The Anti Nuclear & Safe Energy Journal

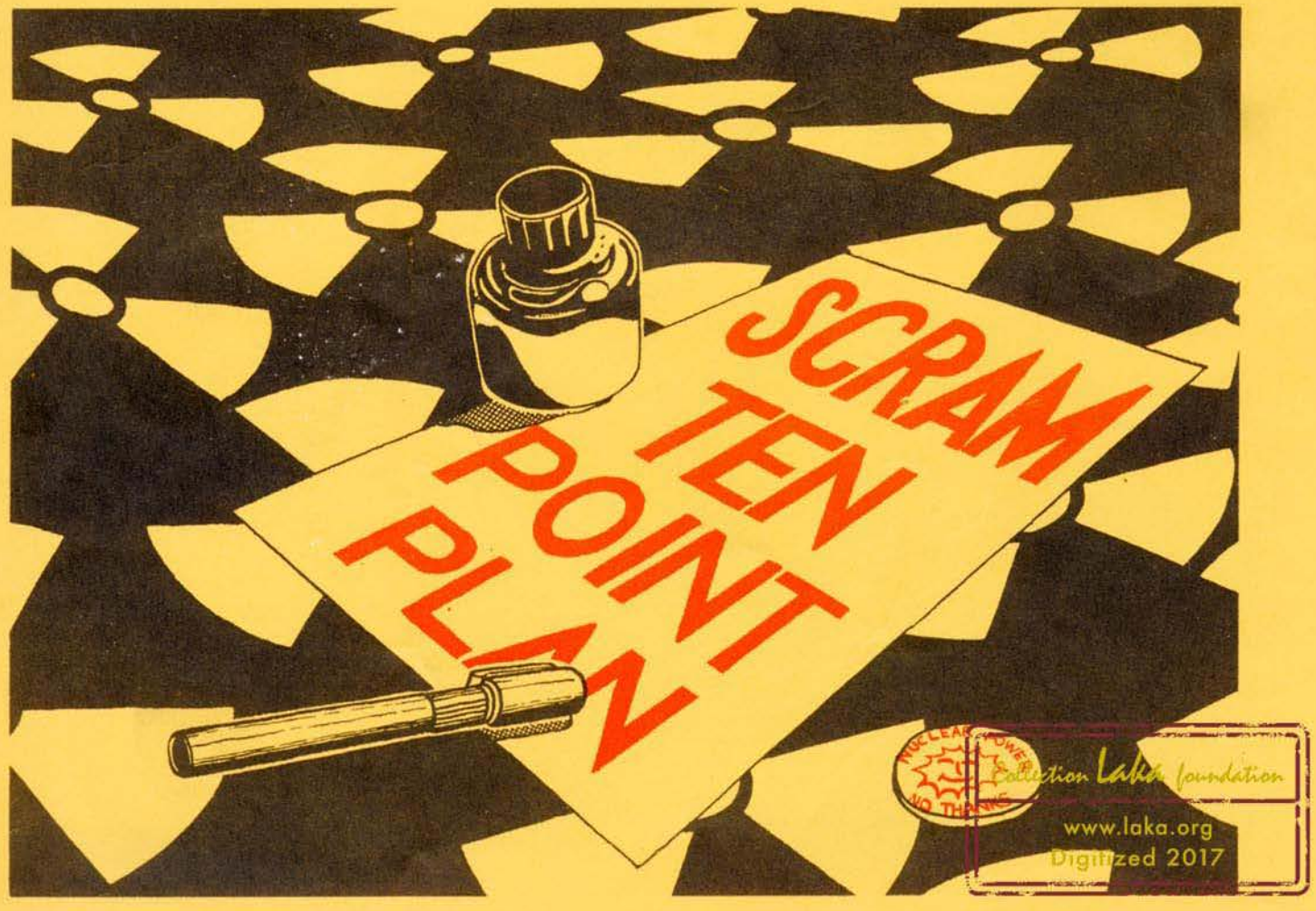
SCRAM

NUCLEAR POWER? NO THANKS

54

50p

STOP TORNESS



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Comment

The 29 March editorial in the 'Economist' argued that while the oil glut lasts, there should be heavy investment in nuclear power: "the time to repair the roof is when the sun is shining". On the 26 April the nuclear roof was blown away when Chernobyl exploded the myth of "safe" nuclear energy. Far from "getting stronger every day", the case for nuclear power has been unequivocally refuted. Even the 'Economist' can change its mind: the 24 May editorial declared that we are not so dependent on nuclear power that "a decision to abandon it would cripple civilisation"; the price of doing without it is not unbearable.

Opinion polls throughout Europe show that the people have rejected nuclear power. The politicians are following suit: it will win no votes. Governments from the Phillipines to Sweden are halting their nuclear programmes: they will have a head start in the race for a clean earth. Commitment to nuclear power is no longer symbolic of a nations prowess, it merely serves to expose a complacent allegiance to a barren utopia.

In Europe only two Governments have stayed faithful to the Nuclear god: France and the UK. These are the only two countries with an "independent" nuclear weapons capability. Spain maintains that it is cheaper to stop construction until the plant is needed, than it is to complete and operate a plant below optimum load factor; Austria is dismantling its Zwentendorf reactor; Holland has shelved its expansion plans; and in West Germany an extensive period of navel contemplation is in progress, with the possbility that a new government could scrap much of the planned expansion.

Yet the UK proceeds, as if in a vacuum, with Torness and Heysham; with THORP; with the public inquiry at Dounreay; and with the imminent ordering of Sizewell B. "The Way Forward" (centre pages) gives SCRAM's ten point plan for the way forward for a safe energy future: the abandonment of all the current projects must take the highest priority. The Stop Torness campaign could inflict sufficient delay to hold up commissioning untill the next election; Dounreay may yet fall at the final hurdle because of the collapse of European collaboration; all the opposition parties have said that they will not commision Sizewell.

Together we can halt the nuclear madness.

STOP TORNESS!

A concerted campaign calling for the halt of the South of Scotland Electricity Board's (SSEB) Torness nuclear power station has developed since the Chernobyl disaster. It has been joined by the Lothian Regional Council, the four District Councils within Lothian Region, the Scottish Area National Union of Mineworkers (NUM) and the Edinburgh Evening News. STEVE MARTIN outlines the campaign.

The campaign was initiated by a group of anti-nuclear activists in Edinburgh who approached the Lothian Regional Council with information on the imminent commisioning of Torness. This followed a local meeting in Dunbar, attended by about 150 people, which passed a unanimous vote of "no confidence" in the SSEB, who refused to turn up.

The NUM called a press briefing, with representatives from the environmental groups and all the political parties (bar the Tories), which called for work on Torness to be halted and a study to be started to look at the viability of converting the plant to coal-firing.

Lothian Region also hosted a press conference with the other councils, which called for the construction to be halted. They instructed the Regional Solicitor to pursue legal methods to delay the plant's commissioning.

PUBLIC OPPOSITION

The Regional and East Lothian District Councils organised a public meeting in Dunbar which attracted 400 people. Unions and opposition groups were on the panel as well as council members.

The most significant contributor to the debate was Dr Preston, the Deputy Chair of the SSEB. This represented the first opportunity in many years for the public to hear both sides of the Torness debate at one meeting, because the Board had consistently refused to share a platform with opposition groups.

The third component of the Stop Torness campaign is the Edinburgh Evening News. On Friday 30 May the paper ran a one page editorial entitled "Put the brakes on Torness NOW". Two weeks later it published an opinion poll with a front page headline which screamed "YOU answer the nuclear question ... NO!" Of the people in Edinburgh and East Lothian questioned, 70% did not want the plant to go ahead (only 2% were undecided). The following week the views of ten MPs in the area were published: SEVEN of them are backing the campaign.

The opposition to Torness is on three levels: need, safety and cost. The need argument can be clearly demolished by examining the SSEB's own Annual Reports.

NOT NEEDED

At the Torness Public Inquiry in 1974 Mr Tombs, then the Chair of the SSEB, claimed that to fulfil future electricity demand "we would need five large new power stations to be either in operation or under construction by 1990 and with a further five or six power stations by the year 2000."

Demand was expected to double by 1985 and treble by 1995. However, the total number of units delivered to the system in 1985/6 was 20,865 million compared with 19,220 million in 1973/4. This represents an increase of only 8.5%.

During this period the installed capacity in Scotland increased from 6,113MW to 7,940MW, a rise of about 30%. If more evidence were required one only needs to look at the point of greatest demand on the system. On 7 January 1986 this figure was 4,536MW; the overcapacity on that day (surplus plant) was 75%; if Torness had been commissioned the figure would have been 104%.

NOT SAFE

The safety or otherwise of the plant has received much attention in the wake of Chernobyl, and the main focus has been the emergency plan. So far only a "draft" plan has been produced.

In a reply to SCRAM, a Deputy Chief Inspector at the Nuclear Installations Inspectorate wrote: "Although full details of the emergency arrangements have not yet been submitted to the NII, we expect that the detailed plans will extend to at least 1km from the station." After Chernobyl at least 100,000 people were evacuated from Kiev, a city some 80km from the station.

The Lothian and Borders Police and Fire Boards are particularly concerned about the minimal public protection which the plan provides. The Fire Brigade are also worried that they don't have the facilities for dealing with a Chernobyl-type fire.

A 1980 study by the Political Ecology Research Group indicated that a catastrophic accident at Torness could cause over 300 early deaths and 25,600 fatal cancers within 30 years; and four million people from Edinburgh and Glasgow may have to be evacuated. Since Chernobyl the authors of the report have said that the original figures may be underestimated.

NOT CHEAP

Torness has cost about £1,500m to build and will employ 600 full time staff. It has been estimated that about 2500 miners' jobs could go, together with another 1500 jobs in the service sector, if Torness comes on stream. There will also be job losses at Cockenzie coal-fired power station which may have to close because of overcapacity on the system.

Quite clearly Torness nuclear power station is not the cheapest way to generate electricity when one takes all of these factors into consideration, before one even looks at actual generating, waste management, and decommissioning costs.

There is a simple answer: STOP TORNESS NOW before we take an irrevocable step down the road to a nuclear wasteland.

PICTURE BY JOHN REIACH

The subject of leukaemia clusters around nuclear establishments is a controversial one. The nuclear industry claims that many of the alleged clusters have not been proven and, even if they are, that they can be put down to chance as can similar clusters distant from nuclear sites. They claim that radiation levels around the nuclear establishments concerned are so low that even if the clusters do exist, radiation could not be the cause. Such an attitude is disgracefully irresponsible.

It is known that radiation causes leukaemia. Indeed, for some leukaemias radiation is the only known cause. Radiation also causes other cancers; in a world where the environment is becoming increasingly threatened by radioactive pollution both from military and civil (ab)uses of nuclear power, it is vital that we try to establish the true effect of low levels of exposure to nuclear fission products.

About 1 in 4 of the population will develop cancer of some form or other. If some environmental agent is going to cause an increase in cancer rates large enough to be detected, then thousands, even tens of thousands of people would have to die before the link was established. This is why leukaemia clusters are so significant. Leukaemia is rare, so a handful of cases above the normal levels is detectable and can act as a warning to us. Of course, the vagaries of chance mean that perhaps no significance should be attached if there are occasional clusters here and there but, when a number of clusters have a common link then alarm bells should start ringing.

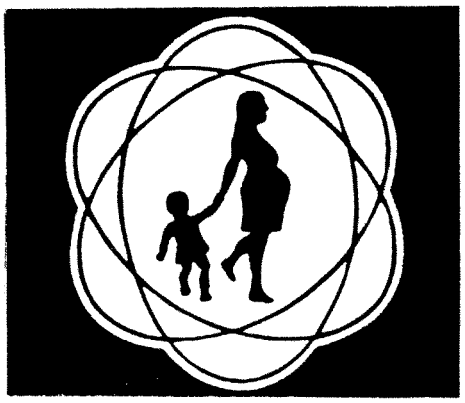
It is now clear that a common link has been established. Clusters of leukaemia have been found around a variety of nuclear establishments; both military, as at Aldermaston, Burghfield and Rosyth, and civil, as at Sizewell and Dounreay, not forgetting, of course, the notorious cluster around Sellafield. Further confirmatory evidence has recently been provided by a Scottish Office study.This shows that not only is the leukaemia cluster around Dounreay "extremely unlikely" to be a chance phenomenon, but that there are also higher than expected incidences of leukaemia around Scotland's other nuclear power stations: Chapel Cross and Hunterston.

Most of the leukaemia victims have been children. The only proven cause of childhood leukaemia is radiation. It is not therefore unreasonable to suggest that there probably is a link between the clusters and the proximity of nuclear establishments.

If this link does indeed exist then the implications could be horrifying.If almost non-detectable levels of radiation exposure (so they tell us) are causing these leukaemias then they could also be causing other cancers which, because they are so much more common, will never otherwise be detected. Indeed, nuclear establishments could be killing hundreds of people a year and we might never know. It also means that the death toll from accidents like at Chernobyl could run into the hundreds of thousands.

It is therefore of paramount importance that the link between nuclear energy and leukaemia clusters be thoroughly examined.If a relationship is established then the source of these leukaemias must also be established. Only then will we be able to obtain a fuller picture of the likely health consequences of living near to nuclear establishments and of nuclear accidents.

To suggest that leukaemia clusters might indicate a much more serious problem is not being alarmist. On the contrary, I am greatly alarmed by the casual attitude that the nuclear industry takes about this important subject. For



instance, they point out that radiation levels around Dounreay are lower than the background levels in Aberdeen. However, they are not so stupid that they fail to recognise the difference between background radiation and radiation which is inhaled or ingested; nor are they so stupid that they fail to appreciate that different materials produce radiation from nuclear establishments, as opposed to background radiation. The issue of background radiation is irrelevant to this debate and the nuclear industry knows it.

It is also somewhat disingenuous of the nuclear industry to compare leukaemia clusters with leukaemia rates amongst the nuclear workforce. After all, the leukaemias have mainly affected children and I am not aware that there are many of them in the industry's employ!

There is clearly cause for concern and a thorough investigation is urgently needed. The nuclear industry is using theories to dismiss the facts. Their response is, perhaps understandable; it may well be that the facts will dismiss the nuclear industry.

Phillipino's say NO

AQUINO REJECTS NUCLEAR POWER

The Philippine Government's decision to mothball its only nuclear power plant could be an expensive one for the builders, Westinghouse Electric.

The plant, sited on the slopes of a dormant volcano near Manila, and only 50 miles from an earthquake fault line, has been the subject of allegations of bribery and corruption in the ousted Marcos regime. According to reports in the New York Times, Marcos received the majority of an $80 million "commission" paid by Westinghouse to its agent Hermini Dessini.

Westinghouse deny that any payment was made "directly or indirectly" to President Marcos,and claim that Dessini recieved only $17 million. This payment was made in connection with Westinghouse's succesful bid for the contract against rivals General Electric.

Even if the bribery charges do not stick, Mr Saguisag, chairman of the Philippines Nuclear Power Plant Commission has stated that since the plant will not be commissioned, Westinghouse will still have to pay back the £1.54 billion cost of the plant.

BNFL play games

The latest edition of BNFL News carries a competition to find the best suggestion to help BNFL improve its communication with the public. Not, one would think, a difficult test.

SCRAM has one tip for any employee hoping to win the first prize of a £600 holiday with Thomas Cook: improve the level of information given to the Press Office. When SCRAM contacted them recently to find out about the Amateur Athlectic Board's fine decision to reject BNFL's offer of sponsorship, we were told that BNFL has spent "just over £200 000 on sponsorship during the last year". Patently untrue. As reported in SCRAM 53, BNFL has given "almost £900 000 to local projects".

If you phone up the Press Office, do not believe all you hear; if a PR exercise can be so much understated, how much more so radioactive discharges.

A Friend for Sellafield?

We could be about to witness an unusual, if not unique, phenomenon: the formation of a protest movement in favour of the nuclear industry.

The seeds of the Friends of Sellafield Society were planted at the A.G.M. of the Copeland Conservative Association. Environmental groups, and particularly the national media, are viewed with resentment. The aims of the organisation are to promote support for Sellafield, counter false or misleading statements made by environmental groups, and assist the tourist industry by drawing attention to the beautiful and healthy environment of West Cumbria.

Cumbria County Council do not quite see it the same way. They want a ban on production of plutonium for nuclear weapons at Sellafield, and a switch towards the long-term storage of nuclear waste. They have also agreed to make urgent investigations into alternative employment options. The Council is also calling for better management, less secrecy and more investment to contain pollution. "After Chernobyl nothing will ever be the same" said one Councillor.

Meanwhile, BNFL's new policy of public openness has not changed the company's secretiveness and paranoia on the factory floor. A fitter was recently sacked for speaking to the press after he was contaminated and another worker was threatened with disciplinary action after he attended a demonstration at a local NATO base to protest at the bombing of Libya.

"HANDS UP FOR AN EARLY GRAVE"

A packed public meeting at Seascale, Cumbria, votes to form the Friends Of Sellafield Society- to defend the continuation of the Nuclear Industry.

The planned thermal oxide reprocessing plant at Sellafield, known as THORP, received a boost on the 24th. of April. The South of Scotland Electricity Board and its English counterpart, the CEGB, signed a contract worth £1600 million to reprocess spent fuel from the second generation Advanced Gas-cooled Reactors (AGR).

The deal comes just a month after the House of Commons select committee urged BNFL to publish a study on the economic and employment consequences of abandoning THORP. Previous contracts, with 28 electric companies in 8 foreign countries, to reprocess fuel at THORP, have all been on a "cost plus" basis, (the cost of reprocessing plus a profit), but the British contracts are fixed-cost. According to evidence given in the Sizewell inquiry, the capital cost of THORP has risen some 60% in real terms since 1977.

The electricity boards have been negotiating with BNFL for some time about the reprocessing of spent AGR fuel. It is understood that they have been holding out for a fixed cost contract, while BNFL would obviously prefer the cost plus arrangement. The signing of this deal would indicate a certain amount of desperation on BNFL's part, coming as it does at a time when they are increasingly being seen as the "dirty end of the nuclear industry".

At the same time as the contract was signed the electricity boards announced the construction of a £200 million dry store for spent fuel. This is to be used as " insurance" in case the THORP plant fails. It will be able to hold up to a years worth of spent fuel.

Another error

Human error, responsible for the majority of nuclear accidents so far, is the subject of a new study by a group of experts.

The National Centre of Systems Reliability (NCSR) are inviting senior executives from both Government and Industry to examine ways of reducing human error in high tech fields.

Many errors stem from inaccurate or misinformed orders from management, leading to unconscious mistakes and potentially catastrophic results. False or misinterpreted data readings can be compounded by a workforce trained to react rather than act.

The NCSR study will try to change this, but experience shows that accidents are caused by unpredictable, and sometimes astonishing, events. Operators at the Rancho Seco reactor in California were reduced to a state of bewilderment in March 1978 when the main computer went totally beserk. A technician had dropped a light bulb behind a control panel, whilst changing it. The 50 cent bulb fell across computer links, causing valves to open and close of their own accord, and the reactor pressure and temperature to "go up and down like a yo-yo". It took seventy minutes to regain control of the reactor.

The fact that both the accident at Chernobyl and the one at Three Mile Island were caused by a human error, shows only too well the fragile link between humans, technology and chance. The new study group will investigate this link, It believes that techniques are now available for reducing human error and improving the reliability of operating systems that could successfully be applied at management level.Time will tell; but can we afford to wait?

News

There was a small sodium fire on 19 March in the Prototype Fast Reactor (PFR) building. Some 90 to 100 grammes of sodium leaked from a coupling in an emergency cooling loop, and caught fire. A larger fire, involving 15 kg. of sodium, occurred on 19 June. Both fires were contained, but could have sparked off a far more serious accident. Sodium, which combusts on contact with both air and water, is used in the primary and secondary cooling circuits of the PFR.

UKAEA-Dounreay claim that mislabelling of fuel was the cause of one of the potentially most serious accidents in recent years when 8 kg. of plutonium accumulated in the PFR reprocessing plant there. They blame BNFL at Sellafield, who admitted human error was responsible for the mislabelling.

The mishap occured in early 1984, when Dounreay tried to reprocess scraps of incompletely manufactured, plutonium-bearing fuel. These did not dissolve properly. This led to an accumulation of plutonium, estimated at less than 8 kg. by the Dounreay management, but claimed to be as much as 25 kg. by former Dounreay employees. The UKAEA explained to SCRAM that the plutonium was not recovered for 11 months because "commercial" operation of the plant, and a desire to minimise waste production, led them to wait until their next reprocessing campaign started in 1985.

The UKAEA tests fuel prior to reprocessing. We have not been able to assertain how this relatively insoluble fuel passed through the net. Cause for comfort?

AGR

Britains' Advanced Gas cooled Reactors (AGR) have been beleagured with faults and accidents over recent months. The AGR is in direct competition with the PWR to replace the rapidly deteriorating Magnox stations. There are 14 AGR's in operation or under construction, including the one at Torness in E. Lothian.

A generic fault has been found in the AGR's at Heysham, Lancashire and Hartlepool, Cleveland. The vertical steel cables in the stressed concrete shields surrounding the reactor are not as taut as they should be.

An explosian at Heysham caused it to shut down at the begining of May. Cooling oil was ignited in the transformer when an electrical fault caused a spark.

Meanwhile, the CEGB plan to carry out a four year, £100 million refurbishment programme on Hartlepool and Heysham 1. They claim that if this does not happen then the reactors will not be able to operate at full load.

Food

The fallout from Chernobyl is having a devastating effect on the agricultural industry throughout the world. In Britain, the sale of milk plummeted during May and, despite statements from officials that lamb is still safe to eat, the only people who are still doing so are government ministers and their unwitting families.

The Europe wide milk surplus has not been thrown away, but has been turned into butter, causing a massive 3 million tonne increase to the EEC butter mountain. Ironically, it is expected that a fair proportion of this excess will be sold to the USSR.

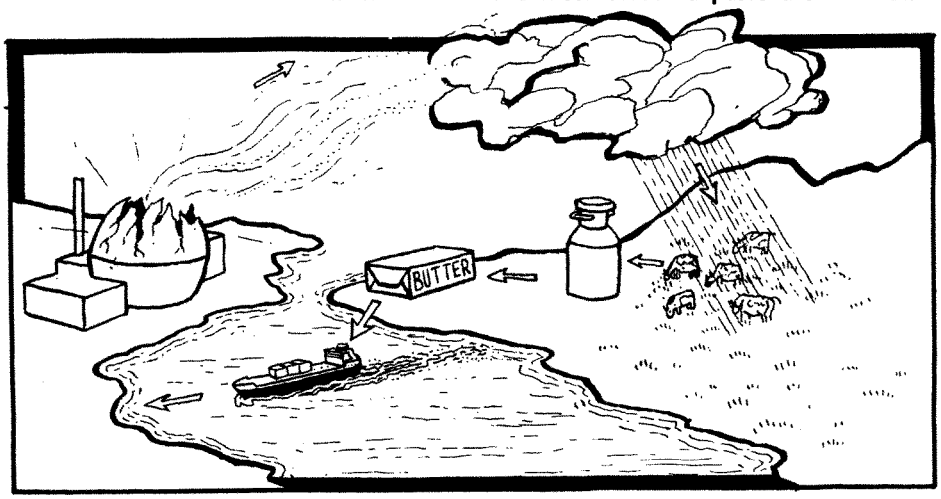
Fears that butter made with contaminated milk will also be radioactive have been denied by the Governments intervention board, who are responsible for buying up surplus agricultural produce. The Institute of Terrestrial Ecology in Cumbria have confirmed this to SCRAM; apparently radionuclides are water soluble and will thus remain in the buttermilk which is drained of in the churning process.

The buttermilk is sometimes thrown away, although it is often fed to pigs. If this has been the case, then the pigs will become contaminated.

Radionuclides have a "biological half life" which is different to the half life of the element. This biological half life varies with different types of contamination and animal. It can only be calculated with accuracy if the animal has recieved a one off "spike", in the case of continued ingestion the contamination will reach a plateau as the amount taken in equals the amount excreated.

Contamination from the cloud of fallout was not a one off affair. It has entered the top soil and is being continuously taken into grass as systemic contamination. The most affected parts are the new shoots to which young lambs are particularly partial. Any animals that are still grazing out in the open will still be eating contaminated grass. Government statements indicate that they expect the levels in lamb to fall away in the imminent future. The ITE do not believe that this is the case.

The level at which British lamb has been withdrawn from sale is 1 000 becqurels per kilo (bpk). No food with a level higher than 600 bpk is allowed to be exported into this country.



Lies

The National Radiological Protection Board are not above a few "white lies" to allay public fears, if Frank Cook MP is to be believed. In the House on the 14 of May he reported that they had informed him: "It would have been a precaution to have kept children inside on Saturday when it rained... But that is in retrospect. Try not to put that statement out because people could be frightened by it."

On the 8th. of May Michael Ancram, Scottish minister for the Environment said: "There is no need for anyone to destroy or wash clothing after being out in the rain, pregnant women and children do not need to stay indoors".

The Government has been very critical about the mis-information eminating from Russia about the Chernobyl disaster.

BNFL and the UK Atomic Energy Authority (UKAEA) plan to build a new reprocessing plant for spent fuel from fast reactors The plant, known as EDRP, will be sited at Dounreay on the north coast of Scotland. The plans for this second Sellafield are currently being examined at a "Public Local Planning Inquiry" which started on 7th. April in Thurso, headed by Alexander Bell. As we go to press, the inquiry has been adjourned for two weeks. The inquiry will go into recess on 18th. July and reopen on 22nd. Sept. Space constraints require that we present only the edited highlights below. We hope to report more fully in our next issue.

SAFETY ASPECTS

Evidence on plant safety occupied about a week at the Inquiry. A preliminary safety report was not submitted as the plans available were not sufficiently detailed. This was despite the Developer's belief that they have given the Scottish Secretary adequate information on which to make a decision.

The impact of an accident at the existing fast reactor on the rest of the site was not taken too seriously: glib assurances were offered. Evacuation plans are circulated to a very limited number of people. In the event of an accident, the 35 000 population of the Orkney and Shetland islands would be evacuated by air - hardly an easy feat. These facts have drawn criticism.

The general view of the objectors is that the application is premature and ill-conceived.

OVERPRICED JOBS

EDRP is a familiar case of jobs being bought at any price: a Parliamentary Answer has revealed the cost to be £300m excluding waste management and transport facilities (Jan. 1985 prices). A quarter of this costing consists of "volume reduction plant" for nuclear waste, and storage facilities for all the waste produced.

Mr. Allardice, of the UKAEA, asserted that EDRP would maintain the excellence of the Dounreay site and would provide a bridge to future projects. During cross-examination, Mr. Blumfield, Dounreay's Director, said that he wanted to see a commercial fast reactor built at Dounreay, although the UKAEA would not be drawn on the subject of a nuclear park there.

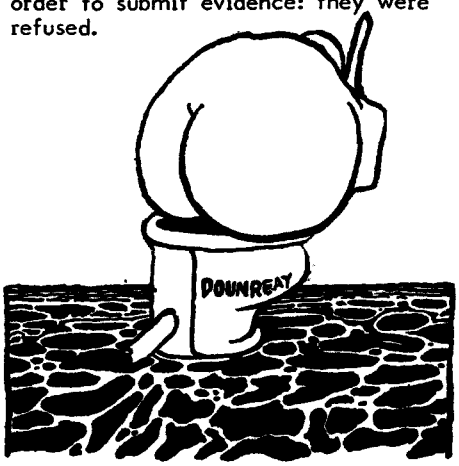
PORT SELECTION WIDENS

The developers have to prove that transport links to and from Dounreay can be found which are broadly acceptable in planning terms. Although the developers will not commit themselves to one specified route, they implied that they would chose from a list of four named ports. The revelation that a Scottish port outside the Highlands, and some seven English ports, are now being considered aroused great anger. This means that the "short-list of preferred port options" is not binding. Speculation that Hunterston is the Scottish port was discounted by the then Transport Secretary, Nicholas Ridley.

The Highland Regional Council reaffirmed its support for EDRP, although it would prefer a Caithness port to be used. Possibly to ensure that the Wick rail line remains open.

A rail link will not now be built as part of the Dornoch Firth Bridge since the Government will not subsidise it. This jeopardises the Wick line on which fuel and waste would travel to and from Dounreay: there would be too few nuclear transports to maintain the financial viability of the line.

The objectors succeeded in getting the Developers' study of transport options released, but the page on port options had been removed. Central Region entered the Inquiry when they learnt that other ports were being considered and attempted to adjourn the inquiry in order to submit evidence: they were refused.



WHAT COST TRANSPORT

The Joint Island Councils argued that the cost of transport facilities is material to the Inquiry in that the cost may affect the feasibility of transport options. This was accepted by the Reporter: "some rough comparison... to the nearest half million, is what we are talking about. I would not go much further..."

The Developers accept that the capital costs of Scrabster are greater than for the Cromarty Firth, and that there are capacity constraints on using Barrow-in-Furness. They claim not to have carried out a detailed costing.

Highland Regional Council have produced some costings: £130m is needed to build a port and railhead at Scrabster. However, no cost comparison with the Cromarty Firth ports is available.

UNDERPLAYING WASTE

Under cross-examination the UKAEA would not admit that EDRP was part of a "large nuclear programme" and that waste management problems should be dealt with before it commences (as specified in Government waste management policy). They believe that "the Government has made it clear that they wish the UK to continue with a substantial development programme for the fast reactor".

It is the normal story of the nuclear industry's faith in its problem-solving capabilities: as the Reporter put it "the test is whether we can have any confidence in these facilities being provided."

WASTE TRADE

Mr. Morphet, the witness for the Department of Energy, stated that the Government expects High Level Waste to be returned to its country of origin: assurances would be sought to ensure that "the Government of the foreign customer places no obstacles in the way of exercising of the options".

The proportion of waste which should be returned has yet to be established. Mr. Morphet suggested that, as far as Low and Intermediate Level wastes are concerned: "it may be sensible to substitute an equivalent quantity, in radiological terms, of higher level waste."

PHANTOM FLASKS

The flasks to transport the spent fuel have not yet been designed. When questioned on flasks, UKAEA witness Mr. Brown, was only aware of conceptual designs for sodium-cooled flasks, and although the UKAEA did not favour them, he could not rule out their use in the future. Sodium flasks are believed to be in operation in France so they can be introduced in this country immediately provided they meet IAEA safety guidelines.

None of the flasks under discussion at the Inquiry have been subject to Department of Transport safety testing. Confusion emerged over the integrity of flasks in deep water. One civil servant believed a plutonium flask would implode at 100m depth, but his deputy contradicted him two days later by saying that the flask would remain intact at 300m.

Ctd. p.14

Chernobyl Reaction

In the confusion that followed the Chernobyl disaster, few people, if any, knew what the effects of the fallout would be, or what precautions to take. LINDSEY STEVENSON was one such person. Here she recounts how she found out what precautions she could have taken, and what to do if the worst happens again.

On Sunday 4th May, when Scotland lay enveloped in the cloud of radio-activity from Chernobyl, I phoned the Glasgow office of the National Radiologicl Protection Board. I wanted to know whether I should suspend breast-feeding my son for a few days because of the extra radiation he would recieve through my milk. The question was not one that the NRPB (Glasgow) had even considered. I was refered to their main office in England. The person I spoke to there listened politely and did not hesitate with his reply, "Carry on breast feeding with confidence." Perversely, I felt less confident. He was too prompt, too unhesitating.

I felt I needed to know enough to be able to form my own opinion, or have confidence in his.

There followed a week of questions, the replies to which varied from the straight forward "don't know", through the confused and contradictory to the downright wrong and misleading. At last I found the answers I needed to begin to understand what was happening, something of the implications to us and our children, and some information about preventative measures for next time. I even found out whether I should have continued to breast-feed.

What follows is only applicable to a repetition of the fallout we have experienced. Should Hunterston experience an accident of the same dimensions as Chernobyl, then we, living so close, would be in a very perilous situation. (Superimpose a map of Scotland on one of Russia, with Hunterstone over Chernobyl.) Should a nuclear bomb explode, then the fallout would be quite different and far more lethal.

I first learnt that radio--activity does not work like other poisons. We know that if we take too much of a poison such as lead, it will build up in our bodies until, at a certain level, we become ill. If we continue to take in the poison we eventually die. The talk of "minimum doses" and "safe levels" from official agencies gives the impression that radiation works in the same way. This is not true. A "lethal dose" of radiation means what it says, but when dealing with lower levels of radiation you have to think of levels of probability of ill effect rather than a level at which toxi-city occurs. This is because of the basic nature of a radio-active particle.

A radio-active atom contains extra particles of energy which it loses over a period of time (radia-tion). These particles of energy shoot away from the atom. If they pass through the body of an organ-ism (plant or animal) and encounter cells which are dividing they are causing damage by destroying or altering the genetic material of the cell. This is the origin of radiation-induced abnormalities, mutations and cancer.

You could think of the particles of energy as bullets which are being fired in random directions. You may stop a bullet in a part of your body where it does not cause much damage and your body may re-cover, for instance, radiation skinburn. The skin is a tissue which is continually replacing it-self and will recover from radiation burn if exposure ceases. You may, however, be hit in a vital organ and there is no way you can hope to recover. This is the situation when cellular damage re-sults in cancers or genetic de-fects. One bullet can kill or do serious damage, so can one particle of energy. This is why there is no such thing as a "safe dose" or radiation.

To understand the probabilities of damage implied in the phrases "safe levels" and "lethal doses" the analogy with gunfire can be carried further. If firing is occa-sional and widely spaced, you may walk right through a firing range and not be hit. As the frequency of firing increases, so too does your chance of being hit. There comes a point at which being hit is inevit-able and a further point at which so many bullets are hitting you that one is bound to strike a vital organ. This last is what the phrase a "lethal dose" means. The phrase "safe level" really means that your chance of being hit in a vital spot by radiation is less than 100% certain - it may be only 1% or whatever scientists have decided is a level of probability acceptable to them. In other countries these levels of probability of damage regarded as acceptable have been reduced as more has been learnt about radiation. Levels regarded as acceptable in this country are now five times higher than the new levels in America and three times higher than in Germany. In no country, however, is the much high-er susceptibility of radiation to pregnant and lactating mothers and children, been taken into con-sideration when setting acceptable levels of radiation. Half-life is a term which was much used in reports about the constituents of the cloud. The half-life of a radioactive substance is the time it takes to lose half its energy. For instance, Iodine 131 has a half life of eight days. This means that after eight days it has lost half its radiation. After another eight days it loses half as much again, that is, a quarter of its original radiation. After another eight days it has only an eighth of its original radiation left and so it continues until it has lost all its radiation.

The types of energy particle emitted by a substance are also

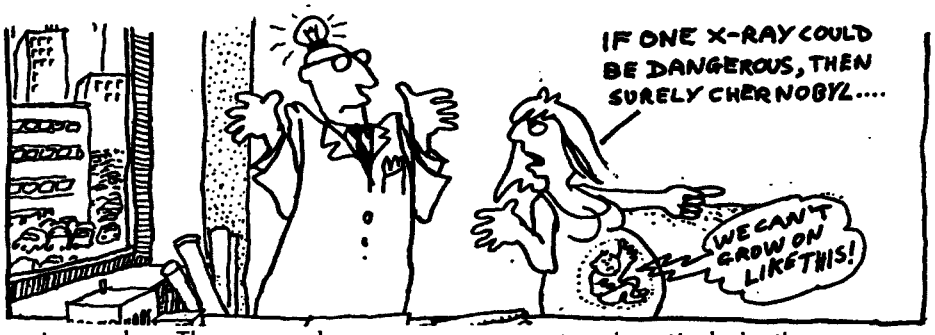
important. Alpha particles can only travel a very short distance and are unlikely to cause much damage unless they are inside you very close to a vulnerable cell. Beta particles can travel a lot further and do more damage, but again you need to have them inside you. Gamma rays are like x-rays and to a lesser extent like cosmic rays (which come from outer space); they can be very damaging. Fortunately for us, our atmosphere partially protects us from the cosmic rays, but unfortunately not from the man-made ones.

The hazards of radioactivity are far greater for foetuses and children under the age of sixteen because they are growing so rapidly. Many cells in their bodies are dividing and are therefore susceptible to radiation damage. The risks are at their greatest, as always, for the embryo in the first three months after conception, but to illustrate just how susceptible to damage from radiation the developing child is. Dr.Alice Stewart of the University of Birmingham estimates that one x-ray in late pregnancy can initiate a childhood cancer, the point being that any exposure to radiation, however small, is dangerous.

A child in utero is exposed to radiation directly through the mothers body wall and also from radioactive substances absorbed by the mother and passed across the placenta. The placenta does not filter out any radioactive substance. A breast-fed child may receive in the mothers milk any radioactive substance which the mother absorbed into her body. The lactation process does not act as a filter or confer any protection against radiation.

Because of the chemical processes within the human body, certain substances are concentrated into particular organs. Iodine is concentratd into the thyroid gland because the gland needs it to function. Iodine 131 was one of the principal constituents of the cloud from Chernobyl. Once absorbed by the thyroid it cannot be displaced. The chemical produced by the thyroid gland into which iodine is bound, is used all over the body in various processes, but of particular interest here, is that it is involved in the maintenance of lactation and by this means radioactive iodine becomes concentrated into milk.

Caesium was present in the cloud in some quantity. It has a half-life of 30 years and emits beta particles and gamma rays. It is a substance which makes its way into the food chain in both animal and vegetable produce. It becomes distributed throughout the body which thinks it is potassium. It is deposited particularly in the muscles and the genitals. The body can excrete Caesium in between 40 to 100 days, but the Caesium does not then disappear. It makes its way back into the food chain and the



water cycle. There was also a small amount of strontium 90 in the cloud. The body treats this as calcium and absorbs it into the bone, where it remains fixed for life.

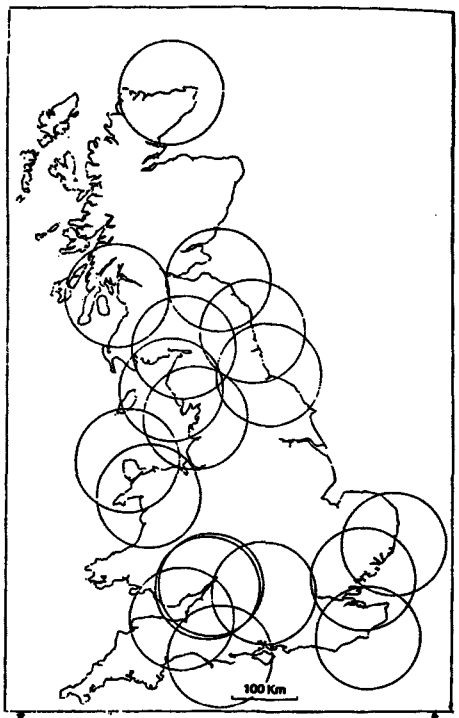
As a result of the fall-out it is known that there will be an increase in cancers, particularly thyroid cancers, and cancers of childhood amongst those children still in utero and increased number of cancers among our present children as they become young adults. There will also be more subtle genetic damage which will not become obvious for one or more generations. Official figures of the damage have got to "guestimates" because nobody has any previous experience of such fall-out.

An aspect of the fall-out to which little publicity has been given, is that it has not gone away. The immediate crisis situation of heavily contaminated milk and undrinkable rainwater has passed, but the longer lived radioactive substances are now free in our environment and already passing into the food chains and water cycle. This means that we will receive continual small doses of radiation from our food and our environment. The question of "hot-spots" is relevant here because agricultural produce from these areas will have a particularly high level of contamination. This has already been amply illustrated with the banning of lamb from Wales and Cumbria. It is worth mentioning also, when considering environmental contamination, that official statements about natural "hot spots" (areas of naturally occuring relatively high radiation) do not really have much meaning in the context of fall-out. Natural radiation is stable in the environment and unlikely to enter the food chain. Man-made radiation enters the body where it will do most damage.

There is nothing we can do about the radiation we have already received, and will continue to receive, from the Chernobyl fall-out. Should the situation recur there are a few measures we can take. The first is to take iodine before exposure to fall-out. By taking Iodine the thyroid gland is flooded and unable to pick up any of the radioactive iodine. After fall-out has occurred fresh milk and dairy products are better avoided, despite official assurances as to their safety. Children should be kept indoors as far as possible while the cloud is present and particularly they should be kept in if it is wet. They should not be allowed to play on grass or in puddles. After being outside they should wash their exposed skin thoroughly and they should be bathed and their clothes washed every day.

Finally, what was the answer to my original query, "Should I suspend breast-feeding for a few days?" It was not an easy question to answer because it is certain that the child is receiving an increased dose of radiation, but on balance, the protective factors which the child is receiving tip the scales in favour of continuing. Whether you continue "with confidence" is up to you as a parent, but how much confidence can any of us have while there are, still operating,

Hunterston, Hinkley Point, Dounreay, Winfrith, Chapelcross, Dungeness, Windscale, Bradwell, Heysham, Sizewell, Wylfa, Calderhall, Trawsfynydd, Oldbury, Berkeley, Hartlepool and Torness (starts fuelling July 7th).



Areas of the UK within a 50-mile radius of current nuclear power stations.

A total of 38 reactors at 17 nuclear power stations in Britain, with another 330 worldwide. Not to mention the fact that there are between 50 and 60 thousand nuclear warheads!

The Way Forward

Nuclear power stations can not be shut down over night; but it will be possible to phase them out before the end of this century. This phased aproach allows time to develop the safe energy options. PETE ROCHE outlines SCRAM s propasals for the way forward in the form of a ten point plan.

Increasing numbers of people are opposed to nuclear power and, after Chernobyl, calls have been made to close down existing stations. An anti-nuclear policy is now seen as a definite vote winner. The Liberal and Labour Parties now have policies of halting the nuclear programme. But with the SDP remaining fairly silent on the issue, it is unclear exactly what an Alliance Government would do. The Labour Party Shadow Cabinet have drawn up a policy which, on the face of it, is an excellent leap forward, but it still leaves room for fudging and policy reversals when memories of Chernobyl have begun to blur.

What we need is a strategy for the transition from a nuclear-based energy policy to one which relies on safe, clean and appropriate forms of energy. The strategy must be seen to be achievable in the short to medium term and able to attract the support of political parties, trade unions, and the community in general. Below is the strategy which SCRAM will support in the run up to the next General Election, in the form of a ten point plan:-

(1) TORNESS AND HEYSHAM B SHOULD NOT BE COMMISSIONED

The economic implications of converting them to coal or using some of the non-nuclear components elsewhere should be investigated. If Torness is commissioned as a result of the intransigence of the current Government, it should be decommissioned by a new Government because of:-

(a) The severe problems which it will cause to the Scottish Coal Industry.

(b) The alarming overcapacity in electricity generating capacity in Scotland.

(c) The need for the new Government to make a clear gesture to both the anti-nuclear movement and the public in general.

Torness has been a focus of the anti-nuclear movement for much of its 12 year life; shutting it would be a way for the Government to say "Yes - we are going to pay more attention to public opinion".

Sizewell and the planned nuclear power programme should be abandoned immediately.

(2) THE MAGNOX STATIONS SHOULD BE DECOMISIONED

A timetable should be drawn up for decommissioning the Magnox reactors as soon as possible. None of them have any secondary containment and may, therefore, be less safe than Chernobyl.

(3) AGR'S MUST BE CLOSED DOWN BY THE END OF THE CENTURY

The economics of spending another £100m on two of the three most recently completed AGR's should be reviewed.

Although the operating AGR's do have a concrete containment vessels, the safety of these stations, along with their environmental and economic implications, should be reviewed. This information should be used to determine how much longer these stations should operate for. Another consideration would have to be the timetabling of decommissioning work, so that it was not happening all at once. We might expect that all of them would have been closed down before the end of the century.

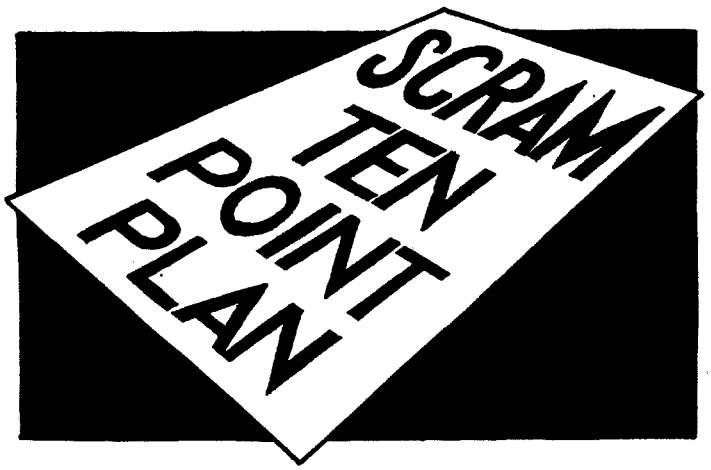
Spent fuel from AGR's should be stored in dry-stores, either built on site, or at Sellafield.

(4) HALT MAGNOX REPROCESSING AS SOON AS POSSIBLE

As soon as all Magnox fuel which needs to be reprocessed as a result of corrosion, has been reprocessed, the plant should be shut down. Other Magnox spent fuel should be kept in dry-storage.

(5) THORP SHOULD BE CANCELLED

Construction of THORP should be abandoned immediately. There is no need for



an economic reappraisal as the Labour Shadow Cabinet has suggested. All foreign spent fuel and waste should be returned.

(6) SELLAFIELD TO BE A CENTRE OF EXCELLANCE IN WASTE MANAGEMENT

Sellafield should become a centre for research and development into nuclear waste management, the decommissioning of reactors, dry storage of spent fuel and other functions as may be required.

(7) ABANDON FAST REACTOR RESEARCH

Fast reactor research should be abandoned. Plans for a European Demonstration Reprocessing Plant should be buried in an engineered concrete trench. Dounreay's existing reactor should be decommissioned. The Dounreay site is ideally located for a renewable energy research centre, specialising in wave power.

(8) IMMEDIATE CHP PROGRAMME

All lead city schemes for Combined Heat and Power should be started as soon as possible, ie Edinburgh, Belfast and Leicester. Newcastle, Sheffield and London should be added to the list. Planning should also start for schemes in other major urban areas, such as Birmingham, Manchester, Liverpool and Glasgow. An experimental scheme in a smaller town would also be a good idea. For example some work has already been done in Stornaway.

(9) MAJOR ENERGY CONSERVATION PROGRAMME

A major energy conservation programme should be implemented - with particular attention paid to local authority housing stock and energy-efficiency grants for low income households.

(10) INCREASE RENEWABLE ENERGY RESEARCH FUNDING

Renewable energy research funding should be substantially increased immediately. A rapid programme of wave power development could provide important work for the shipyards.

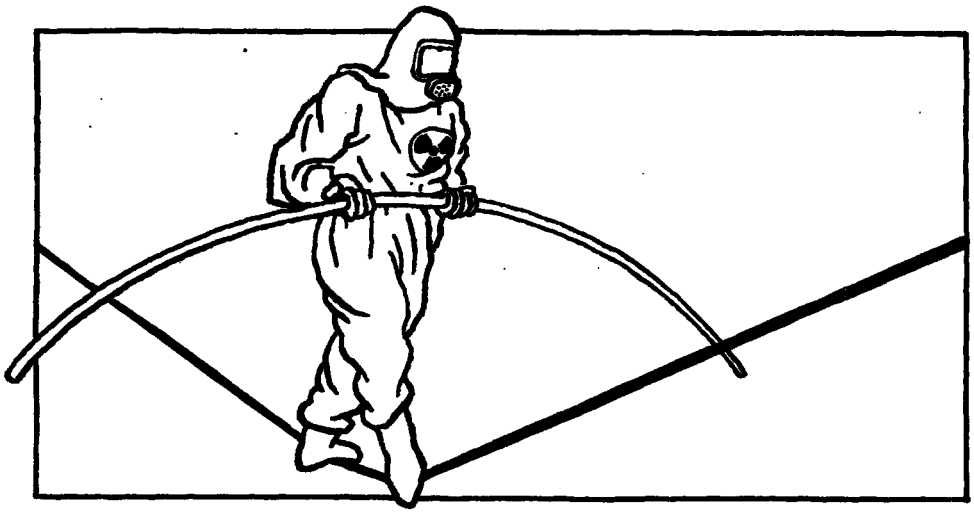
The above plan will obviously have major implications for the institutions which decide our energy planning. The UKAEA and BNFL could, for example, be amalgamated into a Nuclear Waste Agency, with representatives on the Board from trade unions and environmental groups. A new renewable energy agency would be required. CHP and energy conservation both lend themselves to more local control. Local Authorities should be given powers to set up Energy Boards to oversee the implementation of energy-efficiency policy and plan the introduction of renewable energy. It may also be necessary to set up a National Energy Efficiency Agency to oversee local energy planning. Certain sections of the Departments of Environment, Transport and Industry could be amalgamated with the Department of Energy to form the Department of Energy Efficiency. Perhaps a Royal Commission or Select Committee should be set up to gather the views of interested parties to find the most acceptable institutional framework for a non-nuclear energy policy.

A switch away from nuclear power should be carried out without loss of employment. In reality a switch of resources to energy-efficiency and renewables would create more jobs overall, but there would obviously be some problem areas.

The 30,000 workers in the UK power engineering industry would have improved job security from a CHP programme. The workers at Sellafield and Dounreay would be uniquely qualified to deal with nuclear waste management, and de-commissioning work. Abandonment of nuclear power would mean that we would have no further use for the fuel fabrication and enrichment plants at Springfield and Capenhurst. The UK should withdraw from URENCO and halt all trade in nuclear fuel materials and products.

The ten point plan has been in the back of our minds for a long time. It is regretable that it took the death of at least 25 people to bring us to a position where these aims now appear to be achievable. By guaranteeing that there will be no forced redundancies, and that the policies will eventually lead to more jobs, and a safer future for us all, the plans could achieve very wide public support.

Risk Assessment



Prominent in the jargon of the Nuclear Industry is the term "Risk Assesment". This article is based on a paper presented by PETER FLOYD to the National conference on Radioactive Waste Dumping, which was held at Bedford in April. It aims to demistify the confusing and often misused language of risk.

Risk Values are often used to evaluate the safety of the nuclear fuel cycle. Typical figures, according to the UK Atomic Energy Authority, for the annual risk of death include:

Cancer	1 in 400
Road accidents	1 in 7000
Radiation from UK nuclear industry	1 in 30 million.

The purpose of this article is to explain how risk values are derived and what they mean.

Risk is defined as "the likelihood of a specified (adverse) consequence". For example:

> "the risk of being struck by lightning is 1 chance in 10 million per year".

Individual risks are often evaluated for those at most risk or, in nuclear terminology, for members of a critical group. Risks are sometimes expressed as societal risk, which represents the risk to the population at large as in the example:

> the chances of an accident from this installation resulting in over 200 fatalities is 1 in 50,000 per year.

Since the societal risk in dealing with nuclear activities will depend on the total received dose of radiation, the term collective dose is often used to indicate the societal risk. The "adverse consequence" of the evaluated risks associated with the nuclear industry is normally delayed fatal leukaemia and cancers.

RISK ASSESSMENT HISTORY

Attempts to quantify risk began in the 1920s when failure rates of aircraft were used to try and improve designs. However, it was not until the Second World War that the basics of risk assessment were derived from the development of the V2 rocket.

After the war the science of "reliability analysis" was developed in the fields of defence communications and aircraft reliability. In the 1970s industry began to explore these mathematical aids to improve plant reliability, and then operator safety. The mid-70s saw the development of techniques for evaluating risks to members of the public.

By 1980 the classic model had emerged and is the basic method of examining the risks from hazardous activities:

* hazard identification;
* hazard analysis;
* consequence analysis;
* risk determination;
* risk evaluation;
* improvements.

The chronological development of the reasons for assessments needs to be borne in mind when considering the results of a particular assessment:

* 1940s: how can we improve reliability?
* 1950s: how can we improve safety?
* 1970s: is it safe?
* 1980s: can we demonstrate that it is safe?

Since risk assessment still contains areas of uncertainty this slow change in emphasis raises the following questions when considering the results of an assessment:

* why is it being done?
* for whom is it being done?
* who is doing it?

RISK ASSESSMENT

The Risk Assesment Model Works as follows:

HAZARD IDENTIFICATION

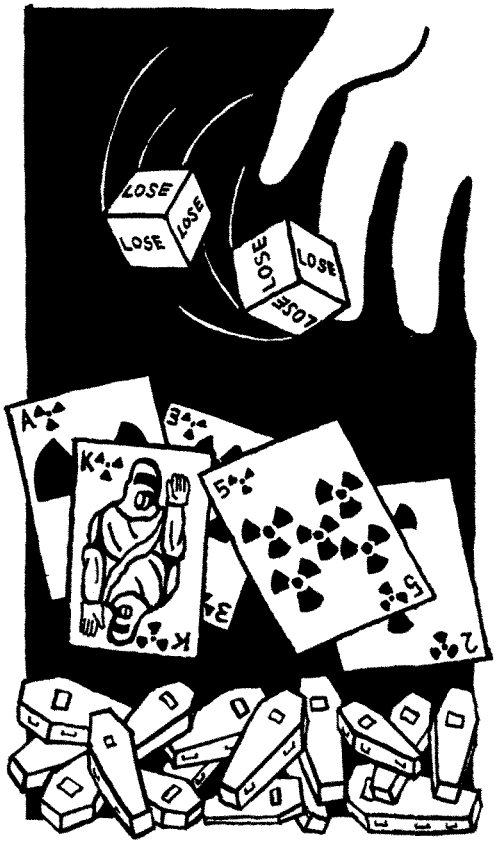
The hazard is a release of radioactivity. It is important to differentiate between planned and accidental releases, as many industries discharge low concentrations of hazardous material into the environment and the nuclear industry is no exception. These "normal" discharges create risks and the 1 in 30 million figure quoted above refers to the risk from normal operations.

Of course normal operations may turn out to be quite hazardous and need to be changed. The plans to neatly stack drums of radioactive waste at the West German Asse disposal site is a relevant example: operators were exposed to far greater radiation levels than envisaged due to the time taken in the stacking operation. As a result the drums were simply heaped, thus eliminating the design intention of easy retrieval of particular drums if required.

HAZARD ANALYSIS

There is always the possibility of accidents or "alternative evolution scenarios" and "disruptive scenarios". Hazard analysis identifies the potential accidents, analyses the routes to the accident and estimates their likelihood.

Without detailed designs it is difficult to carry out a hazard analysis, but some accidents can be postulated and background work can be started. Possible accidents at waste repositories include fires, concrete containment failure, site flooding, and the incorrect placement of drums; accidents involving



the waste in transit are also possible.

Hazard analysis is based partly on speculation and partly on historical experience. Anyone involved in accident analysis cannot fail to be surprised at some accidents which actually do occur. One example is the, yet to be officially confirmed, "disruptive scenario" in which a US nuclear submarine rested on a nuclear waste dump off Lands End in late 1983. The submarine spent several months "cooling off" before it was allowed to enter the Holy Loch base for decontamination (see SCRAM 42).

CONSEQUENCE ANALYSIS

This estimates the effects of an accident. For nuclear accidents this nvolves the determination of the amount and type of radiation released and its effects on the surrounding population. This is not to suggest that the effects of a nuclear accident are limited to human damage but that the risks are usually expressed in terms of human casualties.

There has been considerable debate over the years on the effects of radiation. For received doses of over 450 rem (4500mSv), death in the short term is likely, but such doses are only likely to be received in the vicinity of the severest of nuclear accidents. In dealing with nuclear waste radiation doses of the order of a few rem are of concern. Official figures give the relationship:

> Dose of 6-7 rem (60-70mSv) produces a 1 in 1,000 chance of a delayed fatal leukaemia or cancer.

RISK DETERMINATION

It is necessary to incorporate local population data and distribution as well as other local factors (such as meteorology, topography and hydrog ology).

Individual Risk (IR) is derived from the equation:

IR = P(E) x P(C) where

P(E) = likelihood of event (events per year) and

P(C) = probability of individual being killed in the event.

Societal risk is built up from the fatalities from individual events:

Event 1 has a likelihood f(1) and produces N(1) fatalities,

Event 2 has a likelihood f(2) and produces N(2) fatalities,

etc.

The summation of these events is often presented graphically in the form of "fN curves" in which the y-axis is f, the likelihood of an event causing N or more fatalities, and the x-axis is N, the number of fatalities.

For normal operations there is no component for the likelihood of the event, the event will occur, hence the risks are determined directly from the consequence analysis: the best known example being the effects of the routine discharges to the environment from Sellafield.

RISK EVALUATION

There are a few occasions when a risk can be judged against a standard; more usually there is a subjective assessment.

The consideration of individual risk figures is relatively straight forward since they can be readily judged against other everyday risks: the risk of being killed whilst driving, or working in industry, is of the order of 1 chance in 10,000 per year; the risk of being struck by a meteorite is 1 chance in 1,000 million per year.

What is slightly disturbing is that, contrary to the claims of the nuclear industry, the standards employed are by no means second to none. The radiation dose limits are set out in the Ionising Radiation Regulations 1985 (new limits were introduced this spring) as:

> Workers - 50mSv/yr, a risk of 8 in 10,000 per year;
> Public - 5mSv/yr, a risk of 8 in 100,000 per year.

By comparison new plants in the chemical industry are designed to meet risk values nearly ten times lower and as can be seen the radiation worker standard is eight times higher than the average risk for workers in industry generally: 8 in 10,000 as opposed to 1 in 10,000 per year.

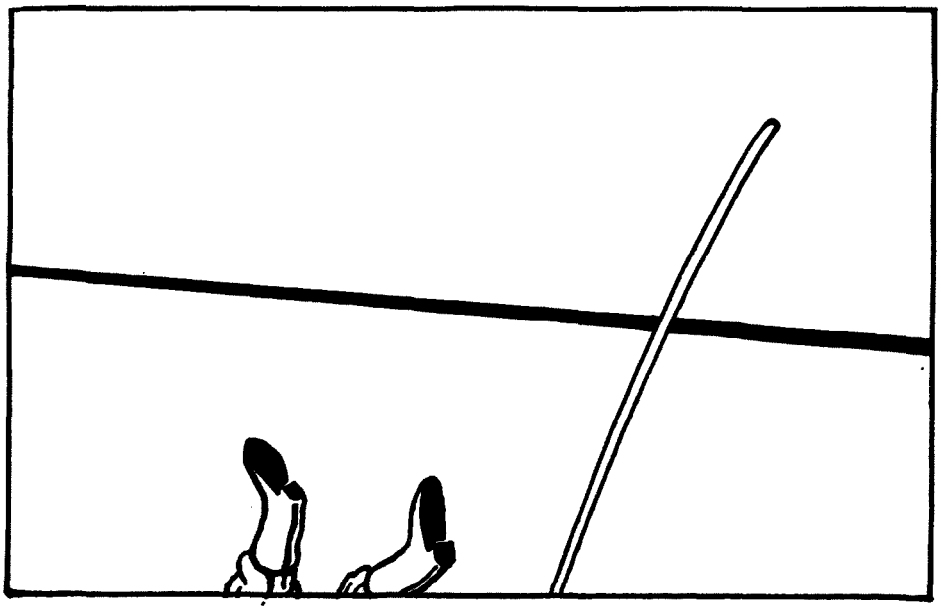
Societal risk is much more complex to judge. The main concern is that a major accident could occur with perhaps thousands of deaths, even though the likelihood may be very slight. Of course this has been overtaken by events in the Soviet Union, where the worst has happened.

IMPROVEMENTS

Carrying out a risk assessment involves a detailed review of plant design and operation; NO plant is perfectly safe, and possible improvements can always be identified during the course of the study. One can therefore have strong grounds for questioning the validity of an assessment should no improvements be identified.

FINAL THOUGHTS

* Risk assessments are an aid to deciding whether an activity is safe, but they are not an end in themselves.
* Risk assessments only provide a "snapshot" in time: it is vital to ensure that assumptions made about the standards are maintained by good management.
* Risk assessments are inherently predictive and the greatest benefit is gained during the planning and design phases when changes are much easier and cheaper to implement.



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DECLARATION OF WYRE

The Orkney and Shetland islands were pledged from Scandanavian to Scottish ownership as part of the dowry when a Danish princess married James III of Scotland in 1468. At the peace of Brenda (1667), Denmark had the right in the peace treaty to redeem the pledge of Orkney and Shetland. This means that the constitutional status of the islands is open to question. Discharges from the planned reprocessing plant would go into the sea at a point where the ownership of the waters could be disputed at any time. Radioactivity may not be discharged into international waters.

The Campaign Against Dounreay Expansion (CADE) is circulating a petition, "The Declaration of Wyre" to be presented to the monarchies in Denmark and Norway. It asks them to "confer and consult" on the constitutional status of the islands and to "inquire into the legality in international law of siting a nuclear reprocessing plant in such a place as to threaten the safety of the waters in an area of unresolved constitutional status."

This move to persuade Denmark and Norway to intervene has excited a lot of interest in those two countries. The Norwegian Liberal Party has launched "Norway Against Dounreay Expansion", in conjunction with Norwegian nature conservation organisations, to represent Norwegian interests which are threatened by EDRP, including the oil industry. The Norwegian Environment Minister, Sissel Ronbeck, has finally requested William Waldergrave, a British Environment Minister, to reconsider the siting of EDRP at Dounreay.

LEUKAEMIAS

A study of leukaemias afflicting the under-25's, recently completed by the Scottish Office, dismisses the theory of "natural clusters", suggesting that the distribution of the disease is a chance phenomenon. It recommends a more detailed investigation of the raised incidence of leukaemias around Dounreay, Hunterston, Chapelcross, Holy Loch, and Rosyth.

The five cases within 12.5 km. of Dounreay from 1979-83, ten times the number expected, were considerably in excess of those expected, and have only a one in 10000 chance of occuring. A Scottish Office spokesman stated, "what we don't know is whether the Dounreay plant in some way or other is the cause of the high incidence and we certainly don't know how it causes it, that remains an open question." He regarded the clusters found in Perth and Edinburgh as flukes.

OFFICIAL SECRETS?

Documents which had been requested by the objectors before the start of the inquiry were finally released by the Developers during its first week. The health and safety documents were released with building numbers deleted for the period 1975 - 1985. Building numbers for plant at Windscale were provided at the Windscale Inquiry and it didn't prejudice security there which is the excuse offered for not doing so at Dounreay. Are Dounreay's activities more sensitive than Windscale's?

There was much debate over the composition of the Dounreay Local Liason Committee and a new parallel committee which is being proposed. Mr Blumfield would not commit himself to allowing environmental groups to be represented on it, and seemed to insist that only elected representatives or academics could serve on the committee. The press are not to be allowed to attend its meetings: Dounreay "openness" seems very selective.

The Dounreay management and trade unions have threatened to take legal action over the allegation that environmental monitoring procedures were not strictly followed. Mr Blumfield, denied that any of the Dounreay workforce might not feel able to come forward with critical evidence under pain of dismissal. To work at Dounreay one has to sign the Official Secrets Act. Signing the Act is voluntary, according to Mr Blumfield, but if one doesn't sign, one isn't employed ..

AIRPORT 87 ?

The fuel for the Prototype Fast Reactor at Dounreay is manufactured at Windscale and, until June, was flown to Dounreay from Speke Airport in Liverpool. At a meeting on 6th June, the Merseyside Public Transport Authority refused BNFL permission to continue flying nuclear fuel out of Speke, 22 times a year. They were particularly worried about plutoniumoxide being flown in hard-wood containers.

DISCHARGES

It has been admitted that some gaseous radionuclides, principally Krypton 85, will not be recovered. Its discharge is likely to be about 100 times the present level. Krypton is due to be recovered from the gaseous discharges from the German reprocessing plant at Wackersdorf.

Ian Leveson: Research & Collation

Geothermal Appropriate Technology

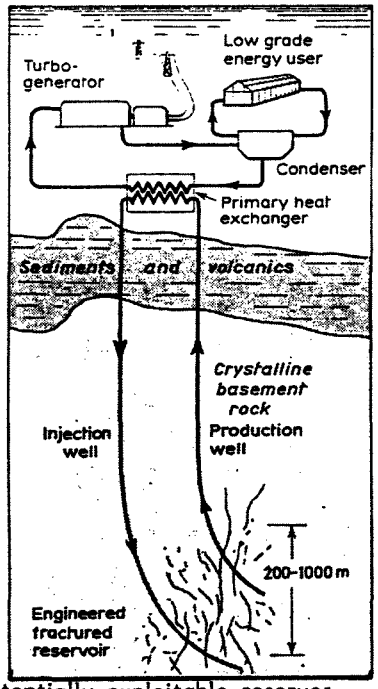
The geothermal pilot project in Cornwall that was jeopardised by a lack of government support (SCRAM 53) has had a last minute reprieve.

Two years funding for the project, at the Camborne School of Mines has been granted by the government. The grant, which is worth £5.85 million, will be reassessed in twelve months time. About £2 million of E.E.C. money, dependant on the grant has been released, but not before 8 of the 90-strong team had joined an English based holding company for a U.S. operation called Geo-science. The scientists, who include Tony Batchelor, the team's director, have been hired back to to Cambourne for the project's duration.

The team is currently exploiting heat from rocks at a depth of 2 km. They have bored two holes and developed a large reservoir between the ends. Cold water is pumped into this space where it heats up to temperatures of over 70 c. before being pumped back to the surface.

At this temperature the water is only of use for low-grade heating in greenhouses and fish farms to be built close to the site. The geophysical aspects of how water behaves when it is forced throuh granite at these temperatures are also under invesigation.

The next stage in the project will be to investigate the potential for extracting steam at 250 C. from rocks at over 6 km. depth. The initial problem will be to construct drills and machines which can operate at such extreme temeratures. The only other comparable deep system in the world is a project at Los Alamos in the U.S.A. which is running into trouble over just such tooling problems. The ultimate goal is to use the steam to generate electricity. It is estimated that the rocks hold



potentially exploitable reserves equivalent to 10 b. tonnes of coal.

Howard Boyle, the registrar at Cambourne, told SCRAM that the Government would find more funds for the project if private companies find it viable. He did not think that the Government had been waiting for private interests to materialise before granting additiional funds, but that they were considering "whether or not at this stage they should go for a two-year, intermediate phase or whether to go right through onto the six year project." The role of Geo-science in the programme has not yet been hammered out. However, RTZ Oil & Gas or Taylor and Woodrow are said to be interested in commercial exploitation of the project.

COAL

A coal-fired power station in the U.S. is now producing electricity with virtually no pollution. The station burns coal with a high sulphur content, but has almost eliminated emissions of sulphur dioxide and nitrogen oxide. It consumes far less water than a conventional power station and produces non-toxic slag which can be sold for road-building.

The new process uses the two existing technologies of coal gasification and combined cycle generation in tandem. Combined cycle means generating electricity simultaneously from turbines running on gas and steam.

The desulphurisation process removes 99% of the sulphur, which comes out almost pure and is sold to a local fertilizer firm.

The experimental plant, situated halfway between Los Angeles and Las Vegas, is an example of the resurgence of interest in coal and in technologies to burn it. Later this year the US's first fluidised bed coal station will open in Minnesota. Fluidised beds will cost about 10% less than coal gasification combined cycle power plants. However, they create more waste, and do not remove sulphur as efficiently. Another technology which is now under discussion in the US is gasifying coal underground.

Meanwhile, here in Britain, the queen will not be opening Drax B, because it will spew out 600 000 tonnes of sulphur dioxide and 200 000 tonnes of nitrogen oxide every year, and is likely to be a major political embarrassment.

Flue gas desulphurisation equipment would cost the CEGB around £150 million, and they refuse to spend this amount unless the government insist. The Health and Safety Executive say that from now on desulphurisation equipment must be fitted to new stations, but this rule has not been applied to Drax B.

NEW SCIENTIST. 10.4 and 22.5.

Waste

The Isle of Wight is to benefit from a Refuse Derived Fuel Plant, producing pellets of fuel from domestic and industrial waste.

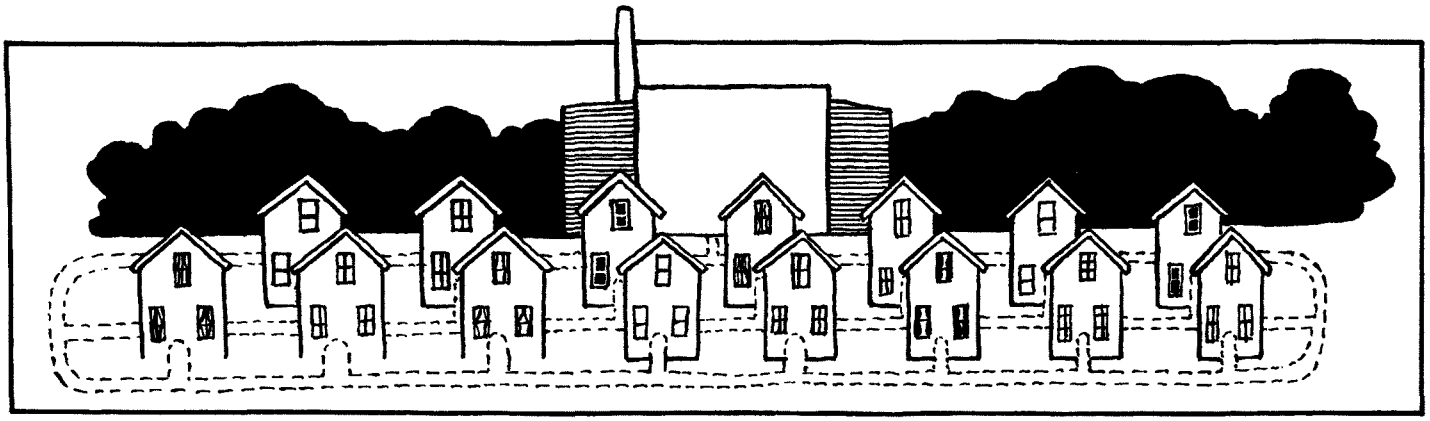
Despite pleas to the Government for funding, the £3 million investment has had to come from the county council. A deputation to the Environment Under-Secretary, William Waldergrave, last July, was given confident assurances for funding. This money would have been dependant on funds being obtained from the private sector. Mr John Hammond, the county waste disposal officer, told SCRAM: "We are in the business of getting a good deal for our ratepayers money. Private investment means opting for profit." This would have increased the cost of the pellets from about £5 a tonne to some £11 a tonne.

Up till now the council has been using landfill to dispose of waste, but present sites will be full by 1989. The costs of other methods of disposal, such as incinerating or exporting waste are prohibitavely high. After aproaching East Sussex Enterprises Ltd., market leaders in the field, the RDF plant was found to be highly attractive.

The plant, which should be completed by spring 1988, will be sited on a disused cigarette-lighter factory. It will produce 20 000 tonnes of fuel pellets a year. Prisons and hospitals will initially take about 10 000 tonnes and research shows that the market will develope once production is underway.

The council plan to use the process as efficiently as possible. They will use residues to form compost--fertilizers. As John Hammond said: "We have found that a tremendous amount of waste on the island - commersial and industrial- is paper, cardboard and plastic, ideal for putting through the plant. We have also noticed that in terms of tonnage the amounts picked up and delivered to us by skip hire companies and private collectors are increasing." The Council hope that the benefits that they recieve from the scheme will encourage other local authorities to follow suit, but Government support leaves much to be desired.

Combined Heat And Power



An adjustment to electricity supply policy, which places less emphasis on Nuclear Power, is long overdue. We should be looking for a robust and proven technology which can be seen to generate employment. ADRIAN ATKINSON proposes that the solution is Combined Heat an Power (CHP).

By far the most substantial comparison that has been made between the nuclear and CHP options was the case put by the Greater London Council (GLC) to the Sizewell Inquiry. The central argument of the case was that urban coal-fired CHP power stations are more economic in electricity generation than ANY form of nuclear power. No evidence was brought to the Inquiry that would refute this conclusion. The calculations were carried out on exactly the same basis as that used by the Central Electricity Generating Board (CEGB) to justify Sizewell and the results stood up to cross examination.

The reason the CEGB gave for not considering CHP themselves was that it does not constitute "main generation"; in other words that it can only constitute a minor option which therefore does not compare with nuclear. The GLC evidence, however, showed that a major commitment by government - but quite comparable with current practice in Scandanavia and West Germany - could result in the obviation of the need for any other main generation plant well into the next century. The situation could be reviewed again at that time.

The Socialist Environment and Resources Association (SERA) and the Jobs from Warmth Campaign have been arguing for many years that CHP should play a more central role in energy policy. The arguments are well rehearsed but worth summarising again:

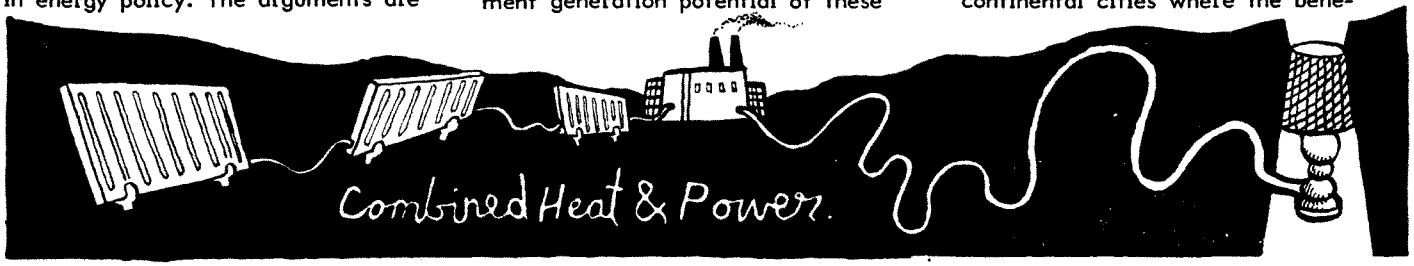
* CHP can provide electricity cheaper than any other significant technology available in the UK;
* CHP can provide space and water heating to surrounding areas substantially cheaper than existing alternatives;
* CHP saves energy outright and is therefore a prudent national energy policy;
* CHP can displace gas, which is a relatively valuable and scarce resource, with coal, which the UK has in abundance and with the effect of supporting the mining industry and mining communities;
* CHP can be an important part of a policy to regenerate inner city areas by improving living standards and because it is attractive to manufacturing industry;
* CHP construction and operation generates more employment per pound invested than other energy supply investments including nuclear power.

CHP & EMPLOYMENT

The employment argument is very important; relative to CHP nuclear power is a POOR job generator. The GLC carried out considerable work in analysing the relative employment generation potential of these two options and the results show that an inner London CHP scheme would generate substantially more employment both in the construction phase and in operation than would Sizewell B. The CEGB carried out a similar exercise and its conclusion was:

> "The overall result of these calculations show the 'direct' generation of 99,000 person-years of employment (building CHP schemes for London and Manchester). This result does indeed confirm the assertion that the CHP-District Heating Schemes would create more employment per million pounds of expenditure than the Sizewell PWR station. My computations show that on the Sizewell project, expenditure of £1097 millions (March 1982 prices) would directly generate 63,700 person-years of employment, 58 per million pounds. The combined expenditure of £1415 millions on the London and Manchester CHP-DHS projects would directly generate 99,000 jobs, 70 per million pounds."
> (Fishwick Consultants: "Employment Generated by Combined Heat and Power and District Heating Schemes in Comparison with those of the Sizewell 'B' Station", An Assessment for the Secretary's Department of the CEGB, June 1983.)

Neither of these studies, it should be emphasised, account for the additional employment benefits that could flow from the supply by CHP systems of cheaper heat to industry. There is accumulating evidence of increased competitiveness in a range of industries in continental cities where the bene-



fits of a local CHP utility are available.

INSTITUTIONAL BLOCKS

The major problem inhibiting the development of CHP in the UK is institutional: who is going to build and run such systems? At the Sizewell Inquiry it was this which the CEGB and the Inspector put to the GLC in the form of a challenge.

The existing fuel supply industries see CHP as offering them direct competition which they would prefer not to have. So far they have successfully resisted its development, to the detriment of the country as a whole and especially those inner city residents suffering fuel poverty.

On the continent such systems are almost universally initiated and run by municipalities or wholly municipally owned utilities. It appears that this is by far the most robust approach. In the UK an increasing number of local authorities are showing interest in building local systems and hence an increasingly urgent need for central government to create the context in which CHP development can proceed. The present Government insists that CHP systems must be privately financed while continuing to finance other energy options through public sector borrowing. Despite the clear advantage of CHP - even in straight financial terms - the difference between the terms of private and public sector finance militate against the development of CHP.

THE WAY FORWARD

There are four things which need to be done to unblock the way to substantial CHP development in the UK:

1 Further legislation is needed to encourage the Electricity Supply Industry to cooperate in the development of municipal CHP systems. It may remain preferable for municipalities to own and run their own power stations rather than rely on an uncooperative industry, but CHP systems will only thrive if the price paid by industry for electricity so generated is fair.

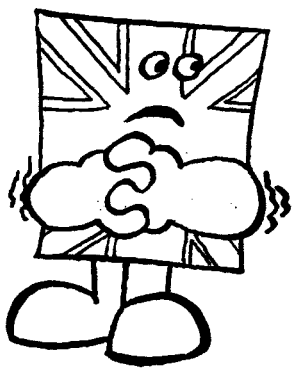
2 The legislation available allowing local authorities to build and run CHP systems needs to be reinforced to give them every encouragement to do so. Something like a "Local Authorities Heat Utility Act" should be put together to create the right context.

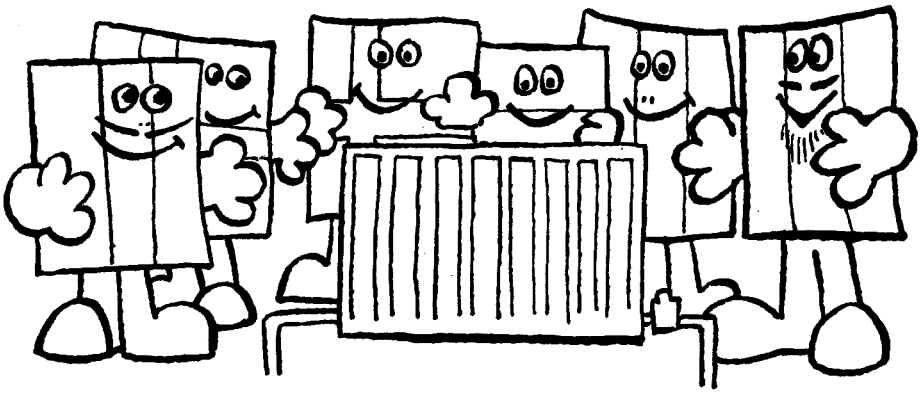
3 Government must be prepared to sanction public sector borrowing for local authorities to construct CHP systems. It cannot be overemphasised that this is not a call for new funds but a call for the redirection of funds which would otherwise be spent on other, less appropriate, energy investments.

4 The Marshall Committee on CHP favoured the establishment of a "National Heat Board" to defend the interests of CHP at the national level in competition with existing fuel supliers. Whilst an alternative view would favour decentralisation of the existing fuel boards, in the absence of this there can be little doubt that some change is necessary at the centre to open up the CHP option effectively. Rather than proliferating competition in national agencies, it is probably preferable to introduce some coordination with CHP, energy conservation and the renewables promoted by one agency, say as a strongly reinforced Energy Efficiency Office and the relevant parts of the Energy Technology Support Unit. It needs stressing that these should provide assistance to local authorities as relatively independent agencies for CHP development and not themselves exercise control.

It should be deemed something of a scandal that the publicy owned fuel industries have been allowed by successive governments to block CHP development where the benefits to the country as a whole and in particular to the inner city poor are so clearly evident. Nobody would sensibly wish a major nuclear accident to be the cause that precipitates the development of CHP; but it would be still worse for the lessons to go unheeded.

Reviews





STILL OUT IN THE COLD: COMBINED HEAT AND POWER IN BRITAIN.
By Rob Edwards.
£2.50 from The Charter for Energy Efficiency, 43 Grainger Street, Newcastle upon Tyne NE1 5JE.

The Charter for Energy Efficiency have produced this pamphlet as part of their ongoing campaign for increased investment in a more energy efficient Britain. It explains, not in technical jargon, how combined heat and power works, and draws on all recent major work on CHP to highlight its advantages. There has been a mountain of paper produced over the last decade, which shows that, not only is district heating from CHP cheaper than the alternatives, but it would also create jobs, help reverse the decline of the inner cities, begin to tackle fuel poverty and have major environmental benefits.

The Government's approach is castigated for its dilatoriness, and its insistence on attracting private finance - another excuse for inaction. CHP/DH is the classic public project; it requires large capital investment which can only be recouped over decades, but it also has enormous social benefits. The survey of other European Governments attitudes to CHP provides the ultimate condemnation of the British Government.

CHP is still a relatively unknown technology in this country, so it is up to those of us who do know about it to trumpet its benefits far and wide. The pamphlet would not take a busy Councillor or MP long to read and understand. Why not buy a few copies and hand them to people in a position to join the growing lobby for safe energy.

PETE ROCHE.

Man Fights Back .....

Until this February there was no coordinated opposition to nuclear power on the Isle of Man, yet Sellafield's sordid seepage soils the sands of Manx's scenic shores. ROWAN ROSShere describes the island's united campaign which has risen under the sloga "Keep Mann Alive: Close Sellafield."

The Isle of Man is situated in the middle of the Irish sea. It has it's own government, Tynwald, which having been in operation for over a millenium, is the oldest known Parliament in the world. Over the last 35 years this unique little nation has had to learn to live beside the operations of BNFL at Sellafield. This nuclear reprocessing plant is known, even within its own industry, as the "muckiest" nuclear installation in the world.

KEEP MANN ALIVE
Close Sellafield

This February, after the third accident at Sellafield since Christmas, the people of the Island finally said "enough is enough". Our Government has been asking for nil discharges into the Irish sea for a number of years.In their monthly report to Westminster this Easter, they asked, in addition, for compensation for the Island's suffering economy to now be considered. The reply from the British Government was polite but dismissive, stating that they are "quite happy with the present situation". Meanwhile our tourist and fishing industries and our property market have all been adversely affected, by our situation in the "most radioactive sea in the world".

The campaign against Sellafield started in February, when 2 women wrote to the local press. Not unduly suprised, but still delighted by the response that these letters inspired, 2 public meetings were organised. The overwhelming feeling from these meetings, well attended by people of all ages, was to demand the closure of Sellafield NOW. At this stage, very few of our MHKs- equivalent to MPs- showed interest. Lobbying them and collating information was our first job.

In April our petition, which demanded the immediate closure of Sellafield , was launched. This coincided with a visit from the Greenpeace boat Sirius. On Good Friday, George Pritchard of Greenpeace and Jean Emery of CORE addressed a large public meeting in Peel, our main fishing centre. A couple of fishermen walked out, but many more stayed to ask relevant and concerned questions.

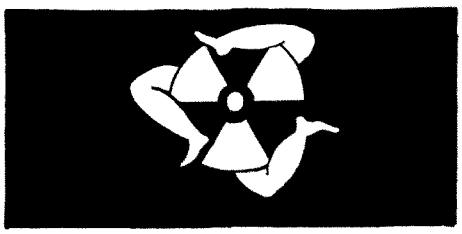
On Easter Saturday the speaker of the House of Keys, Sir Charles Kerruish, officially welcomed the Sirius. He talked at length with George Pritchard and looked at the many reports and studies done by scientists for Greenpeace. He then publicly signed our petition. Our Lord.Bishop also came aboard the packed boat to conduct a short and moving service at which he expressed his fears about Sellafield, the anxiety it caused the Island's residents and the fact that BNFL do not carry much conviction.

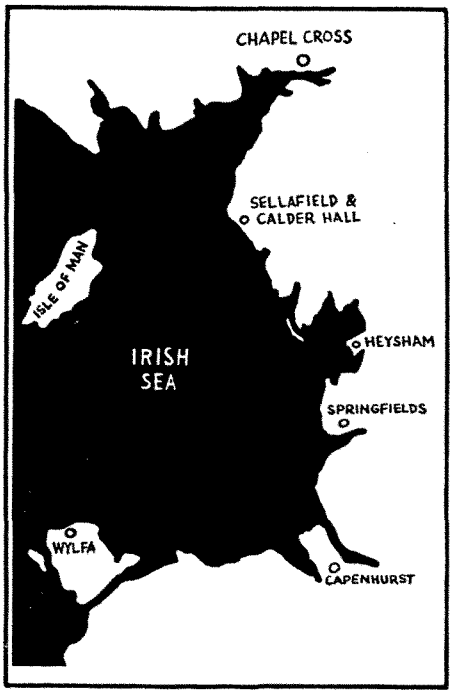
On April the first, Greenpeace sailed off to initiate British Nuclear Fools day at the Sellafield pipeline, while we, much heartened, consolidated our campaign. This period was however a contradiction

KEEP MANN ALIVE
Close Sellafield

for us. The Fishermans Association issued a statement giving no credibility to Greenpeace, although privately many fishermen had signed the petition. We went to see the Government analyst who assured us that as his findings gave no indications of any adverse effects on our environment, the minimal monitoring conducted on the island was adequate. We were not suprised, as his equipment was as basic and underfunded as possible. We were also concerned that no extra monitoring was undertaken after accidents at the plant.

We compared our monitoring to that of our sister islands of Channels and Wight and found ours seriously lacking. These Islands all carry out more extensive and intensive monitoring than we do. They also give top priority to reassuring the public, by publishing quarterly reviews in the local press. We also met with the newly appointed Community Physician, who assured us that there was only a slight increase in cancer mortality. Whilst this did reassure us to some extent, we were all aware that this statistic would not cover treated cancers such as childhood leukaemia or any of the many other illnesses caused by radiation, such as cataracts, diabetes, high blood pressure, benign tumours and genetic malformations. He appreciated this fact and agreed





to work towards getting a fuller picture.

At this point the Guest House Association gave us their verbal support, but Tynwald issued a press statement accusing us of causing "mass hysteria" and grave economic harm to the Island. At that time we felt lonely and vulnerable but people urged us on, by signing the petition in their thousands. Lobbying an MHK at that time one of us remarked: "so you are waiting for a large nuclear accident before you will act." The following week the reactor at Chernobyl blew up.

After the ghastly pause, which has to be for the people nearest the disaster, the radioactive cloud was suddenly over us. Immediately we were called upon, even by some members of our own Government, for advice and information. This tragedy in Russia and its effects on our Island highlighted our

KEEP MANN ALIVE
Close Sellafield

Government's lack of co-ordination and preparedness and, as a result, they are now taking our campaign to heart. At the suggestion of some of our MHKs we are preparing draft reports looking into more extensive and thorough monitoring and also what contingency plans we would like to see in operation.

We have heard today, May 16, that some of our MHKs have tabled a motion in the House, joining us in calling for the closure of Sellafield. Small though the Island may be, with a population of just 65000, we are all working together. Perhaps our voice will now be heard, another major tragedy averted, and the more insidious but equally tragic long-term pollution from Sellafield, halted.

Now the hard work begins...

NEIGHBOURHOOD ENERGY ACTION

CONFERENCE

MAKING BRITAIN WARMER?

Energy Projects Conference
8th - 11th September 1986
University of Surrey, Guildford
Workshops on: Long-term future of energy projects; Project management - Financial and Technical Issues; Energy Advice; Rural Projects; Development training and Long-term employment strategies; Good practice; Promotion; Training.
Exhibitions by major draughtproofing and insulation manufacturers.

Book by 31 July.
Contact: Sara Addington (or Neil Ritchie for exhibitions),
N.E.A.,
2/4 Bigg Mkt.,
Newcastle apon Tyne,
NE1 1UW
Tel.: (091) 261 5677

ENERGY CENTRE

Lothian Energy group are in the process of setting up an energy advice and education centre where people can receive independent and practical energy conservation information. There will be a permanent commercial and educational exhibition of conservation materials and equipment. The centre will create a high public profile for energy and resource management. It will actively support and promote the development of renewable and alternative energy sources.

If you could benefit from this scheme, or want to contribute your services, contact:
Tom Read,
15 Buccleugh Place,
Edinburgh EH8 9LN
Tel.: (031) 667 1011 x 6799

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Little Black Rabbit has been having a fine time down in the notorious "Scottish Surplus Electrickery Board" warrens in East Lothian.

The cause of all the jollity was a "meet the journalists" rally, put on for the benefit of "honest" Don Miller at the Torness Warren. The journalists, replete with all the usual paraphernalia of the modern media, and our long-eared friend, were waiting expectantly for the words of wisdom from Our Don.

At last the Great Man spoke. He gave the assembled multitude his undivided attention and a carefully prepared spontaneous performance. He harangued the mob with the truths of nuclear power; it is safe, clean, cheap and can never blow up; Torness is the "safest reactor that has ever been built." "Of course it is," LBR piped up, "it hasnt been commisioned yet."

After the opening soliloquy, it was time for some dialogue. But others were also in the hall: Councillors from the Peoples Republic of Lothian.

Stop those cameras rolling or I'll not say a word, quoth Don. You what? cried the throng. I said, I'll not exchange a word with anti-nuclear Councillors while the TV crews are in the hall. The hacks were aghast. This is not South Africa they roared as one, and kept the cameras on.

Suddenly the room went dark. Had Don invoked the wrath of the energy gods? No, it was a minion, bent on quick promotion, who had caused the murky mayhem. But to no avail, for the camaras continued to roll and had recorded the whole dastardly event. The minion then turned on the air conditioning which rendered the sound recording equipment useless. "Cease these Micky Mouse antics" cried the People's leader. Where is your new open policy of information for all?

But it had gone, slipped out round the back, leaving narry a trace.

Little Black Rabbit.