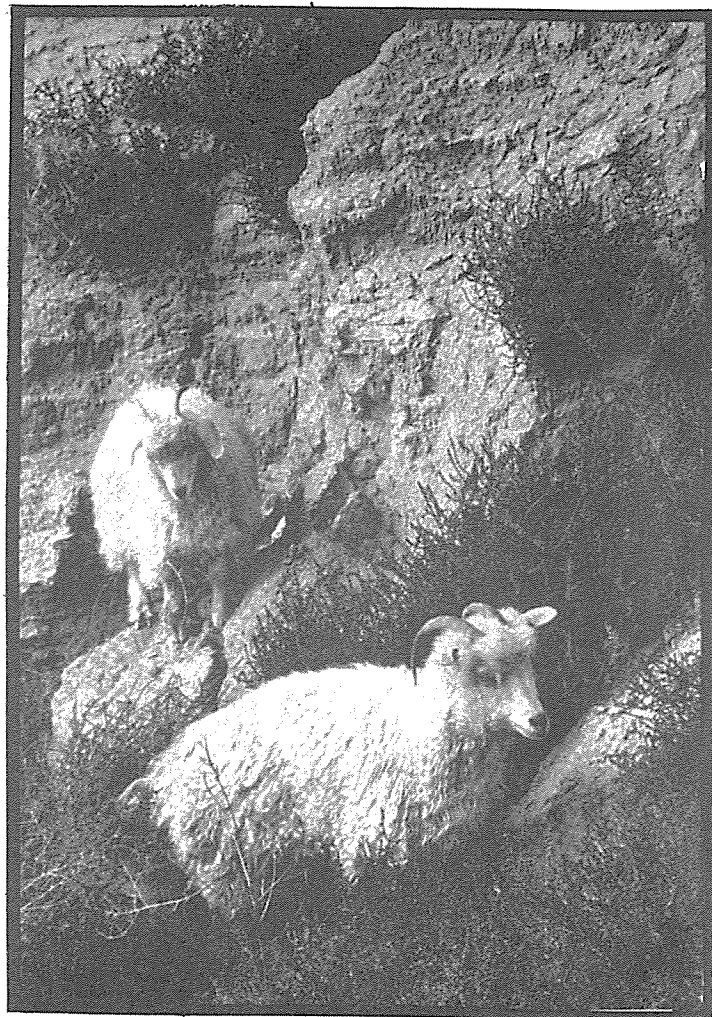
If there is magic on this planet, it is contained in water . . . Once in a lifetime, if one is lucky, one so merges with sunlight and air and running water that whole eons, the eons that mountains and deserts know, might pass in a single afternoon without discomfort. The mind has sunk away into its beginning among old roots and the obscure tricklings and movings that stir inanimate things. Like the charmed fairy circle into which a man once stepped, and upon emergence learned that a whole century had passed in a single night, one can never quite define this secret; but it has something to do, I am sure, with common water. Its substance reaches everywhere; it touches the past and prepares the future; it moves under the poles and wanders thinly in the heights of air. It can assume forms of exquisite perfection in a snowflake, or strip the living to a single shining bone cast up by the sea.

— Loren Eiseley

- A selection of photographs from Earth's Wild Places:
1. Wilber Mills: Caribou flocking down from the forest
  2. John Cleare: Yr Elen
  3. Alaska
  4. Bob Waldrop: Sheenjek Valley, storm.







FROM SONG OF THE EARTH SPIRIT  
by Susanne Anderson

"He alluded then to the mining-company program to drill deep wells for water that could sluice pulverized coal to distant power plants:

"People are concerned with the water level on Black Mesa. They say it is like draining the blood out of the patient. The female mountain is being cut up. It is something like manipulating the body of the whole mountain, and she is being killed. The same thing is happening with the male mountain. Those drills are the same thing.

"People who have so much belief worry. If both mountains die, the old prayers and the Navajo way dies. The Navajo people will be dead."

And so too could die the Song of the Earth Spirit:

*It is lovely indeed, it is lovely indeed.*

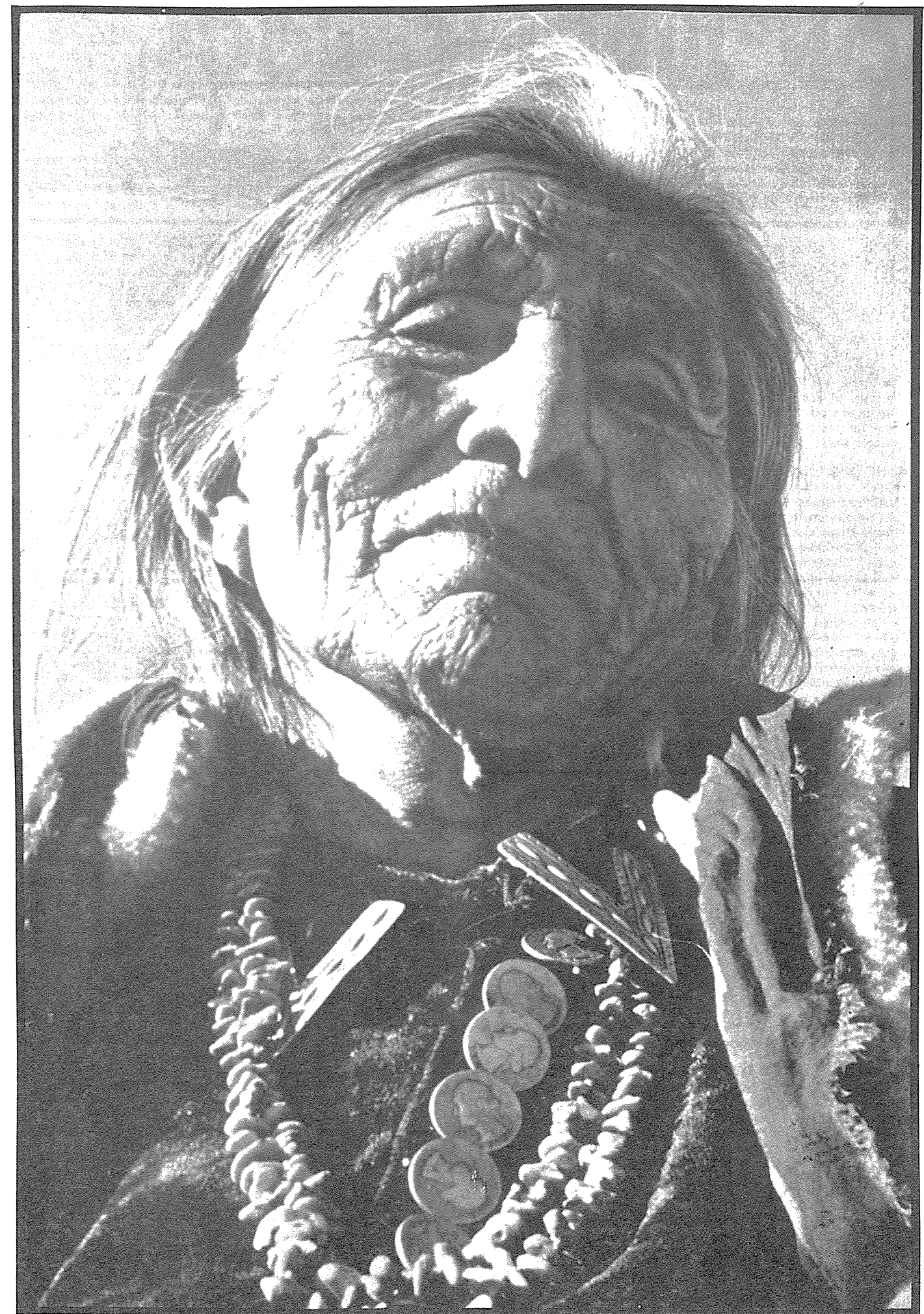
*I, I am the spirit within the earth.  
The feet of the earth are my feet  
The legs of the earth are my legs*

*The strength of the earth is my strength  
The thoughts of the earth are my thoughts  
The voice of the earth is my voice*

*The feather of the earth is my feather  
All the belongs to the earth belongs to me  
All that surrounds the earth surrounds me*

*I, I am the sacred words of the earth.  
It is lovely indeed, it is lovely indeed.*

photographs by Susanne Anderson



CHAIN REACTION NO. 1 1976



# ON JUDGING EGGS



*This article has been compiled from the transcripts of the Ranger Inquiry. Sydney, January 8th - 12th 1976. Amory Lovins and Ralph Lapp were both brought out to Australia to testify at the inquiry . . . the inquiry is open to submissions from any citizen, but is at the time of writing refusing non-technical evidence. This so-called "public" inquiry is now under considerable pressure from both the Liberal Government and the Companies involved in Uranium.*

LAPP: In going through page 2, I notice that you have mention of reactor safety, waste, safeguards, tailings, nuclear economics, net energy, transfer of technology . . . These, would you agree are all specialised fields of science or technology?

LOVINS: Yes, in varying degrees.

LAPP: The answer's yes?

LOVINS: Yes, in varying degrees. Some are more arcane than others.

LAPP: How many of these fields do you feel that you're professionally competent in?

LOVINS: Ian Evanson once remarked that one doesn't have to be a hen in order to judge the quality of an egg. I think I have a sufficient competence as a physicist to read and understand literature which I cite, and that for the purposes of this exercise, as opposed to say designing a reactor, that's all that's necessary.

## THE OLD EXPERT ARGUMENT

LAPP: In the real world of high technology, is it not true that the layman is confronted with experts and with the requirement of taking their judgments or opinions?

LOVINS: Taking them for what?

LAPP: Taking them, in many cases, for their personal value. Such as, for example, going to a doctor and seeking his competent and expert medical advice. Is that not true?

LOVINS: With reservations. One often takes second and even third opinions from -

LAPP: From other medical experts?

LOVINS: Yes. One will, on occasions, ignore all the opinions. That is one's privilege in a democratic republic.

LAPP: You flew here in the aircraft across the ocean, did you not?

LOVINS: Reluctantly.

LAPP: But you did.

LOVINS: Indeed. I'm here.

LAPP: The man who flew the airplane was professionally competent I assume.

LOVINS: It appears so.

LAPP: You had to trust an expert in that case, did you not?

LOVINS: I do so as little as possible.

LAPP: But, in point of fact, you had to trust an expert?

LOVINS: Indeed. There was no choice, but there is a choice -

LAPP: But that is contradictory to the page 2, in which you give advice saying you should not trust experts. I don't quite understand; could you explain.

LOVINS: I said you shouldn't believe an expert. I don't see an inconsistency there.

LAPP: I'm sorry, I do. If I have a pain in my side and expect I have appendicitis, I think I'm going to go to a doctor and trust in professional competence.

LOVINS: On the other hand, let us suppose that the doctor you go to is also, shall we say, a pharmacist, operates a hospital, has a complete monopoly of advice and performance on health matters and has a good deal of promotional zeal, is well known for extracting the appendix of anyone who comes within range.

LAPP: I think you have taken a very specialized case.

LOVINS: I agree.

LAPP: The -

LOVINS: It seems to me that when experts disagree on matters which appear to be highly technical, ordinary people have to make up their mind's somehow. That's what politics is for, and it may occur to people that they will do well to believe that expert who is free to say what they like, who has no commercial or emotional attachment to a particular approach, and whose error won't matter.

## LOW ENERGY LIFESTYLE

LAPP: Now I understand that, from your testimony, that you wish the world to go - to abandon the present dependence on central station electric power and to seek a low energy life style. Is that a correct characterisation of your views?

LOVINS: Broadly. The extent of the dependence is not yet as marked as it is proposed to be and low energy life style is subject to many interpretations.

LAPP: Well, what interpretation would you give it?

LOVINS: Well it covers quite a wide range. I think at the least, I'm talking about energy stability, in terms of depletion of primary fuels in the rich countries. I've suggested substantial energy shrinkage in many of those countries. And, broadly speaking, I'm advocating not only great increases in efficiency, but also changes in what energy is used for. I do not want to see continuation which the nuclear advocate David Rose decried about our present practice of turning resources into junk.

LAPP: Thank you. Do you personally practice a low energy life style?

LOVINS: I practise a mixed life style. My personal energy consumption averaged over the year, is substantially lower than the US average. It's I think, slightly above the UK average. I've never owned a car; that rather helps. I do a fair bit of flying, though I take the train whenever possible and I spend several months a year in a firewood powered bater economy with no electricity. So, when you average quite a wide range over the year, I think it's fair to say it comes out to a low energy life-style.

## THE BUREAUCRATIC COMPROMISE

LAPP: You believe then that scientists working the Reactor Safety Program are peddling one line of testimony officially or taking viewpoints, because it conforms to what they think the administration wants them to say or the agency wishes them to say. Is that correct?

LOVINS: Broadly speaking I think that is true in some cases.

LAPP: Based upon hearsay?

LOVINS: Yes, again by people I consider reliable informants. Perhaps I should follow that up though. I think as it's now ancient history, it wouldn't hurt for me to mention it. I used to have occasional conversations with the man who until recently was Director of Licensing for what was then the US Atomic Energy Commission, and over the course of a year or so as things landed on his desk which he'd been told couldn't happen, he lost some of his initial confidence in the advice he'd been given. Shortly before he resigned he told me that although he did not strictly speaking consider light water reactors to be licenseable on safety grounds, he had continued to license them. His reason I think represents part of what's wrong with the nuclear regulatory scene in the States. I should stress that he's an honest man, he's incapable of lying but he is capable of rationalising. He took the view that when he eventually resigned of made the Commission sack him, whichever came first, his successor would probably go for urban siting or reactors and that he felt the best way he could postpone this as long as possible was to license the reactors but to fight for remote siting. That's the kind of bureaucratic compromise that gets made rather often and that gets misconstrued by people on the outside who don't realise the pressures.

## COMMONSENSE GENERALISTS

LAPP: Thank you. Turning to your text of your testimony. On page 2 in the middle paragraph lying - well it's right in the middle, and if I may read it, you say "Commonsense judgements by accountable generalists" How would you define or explain the word "accountable" there?

LOVINS: Subject to periodic election and to other political remedies for misbehaviours meanwhile.

LAPP: I see. I'm sorry I didn't understand. You're talking the political sense there?

LOVINS: Yes. I do hope that you'll read that exchange I cite between Green and Handler and perhaps I should mention what it is. Phil Handler is head of the National Academy of Science, he gave a speech called 'How safe is safe enough', putting forward the view that these policy decisions about the risk should be left to the private processes of expert, exercising the same subjective judgements, though on a professional basis, which they consider unsatisfactory if exercised by the public; because it may lead to what they consider irrational results. Harold Green Professor of Law at George Washington University and a leading thinker on public policy regarding hazardous technologies, took Handler's speech, annotated it, added a discussion and then Handler has a response at the end. It's a most illuminating exchange. I understand it went to members of the Nuclear Regulatory Commission marked urgent reading from their General Council.

## ENERGY CONSUMPTION AND GNP

LAPP: Thank you. On page 3 you have in the middle of the first column a sentence that says . . . "our forecasters have assumed that rapid energy growth is essential for a healthy economy and full employment, yet there

is no evidence that this assumption is true. Indeed in the only country, USA, where it has been carefully studied, it appears to be untrue." Are you aware of the fact that the Gross National Product as a measure of general economic conditions and the Gross Energy Consumption plotted on a log scale tract rather nicely?

LOVINS: Let me take that one part at a time. GNP measures just what its definition says it measures. It will measure the economic value of pollution added to a river and the economic value of having someone else fish it out again. It is not a measure of social welfare. The GNP/energy correlation to what you refer is not greeted with such enthusiasm as it used to be even among the people who first worked with it such as Joel Domstatter and in ERDA 52 you'll find a fairly detailed discussion why the correlation isn't much good. However, were I to grant for purposes of argument that such a firm correlation existed I think it would perfectly consistent with the statement I made. You're talking about correlation, I'm talking about causality.

LAPP: But in general is it not true that when the Gross National Product dips it is an indication of economic ill health? There's unemployment which accompanied this, is that not true?

LOVINS: That may be true, to pick the example I mentioned earlier it may be equally true that someone has merely stopped polluting the river, which will presumably increase social welfare.

LAPP: I'm sorry are you saying that if someone pollutes the river the GNP is going to dip?

LOVINS: No, it will increase in fact it will probably increase doubly because the GNP will also reflect building equipment to clean up the water.

## PUBLIC PRESSURE

LAPP: Yesterday I think you made reference to the fact that in the United States there were some 21 states which were considering a nuclear moratorium, is that correct?

LOVINS: Not that - my latest information is that many had legislation pending in the state legislature to ban or stiffly restrict nuclear power and that there were referendum efforts underway in about 16 states.

LAPP: Are you personally aware of the status of this legislation in these 21 States?

LOVINS: No, it keeps changing. I believe it's already been considered in 1 or 2 but I don't think those are included in the 21, I stand to be corrected on that. I have just been in California talking to some of the people involved initiative effort there and my friends in the Federal Energy Administration are beginning to think that effort might succeed, they're beginning to get rather nervous and think about contingency planning.

LAPP: Are you aware of the Harris Poll - public poll released in August? (ed. 1975).

LOVINS: Yes.

LAPP: It did show, did it not, that some 70% of the American people approve of nuclear power plants?

LOVINS: It purported to show that, I regard it as a tendentious sham, which no reputable polling company should've put it's name on. The essence of the poll was to state as fact, "nuclear power is economic, clean and safe so is it alright with you?", and it seems to me an honest poll in the US to this effect has yet to be done. There have been some in other countries which have produced varying results, ranging from about an even split in France to a strong opposition to nuclear power in such countries as Holland, Norway and Sweden.

## I KNOW OF NO SCIENTIFIC BASIS . . .

LAPP: Could you give us some rough indication of what you believe to be a comparative person/rem dose from the nuclear power industry projected to the year 2000 and the radiation dose that one gets from - let's say diagnostic and medical X-rays.

LOVINS: That is what Alvin Weinberg would call a trans-scientific question. I know of no scientific basis for giving an answer.

LAPP: No scientific basis?

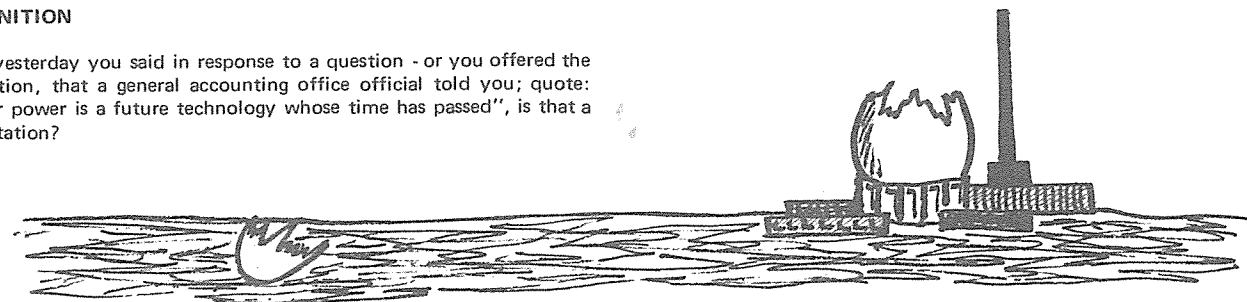
LOVINS: No.

LAPP: Thank you.

LOVINS: Which is why I decry some scientists' attempts to give answers which are presented as authoritative calculations. It seems to me that there are many factors involved which are unknown any many which are even unknowable.

## A DEFINITION

LAPP: yesterday you said in response to a question - or you offered the information, that a general accounting office official told you; quote: "nuclear power is a future technology whose time has passed", is that a fair quotation?



LOVINS: The quotation is correct. He applied it to oil shale and then agreed with me that it applied also to fission.

## APPLE PIE AND THE EIS

LAPP: Yesterday you commented on the Environmental Impact Statement. Do you approve of Environmental Impact Statements?

LOVINS: Yes, I also approve of motherhood, God, apple pie. It's a good exercise for promoters to go through, that is it's heuristically valuable and it is, if properly done, which it seldom is a very important contribution to public participation.

LAPP: Now you are proposing what appears to be a very radical transformation and not judging it's value - I'm just saying that it appears to be radical, from a present energy technology to a soft technology with great consequence for the world. My question is, do you not think you are to prepare, as one of the sponsors of this, an Environmental Impact Statement so that people on the other side of the fence can judge it?

LOVINS: I am assisting in efforts to do so, for example the ERDA Solar Division is trying to set up an Environmental Impact Statement cum technology Assessment of solar technologies, a solar division are making a conscientious effort to do it right and come up with a study that everyone else can look up to as a model and I'm trying to help them find the people to do that, it's quite difficult. I've provided in Annex IV some of the ingredients of the start of a technology assessment of the kind of energy policy which others including you have proposed and which I think involves much more radical transformation of society, a much less pleasant one than the path which I have proposed.

## THE ILLICH NUMBER

LAPP: Thank you, On page 3, the bottom of the first paragraph, in the second column you quote Illich and say, "He has calculated an illustrative number" and say: "Whether or not the number is quite correct, the idea is undoubtedly important that the average American man drives about seventy five hundred miles a year in his car, but to do this and earn the money to finance it, it requires about sixteen hundred hours a year, which works out to 4.5 miles an hour and we can walk that fast." How many hours would you estimate that the average American works per year.

LOVINS: I've no idea.

LAPP: Well, certainly most Americans work 50 weeks a year and 40 hours a week, which would be 2,000. Do you believe that sixteen hundred hours out of two thousand are required to drive a car in the United States?

LOVINS: Remember, what Illich is calculating is adding up the time you take to drive, park, hunt for your car, pay for the car, petrol, insurance; go through the usual hassels of licensing, paying parking fines and the like; maintenance. It's quite a large list. Now I have indicated a reservation about the number. He doesn't say where the number comes from so I'm unable to check whether it's true. I've heard it said that the number may be too high. I still think the idea which it illustrates is important.

LAPP: But you published it?

LOVINS: With a due reservation.

## THE ENTRY EXIT

LAPP: Have you ever seen any of the - have you visited Los Alamos and any of the weapon facilities?

LOVINS: No. And if I visited them, I should not got inside without receiving a satisfactory answer to the question, "How much actinide is in the air, and how do you know?" I don't think a satisfactory answer would be given, so I shouldn't go in.

LAPP: May I assume then, that you feel the people who do go in either do not care about their health, or are somehow rather convinced that their health is being adequately looked after.

LOVINS: Presumably both or more likely the latter.

LAPP: And yet there are thousands of people who have handled plutonium in areas, in the Atomic Energy Commission, are there not?

LOVINS: Indeed.

LAPP: Thank you.



At noon on March 22, 1975, both Units 1 and 2 at Browns Ferry plant in Alabama were operating at full power, delivering 2,200 megawatts of electricity to the Tennessee Valley Authority.

Just below the plant's control room, two electricians were trying to seal air leaks in the cable spreading room, where the electrical cables that control the two reactors are separated and routed through different tunnels to the reactor buildings. They were using strips of spongy foam rubber to seal the leaks. They were also using candles to determine whether or not the leaks had been successfully plugged - by observing how the flame was affected by escaping air.

The electrical inspector put the candle too close to the foam rubber and it burst into flame.

The resulting fire, which disabled a large number of engineered safety features at the plant, including the entire emergency core cooling system (ECCS) on Unit 1, and almost resulted in a boil off/meltdown accident, demonstrates the vulnerability of nuclear plants to "single-failure" events and human fallibility \*

Approximately 15 minutes passed between the time the fire started (12.20 pm.) and the time at which a fire alarm was turned on. It was not until one of the electricians told the plant guard inside the turbine building that a fire had broken out that an alarm was sounded. However, confusion over the correct telephone number for the fire alarm delayed its being sounded.

Despite the fire alarm, the reactor operators in the plant control room did not shut down the two reactors, but continued to let them run. At 12.40, five minutes after the fire alarm sounded, the Unit 1 reactor operator noticed that all of the pumps in the emergency core cooling system (ECCS) had started. In addition, according to the official TVA report,

## THE 'BROWNS FERRY INCIDENT'

*"Control board indicating lights were randomly glowing brightly, dimming, and going out; numerous alarms occurring; and smoke coming from beneath panel 9-3, which is the control panel for the emergency core cooling system (ECCS). The operator shut down equipment that he determined was not needed, only to have them restart again."*

The flashing lights, alarms, smoke and continual restarting of ECCS pumps went on for a full ten minutes before the reactor operators began to wonder whether it might be prudent to shut down the reactors.

After the power level on the Unit 1 reactor began to drop inexplicably, the operator started to reduce the flow of the reactor's recirculating pumps; when the pumps suddenly quit at 12.51 he finally shut the reactor down by inserting the control rods.

Beginning at 12.55, the electrical supply was lost both to control and power the emergency core cooling system and other reactor shutdown equipment on Unit 1. The normal feedwater system was lost; the high-pressure ECCS was lost; the reactor core isolation cooling system was lost and most of the instrumentation which tells the control room what is going on in the reactor was lost. According to the Unit 1 operator

*"I checked and found that the only water supply to the reactor at this time was the control rod drive pump, so I increased its output to maximum."*

Meanwhile, a few feet away on the Unit 2 side of the control room, warning lights had also been going off for some time. A shift engineer stated,

*"Panel lights were changing color, going on and off. I noticed the annunciators on all four diesel generator control circuits showed ground alarms. I notified the shift engineer of this condition and said I didn't think they would start."*

According to the official TVA report, "At 1.00 pm the Unit 2 operator observed decreasing reactor power, many scram alarms, and the loss of some indicating lights. The operator put the reactor in shutdown mode."

Some of the shutdown equipment began failing on Unit 2, and the high-pressure ECCS was lost at 1.45 pm. Control over the reactor relief valves was lost at 1.20p.m. and not restored until 2.15pm at which time the reactor was depressurized by using the relief valves and brought under control.

On the Unit 1 side of the control room things were not going so well. According to the Unit 1 operator, "At about 1.15 I lost my nuclear instrumentation. I only had control of four relief valves.....At about 1.30, I knew that the reactor water level could not be maintained, and I was concerned about uncovering the core."

Had the core become uncovered, a meltdown of the reactor fuel would have begun because of the radioactive decay heat in the fuel.

In order to prevent the reactor water from boiling off, it was necessary to get more water into the core than the single high-pressure control rod drive pump could provide. None of the normal or emergency low pressure pumps were working, however, so a makeshift arrangement was made, using a condensate booster pump. This was able to provide a temporarily adequate supply of water to the reactor, although the level dropped from its normal 200 inches above the core down to only 48 inches. Using the makeshift system, the Unit 1 reactor was under control, but by a rather thin margin.

Many instrumentation and warning lights in the control room were inoperative. The reactor protection system and nuclear instrumentation on both reactors had been lost shortly after they were shut down. Most of the reactor water level indicators were not working. The control rod position indicator system was not operative. The process computer on Unit 1 was lost at 1.21 pm (The computer on Unit 2 was inoperative because it was down for reprogramming.)

Other systems were failing; at 2.43 one of the plant's four diesel generators failed, leaving the plant with a bare minimum of emergency on-site power supply.

To add to the confusion the PAX telephone system failed at 1.57 pm, making outgoing calls from the control room impossible for several hours. This represented a considerable hardship, because the control room had lost control over most of the plant's valves, and the plant telephone system was being used to instruct equipment operators to manually adjust certain key valves in the condensate booster system pumping water into the reactor core.

The fire-fighting effort was not going well. Soon after the electricians had fled the cable-spreader room, a shift engineer had tried to turn on the built-in Cardox system in order to flood the room with carbon dioxide (CO2) and put out the fire. He discovered that the electricians had purposely disabled the electrical system that initiated the Cardox.

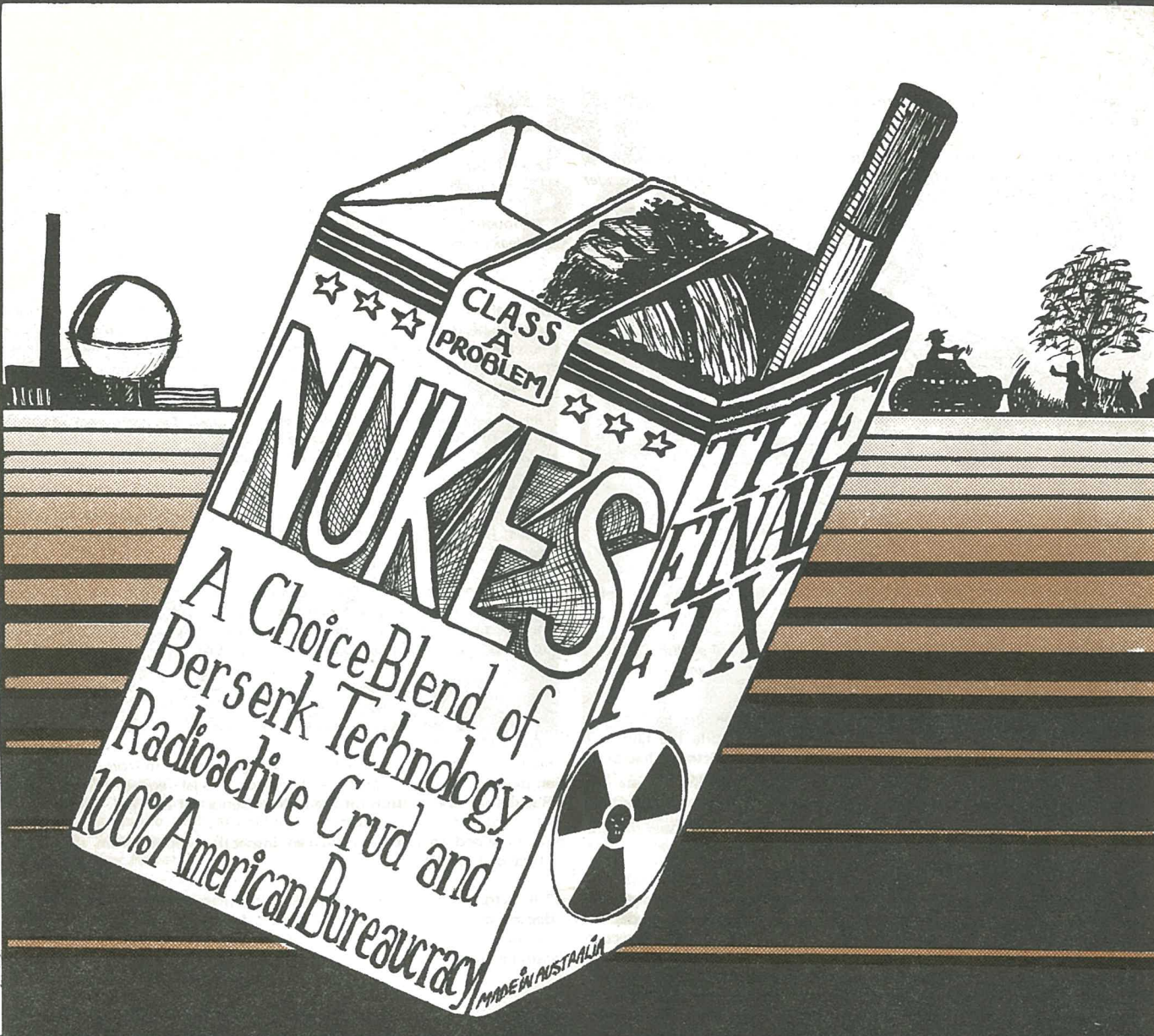
*"I tried to use the manual crank system and discovered that it had a metal construction plate on under the glass and I tried to remove it. This was difficult without a screwdriver.....the next day, I checked other manual cardox initiators and found that almost all of them had these construction plates attached."*

He finally got the power on, but the Cardox system ended up driving smoke up into the control room above the cable spreader room. One person present described the scene in the control room as follows:

*"The control room was filling with thick smoke and fumes. The shift engineer and others were choking and coughing on the smoke. It was obvious the control room would have to be evacuated in a very short time unless ventilation was provided."*

After the carbon dioxide system was turned off, the smoke stopped pouring into the control room. It had not put out the fire in the spreading room, however. A safety officer fighting the fire pointed out,

*"The CO2 in the spreader room may have slowed down the fire but did not put it out. We opened the doors for air, as the smoke in the whole area had become dense and sickening. The neoprene covers on the cables were burning, giving off dense black smoke and sickening fumes.....It was impossible to not swallow some smoke. I got sick several times."*



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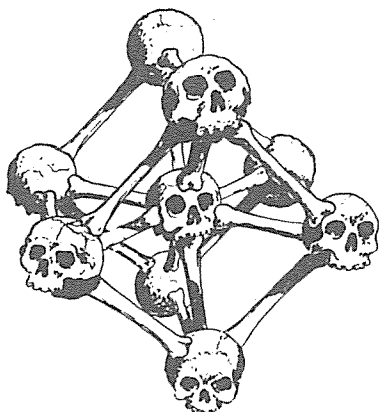
YOUR GOVERNMENT WANTS YOU TO BE AWARE OF THE DANGERS OF SMOKING  
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OF URANIUM MINING. IT'S THE GOVERNMENT'S PRODUCT.



Inoperative equipment also hampered the fire-fighting effort. For example, one assistant shift engineer said,

*"I returned to the spreader room to direct the fire fighting effort. A wheeled dry chemical extinguisher had been brought to the spreader room, but its nozzle was broken off at the bottle."*



The official Nuclear Regulatory Commission report noted other deficiencies:

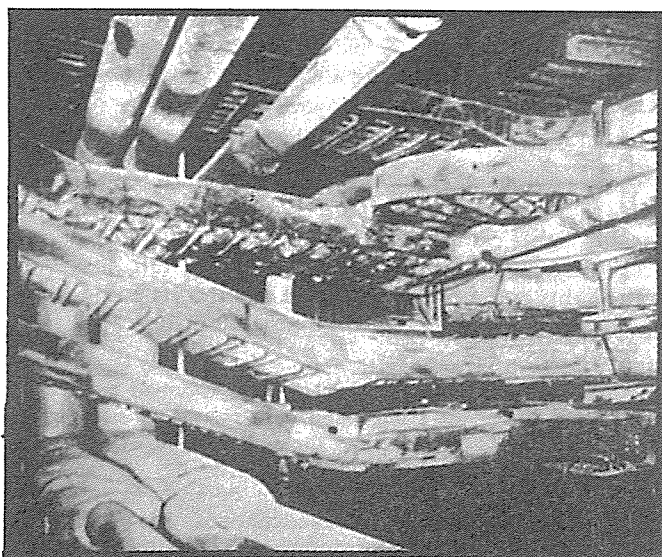
*"Breathing apparatus was in short supply and not all of the Scott air packs were serviceable. Some did not have face masks and others were not fully charged at the time of the start of the fire."*

The electrical cables continued to burn for another six hours, because the fire fighting was carried out by plant employees, despite the fact that professional firemen from the Athens Alabama fire department had been on the scene since 1 30 pm. As the Athens fire chief pointed out.

*"I was aware that my effort was in support of, and under the direction of Browns Ferry plant personnel, but I did recommend, after I saw the fire in the cable spreading room, to put water in it. The Plant Superintendent was not receptive to my ideas."*

*I informed him this was not an electrical fire and that water could and should be used because the CO2 and dry chemical were not proper for this type of fire. The problem was to cool the hot wires to prevent recurring combustion. CO2 and dry chemical were not capable of providing the required cooling. Throughout the afternoon, I continued to recommend the use of water to the Plant Superintendent. He consulted with people over the phone, but apparently was told to continue to use CO2 and dry chemical. Around 6.00 pm., I again suggested the use of water....The Plant Superintendent finally agreed and his men put out the fire in about 20 minutes...."*

With the reactor pressure mounting higher and higher, the relief valves were finally brought back into operation at 9.50 pm., and about 10.20 pm. the reactor was depressurized to the point that the condensate booster pump could again get water into the reactor.



Aftermath: Burned trays carrying cables beneath the control room in the reactor building.

Normal shutdown was established on the Unit 1 reactor at 4.10 am. the next morning, and the nightmare at Browns Ferry was over.

One of the electricians who started the fire said that candles had been used for more than two years, but said,

*"I thought that everybody knew that the material we were using to seal our leaks in penetrations would burn.....I never did like it."*

On Unit 1, however, a new emergency developed. About 6.00pm., control of the last four relief valves was lost, and the reactor pressure increased to above 350 pounds per square inch, making it impossible for the makeshift condensate booster pump system to inject water into the reactor.

The real irony of the Browns Ferry fire was that two days before, a similar fire had started but had been put out successfully. After the fire on Thursday night, the shift engineers and three assistant shift engineers met. According to one of them,

*"We discussed among the group the procedure of using lighted candles to check for air leaks. Our conclusion was that the procedure should be stopped."*

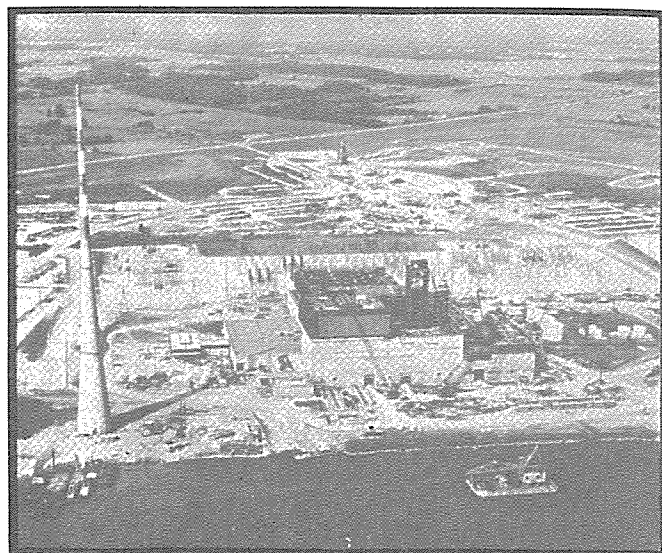
Yet nothing was done. The fire was noted in the plant log, and briefly discussed the next day at the plant management meeting. No one on the management level seemed to consider it a safety problem worth following up. This was the standard operating procedure.

\*\*\*\*\*

\*This article consists of extracts from an eight page booklet published by FOE (USA). The original author of the article, David Cowey, is a leading nuclear critic in the US. After obtaining information from Browns Ferry employees soon after the fire, he made a legal request to the Nuclear Regulatory Commission for the utility's report of the fire.

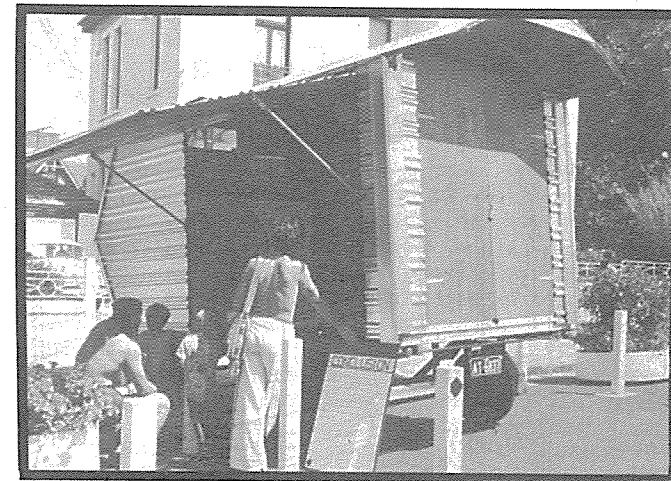
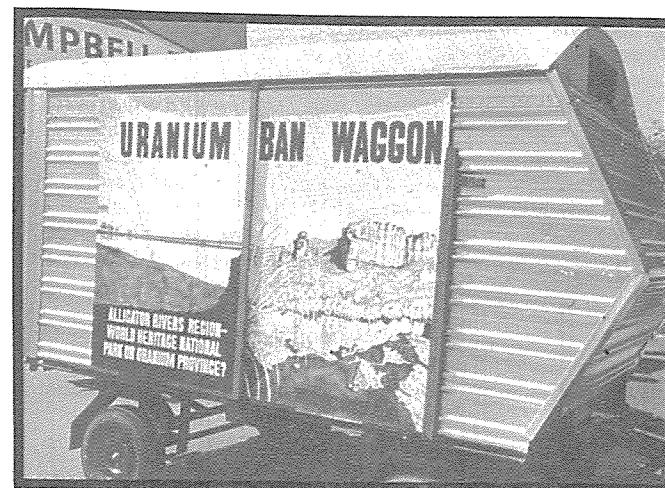
He obtained this report, plus an inspection report from the Atlanta office of the NRC.

The extracts printed above are based on these reports. The full 8 - page document is available from FOE state offices.



Browns Ferry reactor near Athens, Alabama.

# THE URANIUM BAN WAGON



Realizing that important environmental issues get only "spot" coverage in the press FOE Sydney began construction of a mobile display to confront the public with environmental issues on a continuous basis. Thus the "Uranium Ban Wagon" was born as part of the Campaign Against Nuclear Power.

The 12' wagon, donated by Michael Bell, was originally a flat bed farm trailer to which walls and a roof have been added. One exterior wall is covered by a mural of Kakadu National Park painted by Jules Carr and poses the question, "Alligator Rivers Region-world heritage national park or uranium province?" (see pic 1).

The opposite side is fitted with an awning which opens to reveal the interior display (see pic 2). The display depicts each stage of the nuclear fuel cycle and its hazards. Pictures from Rum Jungle, cartoons, and graphics add interests and the display ends with an anti-uranium petition that the public can sign.

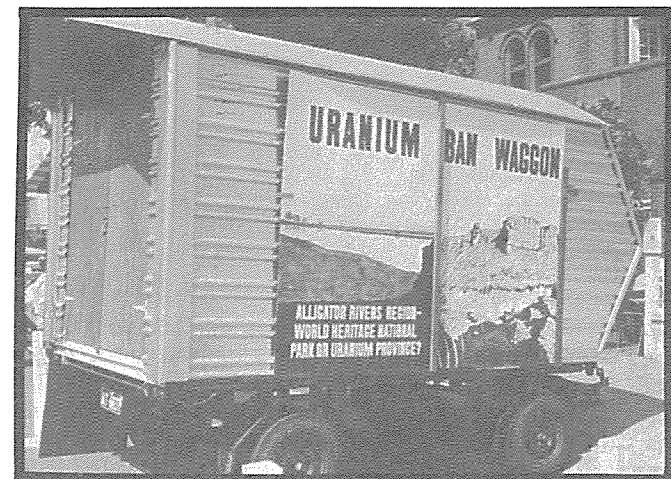
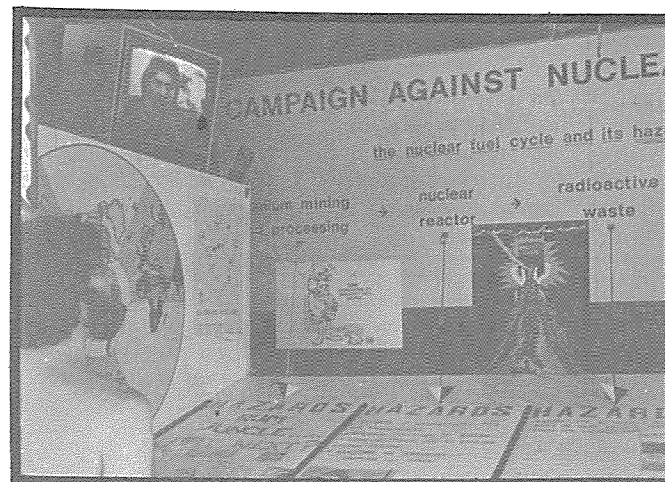
Also included is a world map showing the current status of the Nuclear Non-proliferation Treaty and a video tape system. The latter is to be converted to a 12v system so exterior power can be dispensed with, and, with a bit of skill, this system can be recharged using wind energy. (A bicycle - windmill is now operating on top of the ban - wagon - ed.)

In stating the case against nuclear power, it is necessary to show alternative power sources. This is because the most often asked question by those viewing the display is "... but what's the alternative?" To answer this in part, we have a solar cooker display and several diagrams of a wind energy source proposed by Sydney inventor Darcy Pulbrook. In addition several students from Randwick Technical College have expressed an interest in exhibiting their solar cookers in conjunction with our display.

For those who want more information about alternative energy, we keep a folder on the latest information in this field with the wagon. This, plus a stock of FOE and ACF publications, makes the "Ban Wagon" an energy information source on wheels.

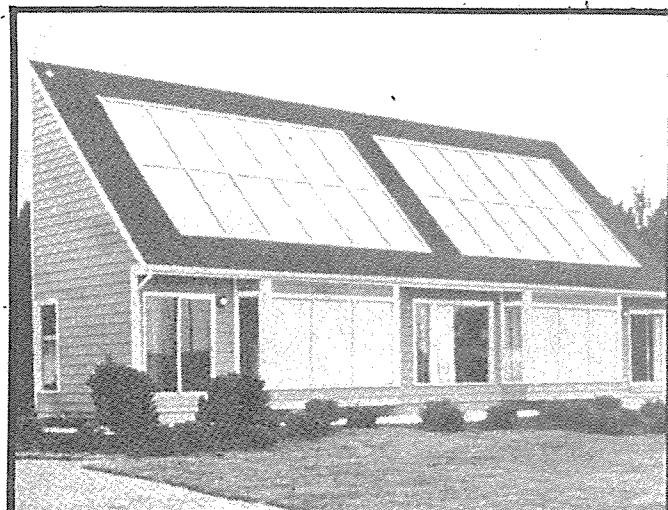
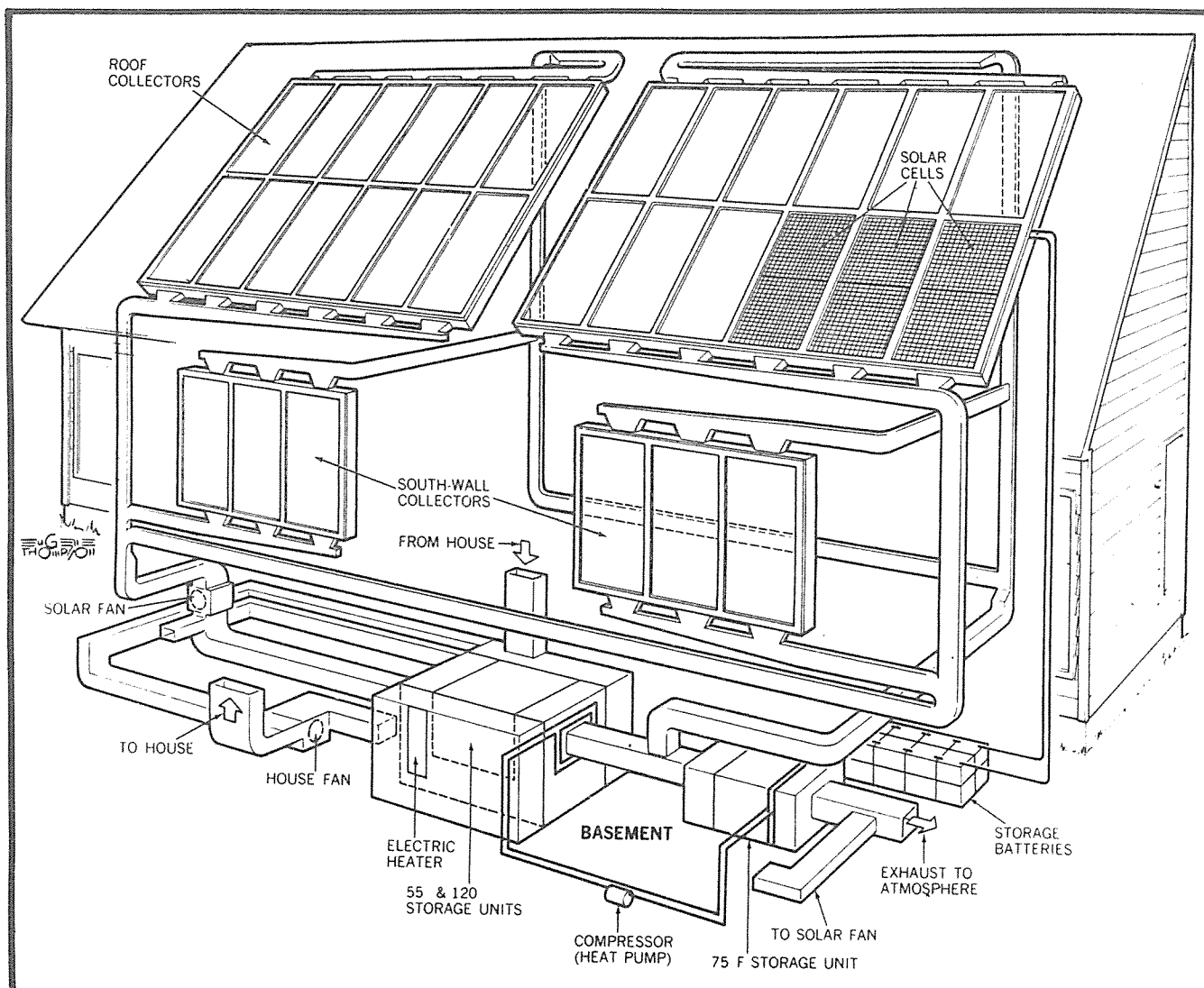
Since its completion in late November, the wagon has been to Paddington Town Hall several beaches, a shopping centre, and other prominent spots. It has led to many useful contacts with interested people, has increased FOE's membership, and led to a 100 dollar donation. Judging from the response, taking the environment to the people has been a great success.

Herb Fenn  
FOE, Sydney





# SOLAR CELLS



Solar One house at the University of Delaware 'harvests' sunlight into both heat and electricity. The house will obtain 80 per cent of its energy needs from the sun. The 45 degree roof has 24 solar-collector panels; six additional panels are on the south wall. Three roof panels are covered with cadmium-sulphide (CdS) solar cells. A small proportion of sunlight striking the cells is converted into DC electricity, charging an 18-kw-hr. battery system for lighting and resistivetype appliances.

The cells are wired to put out 110 volts DC. An inverter, which converts DC to AC, is planned for motor-driven appliances. Solar One is also tied into the utility network for auxiliary power and backup during extended cloudy weather. About 45 per cent of the sunlight striking the cells is converted into heat energy. Heat is collected by air circulated beneath the cells and other dark solar panels. The hot air passes through duct-work into a compact basement-storage system using eutectic-salt bins. As these salts melt, they store the heat for later use. A heat pump can aid the heating cycle. The pump also collects cool air at night, further chilling it to freeze another salt for the air-conditioning system. An automatic control system determines when the heat pump is needed to supplement heat coolness from the salt bins.

As research into direct conversion of the sun's energy to electrical energy continues, the prospects for Solar cells become more and more promising. With a small fraction of the investment required for a nuclear powered society, development of solar cells is leaping ahead, with order-of-magnitude cost-decreases predicted over the next couple of decades, as cell units go into mass production. The potential for more environmentally harmless and inexpensive solar cells than the present cadmium based ones is enormous. . . . As with the other "soft" energy technologies, their development is dependant on a change of priorities. We must aim for a technology which supports a simple self-sufficient, diverse and decentralised society.

# RIDE AGAINST URANIUM

"Under no circumstances would I act to establish an atomic reactor plant in Australia when the state of atomic technology has no answer to the radioactive wastes from spent reactor fuel."

This statement by the former Minister for Minerals and Energy, Mr. R.F.X. Connor (June 4, 1974) was reason enough for 250 bike riders from Sydney, Melbourne, Adelaide and Canberra, to ride on Parliament House, Canberra, last year. (See *Chain Reaction*, Sept, 1975. Vol. 1. No. 3.)

The Federal Government's policy on uranium mining this year is at least as bad as that of last year's government(s). Under the Fraser government Mr Anthony, the present Minister for Minerals and Energy, is moving to satisfy mining and export contracts with foreign companies, whilst dropping government controls and attempting to avoid government responsibility in the matter.

The "Ranger" Inquiry, commissioned by the former Labour Government to assess the impact to the environment of uranium mining, is expected to present its report to the cabinet around July/August.

## WHOSE DECISION?

No matter what the Inquiry reports, the "national interest" escape clause of the Environmental Impact of Proposals Act can be used by the Fraser Government to override the Inquiry's recommendations. The final decision should be made with the understanding and active participation of the whole Australian population.

In order to cast light upon the serious nature of such decision making, bicycle riders from Sydney, Melbourne and Brisbane will be riding on Canberra in a national protest against uranium

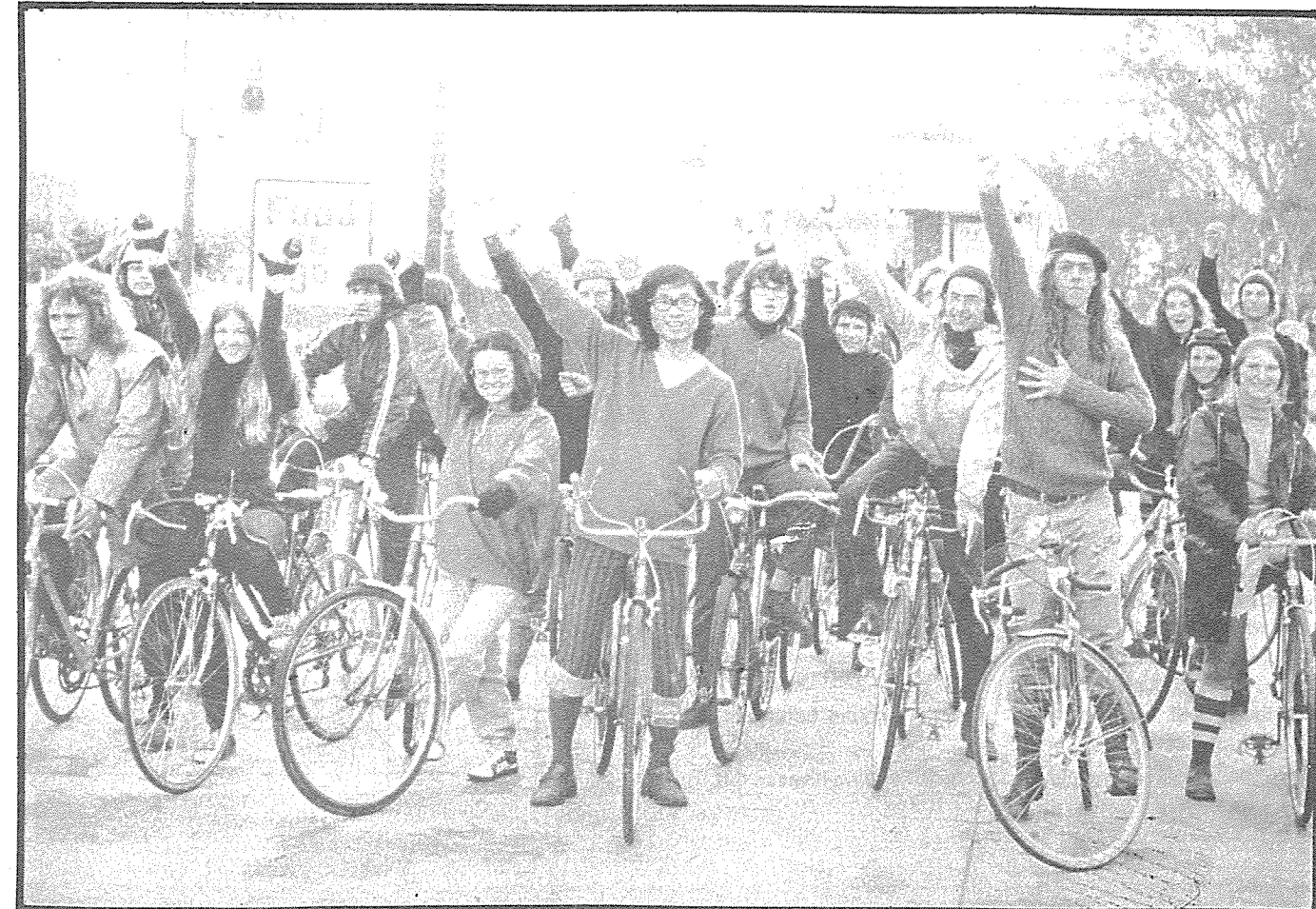
mining during the May Uni./school holidays this year. Anyone with a bike can take part by riding all or some of the way (joining us anywhere along the route by train or private car) or just by making it to Canberra for May 18.

The Bike Riders will be setting up camp on the lawns opposite Parliament and displays, stalls and demonstrations of alternative energies are planned; any contributions to these displays will be really helpful. Of course, the bicycle themselves will provide the main demonstration — a rolling theatre on wheels, a "human event" worthy of national press coverage, and for those participating, a reaffirmation of the potential inherent in human beings to provide for themselves in this technological age.

Last year's bike ride was a great success. Our demonstration drew a great deal of media coverage on both a national scale and in the towns through which we passed. The attention of the Australian public was drawn to the issue of Uranium mining, and riders were generally met with sympathy for our cause and respect for our efforts.

The Ride, as a physical endeavour, at least from Melbourne and Sydney, will present no great obstacle to the determined healthy person. If you have the use of a geared bicycle, and can gain a little practice between now and May, you should easily accomplish the few hours each day which we will spend pedalling down the road. People found that any soreness vanished by the third day last year, and when we arrived in Canberra, everyone was much fitter, a bonus for the holidays!

We hope that May 1976 will see many more people coming together to provide the vital human energy needed for us to move on Canberra en masse. We are certain the '76 ride will prove to be a great experience and a most worthwhile way to spend the holidays. See you in Canberra in May!





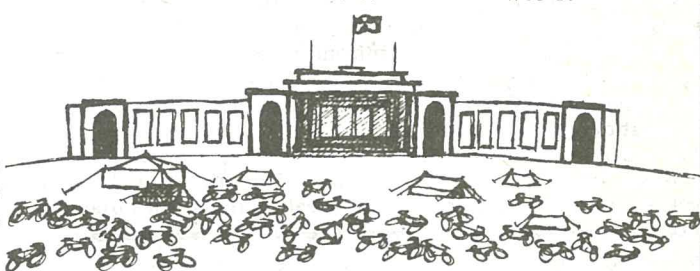
## SYDNEY

The Hume Highway between Albury and Yass is to be

Phone: 660 0227

	TOWN	DATE — MAY	Miles/Km		TOWN	DATE — MAY	Miles/Km
<input type="checkbox"/>	Melbourne	Sat. 8th	60km (37miles)	<input type="checkbox"/>	Circular Quay	11 a.m.	Sat 8 May
<input type="checkbox"/>	Kilmore	Sun. 9th	38km (24 miles)	<input type="checkbox"/>	Lucas Heights	Vigil for one day	Sun 9
<input type="checkbox"/>	Seymour	Mon. 10th	97km (64 miles)	<input type="checkbox"/>	Lucas Heights	10 a.m.	Mon 10
<input type="checkbox"/>	Benalla	Tues. 11th	40km (25 miles)	<input type="checkbox"/>	Wollongong	Rest day	Tues 11
<input type="checkbox"/>	Wangaratta	Wed. 12th	72km (44 miles)	<input type="checkbox"/>	Wollongong	10 a.m.	Wed 12
<input type="checkbox"/>	Albury	Thurs. 13th	53km (32 miles)	<input type="checkbox"/>	Moss Vale	Rest day	Thurs 13
<input type="checkbox"/>	Rest Day	Fri. 14th		<input type="checkbox"/>	Moss Vale	10 a.m.	Fri 14
<input type="checkbox"/>	Culcairn	Sat. 15th	80km (50 miles)	<input type="checkbox"/>	Goulbourn	1 p.m.	Sat 15
<input type="checkbox"/>	Wagga Wagga	Sun. 16th	93km (58 miles)	<input type="checkbox"/>	Gunning	12 Noon	Sun 16
<input type="checkbox"/>	Cootamundra	Mon. 17th	107km (66 miles)	<input type="checkbox"/>	Yass	Rest	Mon 17
<input type="checkbox"/>	Yass	Tues. 18th	61km (38 miles)	<input type="checkbox"/>	Yass	9 a.m.	Tue 18
<input type="checkbox"/>	Canberra	Wed. 19th		<input type="checkbox"/>	Canberra	Protest	Wed 19

The Ride will be close to the railway line all the way to Yass, to facilitate transport to and fro for people joining the Ride for a few days only, or over the weekend. Group bookings for riders and their bikes will be arranged for the return from Canberra, by train via Queanbeyan, on May 19.



## SPONSORSHIP FORM

**COOKING?** **VEHICLES?**

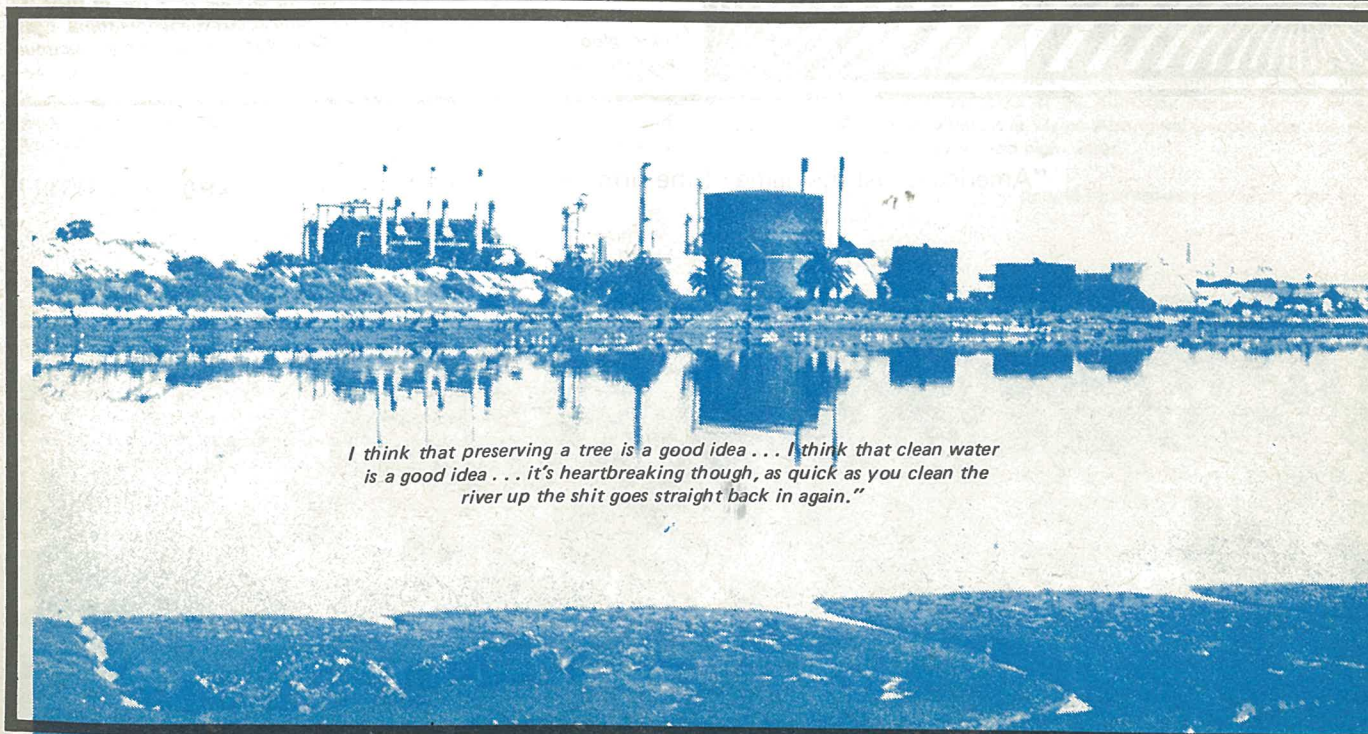
All contributions by sponsors are tax deductible if made out to: the AUSTRALIAN CONSERVATION FOUNDATION, specifying that you are making a donation to F.O.E's Uranium Defence Fund.

All riders can obtain as many sponsors as they can, the miles they ride being checked off each day, so that we can make a substantial contribution towards activities aimed at publicising and ultimately stopping Uranium mining in Australia.

[illegible]

He entered quietly . . .

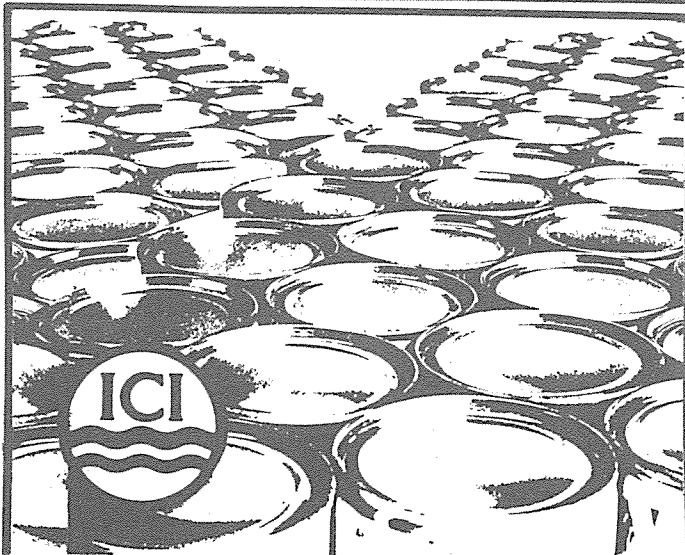
*"We live on a finite globe and we are becoming infinite. The globe will not take it all the time. There's no stopping us, there's no plan to stop the overwhelming, small groups here and there, chaps making up statistics, government statistics. When I investigate government statistics, it's all crap."*



*I think that preserving a tree is a good idea . . . I think that clean water is a good idea . . . it's heartbreaking though, as quick as you clean the river up the shit goes straight back in again."*



"Communications become more complex as more people become involved. I mean, the more people you have, the more complex it is to deal with them. We can be pushed into tube trains like sardines, walk down the street, people clang at you and don't say a word . . . nothing! Touch their car, they leap out, hey car, touch the car, there's no feeling in it. They leap out at you and look at their bumper and all that . . . but they bang into each other in the street non-stop."



"They're not going to disappear though, they're going to take us with them. We're locked up in the firm. I tried to stop buying ICI products but there's so many that it would take me a whole day with a list to stand in front of a tin of beans to find out that their brand name is one of ICI's products."



"America is just the name of the firm, not the nation."

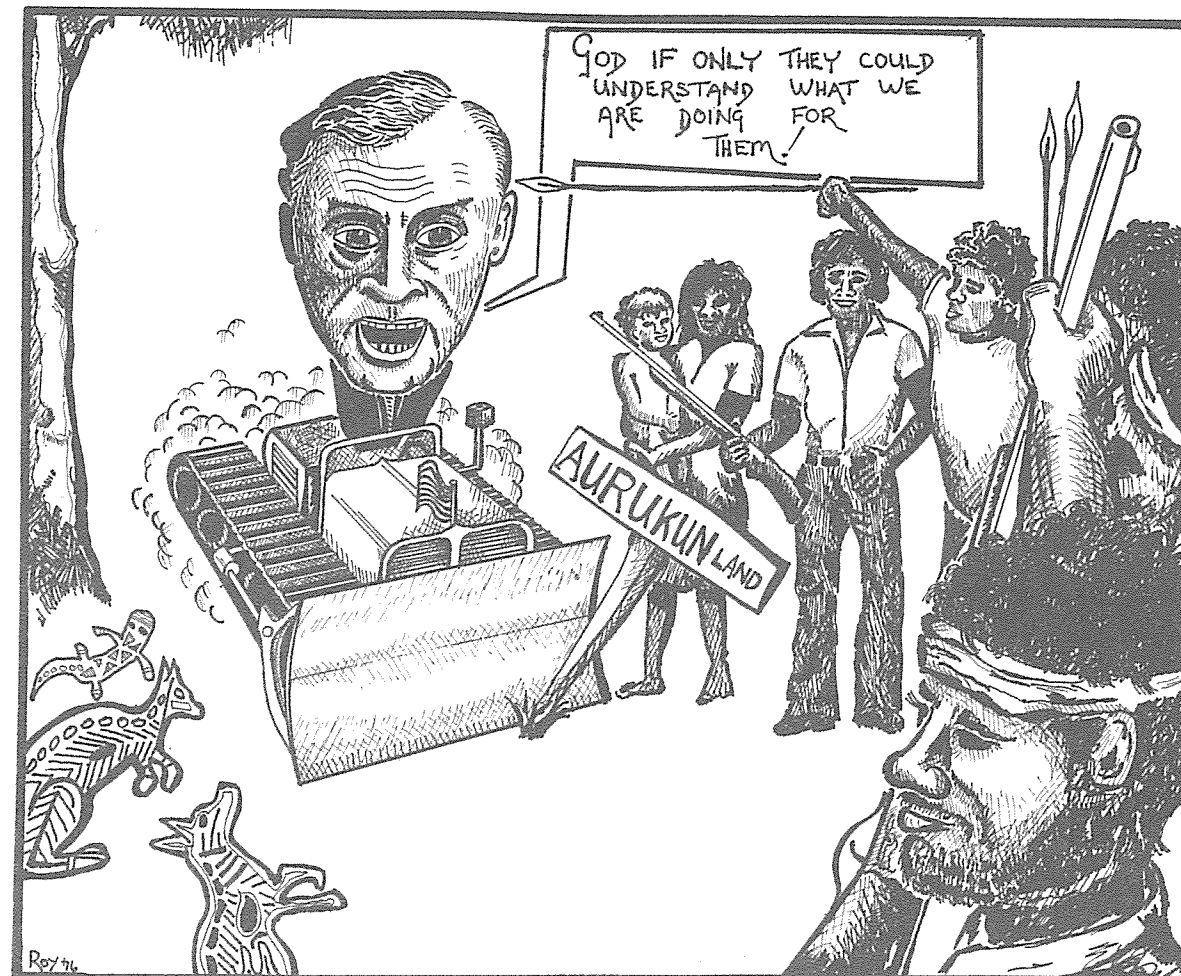
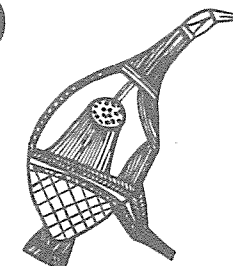
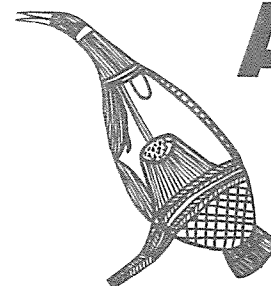


"People can gradually get indoctrinated. Children being born into small rooms believe that that's the size of the room. So it's possible for the big boys, the firm, to keep pumping as much as they like into the system, keep changing the pattern and people accept it because people are easily managed. But bit by bit it's eroding the space that they live in, their quality of living and it depends on how long they can stand it before they start tearing each other to pieces . . . like when you experiment with mice in a cage."



"If you're going to survive under the firm then you have to buy their products and you need bread to buy their products. If you want to get out of it you really have to go far out and this means that you have to cut yourself off completely. So I go along with the firm, I buy their products but I disagree with it, I'd like to change it, I try to fight it, but it's very, very hard. I get very depressed about the whole thing. I get black gloom. But I'd rather have black gloom than empty, vacuous laughter over a glass of beer."

# AURUKUN LAND NO MINING KEEP OUT!



## THE AURUKUN BAUXITE SWINDLE

The east side of Cape York Peninsula contains some of the largest deposits of high grade bauxite in the World. Since early this century, the area has also been a reserve "for the benefit of the Aboriginal inhabitants of the state".

### A LITTLE HISTORY

The European invaders of Australia came late to Cape York Peninsula. About 90 years ago the missionaries came to Mapoon, then to Weipa further south, and then to Aurukun, further south again. The missionaries encouraged the Aboriginal people to settle and then acting under the racist and repressive Queensland Laws, proceeded fairly systematically to try to destroy their culture and independence.

The missions were fairly isolated. Though under white law none of the Cape York Land was owned by the Aboriginal people, it was at least reserved for them and their use (subject to the powers of the white mission staff and government administrators!).

This wasn't to remain the case. As elsewhere in Australia (and overseas) the land remained reserved for aboriginal inhabitants only as long as the white invaders didn't want it. In the 1950's, Cape York became desirable because of the discovery of bauxite. The Aboriginals stood in the way.

Shifting them was not easy. Comalco and Alcan were granted huge mining leases, and acting together with a reluctant(?) church and an enthusiastic(!) Queensland government, mounted a combination of persuasion, harassment and force to move the people. At Mapoon, the

community resisted several proposed moves; however, in 1963, the remaining families were removed at gunpoint by police. Many were shifted to Weipa South, where the Weipa Aboriginal people now live in a tiny reserve of three hundred and eight acres.

Neither the Mapoon, or the Weipa people received any compensation for their land.

### THE AURUKUN MOVES

Although the land around Aurukun has been under a prospecting lease since before 1968, mining has always appeared to be a long way off. At the Presbyterian mission settlement, there is a very strong community of some 700 people. It has a living and independent culture - the people speak their own languages, keep their own laws, know their own land and story-places, fish and hunt and gather food as they need it.

On 21st November - ten days after the Fraser 'caretaker' government was appointed - it was announced that a mining lease would be granted for the land around Aurukun. The legislation was rushed through State Parliament in early December.

The Aurukun people were taken completely by surprise. The decision to grant the lease was a well-kept secret: the church authorities, and the Australian government officials were also in the dark. The move was clearly a piece of cynical opportunism, designed to avoid public criticism of the proposal.







# FOE MARKET

## POSITION VACANT: CALICO

Information officer, central arnhem land information communication office, (calico), camp concern. The current trend is toward an emphasis on "soft technology" manuals that are regional (30,000 square kilometers) in scope, research, documentation and sorting that may lead to calendar or almanac style files that would serve as a basis for a publications program through 79/81, or about that time.

Energy is available to build an adequate building, it should be together May to August 1976.

In the short term the community can provide "equity in misfortune" in the economic field. An adequate living. The applicant will have to seek economic self sufficiency through gardening, production of staple food crops is expected to settle down so as to provide a measure of security, about March 77.

An unusual opportunity to "get in on the ground floor" in a freewheeling new venture that is unlimited in scope, personal in scale, and is based in a stimulating wilderness environment.

Good one for a team of 2 or 3 people who already have some ideas to try out, and a good learning space for a dude.

Applications should be addressed to: CALICO, C/- N.T. Environment Centre, P.O. Box 2120, Darwin, N.T.

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## POSITION VACANT: C.R.A.C.

The community research and action (C.R.A.C.) at Monash University requires a co-ordinator, with a broad knowledge of social and environmental issues, who will act as:

- Motivator for student research
- An activist to organize and implement student action
- A medium of communication with groups and individuals within the community.
- Guardian of the Resources library.

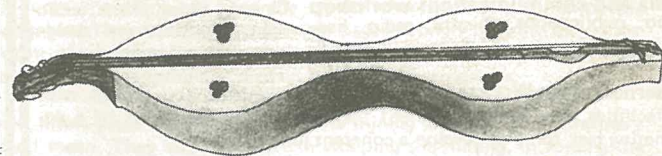
The terms of the appointment will be for one year, full time. Hours will be flexible. Salary: \$7,454 P.A.

Closing date for applications: around mid-March (early applications will be appreciated).

For further information contact Mrs. M. Taylor, phone: 541 0811, ext. 3100

## HANDCRAFTED DULCIMERS — FOR SALE!

The Dulcimer is a stringed instrument in the zither family. Its present form is derived from a medieval Scandinavian instrument: the Langeliech. It has been played in the Appalachian mountains in Kentucky since the very early days of European settlement. In recent years, it has experienced a new wave of popularity in western countries.



Unlike the guitar, which is fretted chromatically, the dulcimer is fretted in the centuries old modal form. It can be used to play a wide variety of music; equally it can be played with a variety of other instruments including the guitar, sitar and flute. It is one of the easiest instruments to play, especially in a free-form way.

FOE Melbourne has recently arranged with Morgan Mackay, a well-known maker of handcrafted dulcimers, that FOE acts as a retail outlet for his wares. We are doing this primarily to improve our finances - but we are sure that its the type of product for what Illich calls a convivial society.

The price is \$50.00. (Buyers from other capitals must add on an allowance for packaging and freight: Sydney \$5; Adelaide \$4.50; Brisbane \$5.50 and Perth \$6.20).

## RUBBER STAMPS AVAILABLE



These two attractive rubber stamps are now available from FOE for use on stationery. Price \$1.80 each. Contact FOE offices for further information.

The Chain-Reaction Staff know that Penny Farthing's don't have ball bearing! But, there are still plenty of other things to write in about.



# PUBLICATIONS

## EARTH'S WILD PLACES

### MICRONESIA: Island Wilderness

By Kenneth Brower, Photographs and introductions by Robert Wenkam. Prefatory statements by David R. Brower and Raymond F. Dasmann.

To Walter Hickel's plea for Micronesians, Henry Kissinger replied: "There are only 90,000 people out there. Who gives a damn?"

There are now 110,000 people, living on 90 of the 2,203 islands of Micronesia who give a damn. Their total area is less than that of Rhode Island scattered over a vast three million square miles of Pacific. Some islands can sustain only a single family, or an occasional copra-harvesting party. The rest of the islands are wilderness. With few exceptions, even the inhabited islands are wild, for the traditional life is not the kind that makes land tame.

Kenneth Brower writes: "It has been decided, apparently . . . that the success of millenia is of no account and the island cultures that passed on, through all those successive generations, the living reefs and their various and variegated fishes, and the green, fecund jungles, and the flawless beaches painfully white in the sun, must now give way to a civilization that can't pass a thing on intact, and has never learned to live harmoniously with anything."

To give a feeling for the place, for its people, and for the kind of help they need and don't need, Robert Wenkam and Kenneth Brower have collaborated for the third time, and have done so magnificently.

Micronesians cannot defend themselves against the great powers who now seek to make the island of Micronesia something else and something less. It is the powers themselves who must learn what the unique island beauty means to the eye and ear, and to the conscience.

This book tries to give them that chance. May it succeed!

160 pages, 64 endpapers in colour \$27.00 (members \$22.00)

### GAULE, the Golden Coast of Georgia

Photographs by James Valentine and John Earl. Edited by Kenneth Brower, selecting from the writings of Robert Hanie, William Bartram, Rachel Carson, John McPhee, John and Mildred Teal, and others. Introduction by Eugene Odom and John P. Milton. Foreword by David R. Brower.

Cumberland Island, is one of the well-known islands of Georgia's golden coast. Writing about the development-versus-park battle for Cumberland, in *Encounters with the Archdruid*, John McPhee said: "... there could be human winners here or there, but no matter what might happen, there could be no victory for Cumberland Island. No one will ever be as free on that wild beach in the future as we had been that day."

To stay or reverse such change, we publish *Gaule, the Golden Coast of Georgia*. The region belongs in the World Heritage, Russell Train's concept, encompassing scenic resources of importance to the world as a whole, such as the Grand Canyon, the red-woods, and the Serengeti —

SYDNEY  
C/- N.S.W. Environment Centre,  
263B The Broadway  
BROADWAY  
N.S.W. 2007 Phone (02) 660-0227

AUSTRALIAN CAPITAL TERRITORY  
P.O. Box 1633  
Canberra City, A.C.T. 2601  
or Phone (062) 47-3064

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P.O. Box 25  
Warrawong, 2502

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Carlton,  
Victoria 3053 Phone: (03) 347-6630

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## THE EARTH AND WHY IT NEEDS YOU FOR A FRIEND

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and cultures, monuments, and ecological uniqueness.

In what is certainly one of the most beautiful of books about any coast, the photographs, authors, and editors have joined to let the world know this piece of coast, unique in all the world. They bring a new understanding of the living landscape. They put us there, and celebrate its beauty.

144 pages, 64 and endpapers in color, \$27.00 (members \$22.00)

### ERYRI, The Mountains of Longing

By Amory B. Lovins

With photographs by Philip Evans

"The assault is two-pronged in thin most eloquent plea. It is a spectacular appeal to the senses through the superb colour plates of Snowdonia, largely but not exclusively the work of Philip Evans, accompanied by quotations and verses. . . The photographs have a rare subtlety, catching the Welsh moods with great precision of light and colour. Evocative and unusual, they eclipse what the authors admit is a very small ration of the Park's beauty — but they do it convincingly.

The second prong of the attack is a most cogent appeal to reason, the writing throughout is solid and to the point. It entertains and convinces; it embodies with and Welsh humour; it bears all the signs of careful research. In a very few pages, Lovins summarizes the special appeal and characteristics of Snowdonia, what National Parks ought to mean, why this particular one has failed."

New Scientist

178 pages, 64 in color, \$27.00 (members \$22.00)

### EARTH AND THE GREAT WEATHER:

The Brooks Range

By Kenneth Brower

The Brooks Range is the northernmost mountain range in the United States, and the North Slope tundra the northernmost plains. These ultimate provinces are the last great wilderness in the nation, a wilderness of endless distances and infinite detail. "Kenneth Brower describes vividly his summer explorations of the fantastically beautiful Brooks Range where oil today poses the threat of ecological disaster. Texts and photographs (64 plates in full color of superior fidelity) are skillfully orchestrated, with occasional marginal drawings, a relevant map or two, end-papers and very striking jackets."

— Publishers Weekly

188 pages, 64 in color \$29.00 (members \$24.00)

### MAUI: The Last Hawaiian Place

By Robert Wenkam.

Introduction by Charles Lindbergh.

Edited, with Kipahulu sketches,

by Kenneth Brower

A counterpoint of photographs and words portraying the last refuge of



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