SCRAM

The Safe Energy Journal

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after chernobyl

AN INTERVIEW

page 14

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COMMENT

With the minimum of fuss, another Magnox power Station is to close. Towards the end of March the SSEB disclosed their desire to close Hunterston A within the next 12 months - the reasons given were the now officially recognised Scottish over-capacity, and the increased cost of magnox fuel reprocessing being charged by BNFL. Other considerations demand attention.

The NII confirm that their, long overdue, Long Term Safety Review for the station, is within months of completion - the report is now undergoing fine tuning, before publication. However the SSEB's announcement, as well as catching journalists off guard - the statement was released at 5pm on a Monday, also caught the NII unawares. The NII have received no official confirmation from the SSEB, and cannot say whether the impending LTSR will be published.

Privatisation may also have played its part. A decrepit nuclear station is not an attractive inclusion in a portfolio of relatively new generating plant. The solution: cut loose the dead weight before you're floated.

The Board have been telling us for years that there is no overcapacity - what they have is to meet anticipated demand; or to meet the shortfall of their English counterpart.

Are they rationalising before privatisation? If so, what will now happen to Hunterston A? Will it remain, awaiting decommissioning - an economic time-bomb - as part of the private package? For sale - used Magnox Power Station, only one owner!

No! It will have to be typexed from the portfolio.

The Government (ie the tax payer), always on the look out for a bargain, could buy it - with the last batch of fuel inside. The reprocessing cost, then, will not strain the Board's wallet, and the plutonium can go directly to Trident!

But what about the LTSR? If it is not not published, how can the station continue operating for another year? Indeed, the NII concede that, even if the plant were to close tomorrow, they may still demand modifications at the station.

Yet the decision, if indeed it can be counted as such, may not be definite. The General and Municipal Boilermakers' Union, the largest at the plant, hope it is no more than a negotiating ploy to force the price of reprocessing down. They are urging the SSEB to renegotiate the deal in the hope that one or both reactors can be kept open.

Watch this space.

"Full & Fair" Inquiry?

The Public Inquiry into the Hinkley Point C Pressurised Water Reactor, now into its fifth month, has lurched into confrontation between objectors and the Inspector. DAVID ROSS reports on the objectors' complaints, which he argues demonstrates this to be anything but a "full and fair" public inquiry.

The objectors' complaints at Hinkley are over the way Michael Barnes QC, the Inspector, is trying to rush through the inquiry. He is processing as many as 10 objectors a day, extending the sittings so that serious consideration of the issues is impossible, and provoking even a fellow-QC to protest that the inquiry was meeting for "hours substantially in excess of those that are sat in any court."

Barnes, the galloping Inspector, retorted: "I am not concerned as to other inquiries." But a lot of people are concerned, and they may make an appeal to the High Court on behalf of normal legal procedure.

Other complaints include constant interruptions, particularly when objectors are in danger of winning a point, and even refusal to allow some of them to cross-examine.

The trouble burst into the open when Gerard Ryan QC for the Consortium of Opposing Local Authorities (COLA) complained that there was a "very widespread feeling of unease and objection" about the long hours of sittings.

He was interrupted by the Inspector: was Ryan speaking for COLA or "for people generally," as he was "in some difficulty as to the status of those who speak for anybody except themselves."

This is a sensitive issue. The Inspector had already rejected the idea of an independent Counsel, such as was provided at the Sizewell inquiry, on the grounds that COLA would be there. COLA promptly replied that they were not accepting any such responsibility. So the Inspector was trying to score a point when Ryan mentioned "people generally."

"CHEAP POINTS"

There was then an interruption from the body of the hall and the Inspector demanded that the interrupter "keep quiet and sit down." The culprit was the distinguished Liberal-Democrat Somerset County Councillor Humphrey Temperley, who organised the COLA case.

He was trying to explain, as he has since said, that they cannot look after everyone's interests because their resources are fully stretched. "But the Inspector cannot have it both ways. He either allows us to act as **amicis curiae** (friend of the court) or he doesn't.

"It really is not good enough to score cheap points off Mr Ryan, to say 'Look, you said you couldn't do this job so why are you doing it?' I don't think it is in the public interest to run the inquiry at such a pace that ordinary, normal, reasonable people cannot keep up with it."

The Inspector did not try to be conciliatory. He told Ryan that he would be grateful if in future "neither you nor I is interrupted by those who instruct you." He said that he was starting the sittings at 9.30 to avoid evening sittings and he rejected a suggestion by Commander Rob Green, the nephew of the murdered Hilda Murrell, that "Government pressure" was the reason for the rush.

CHANGE OF PLANS FORCED

Cdr Green was forced at short notice to change the plans for two internationally-known experts who were flying in from the US and Austria. This is the type of harassment given to objectors who have to find their own expenses and then face teams of people from the nuclear establishment who are living in luxurious hotels at public expense.

Other objectors have been given similar treatment. The Irish Sea Project, who have done much work on revealing sea pollution, naturally wanted to cross-examine the National Radiological Protection Board. They complied with the request to state how long they would take and estimated 8 hours. The Inspector told their spokesperson, David Gillam, that they must finish in 1½ hours. "If you don't, we will terminate you." At the end of 90 minutes, he was duly "terminated."

Brian Rome of the Bristol Conservation Society has detected a secret timetable, known to the CEGB, to get Government approval for a PWR at Hinkley by May next year. Barnes denies knowledge of this.

PREFERENTIAL TREATMENT

Several of us have been prevented from cross-examining the CEGB because of a distasteful ruling made behind the scenes. In essence, those people who can afford expensive lawyers get preferential treatment.

They have been allowed to require the CEGB to return to face questioning on the reasonable grounds that lawyers cannot be expected to make repeated visits to the inquiry as each "Government" team comes up (CEGB, NII, NRPB, BNFL etc). We are paying, through our electricity bills, for their appearances. But in an exceptionally mean gesture, Barnes has refused to allow other objectors to question the CEGB during the same visits.

How can such discrimination occur? One reason is that the Council on Tribunals, which receives £500,000 a year from the Government to oversee inquiries, admits that its role is "very restricted" and it cannot instruct an Inspector.

Seeing the way that Barnes is conducting the inquiry, it is not surprising that it took six months to find a lawyer who would take on the job.

What remains important is that objectors do not allow themselves to be intimidated and insist on pursuing their right to appear and state their case.

They will have helped to show how much weight should be attached to the eventual declaration by Government that it is happy to respond to the Inspector's recommendation ... etc. With an appropriate dash of hypocrisy, they will of course add that such a decision has been reached after a "full and fair" public inquiry.

DAVID ROSS is a freelance journalist and objector at the Hinkley C Inquiry.

A storm of protest, lead by environmental groups and local authorities followed the announcement that Nirex are to concentrate their search for a deep repository for nuclear waste to Dounreay and Sellafield. The credibility of their consultation exercise and their geological research have both been questioned.

Nirex Faulted

Deep disposal of radioactive waste is not a safe and reliable method of isolating it from the environment, and can never be justified on geological grounds, according to a new report by Greenpeace and FoE. (*)

Geologist Philip Richardson stresses the impossibility of simulating the conditions over the timescales envisaged. He accuses Nirex of using grossly over-simplified data in their computer models, and making assumptions based on simplistic theories of geological processes which cannot be validated or verified.

Not enough is known about the effect of fractures and faults on the movement of groundwater, and reliable models of groundwater movement do not exist. Construction of the repository is likely to greatly alter those factors which favoured the site's selection in the first place.

Nirex assume that gas generated in the repository will move rapidly away, thereby avoiding increases of pressure. This is a contradiction in terms: "On the one hand the repository is to be totally sealed and safe from water ingress for long periods and on the other it is assumed that gas will escape through breaches in the structural integrity."

Nirex argue that radionuclides will be slowed down by 'sorption' ie they will become attached to the surface of rocks. Yet a 1985 Harwell study said that "the quality of sorption data currently available is insufficient."

Richardson claims very little is known about the potential for earthquakes, "there are just not sufficient historical data available to state categorically that an area is stable and will remain so over the timescales envisaged."

"Nirex have tried to dupe the public" said a spokesperson "into believing a technical solution to the problem of radioactive waste exists, when in fact it doesn't."

* Exposing the Faults is available from FoE 26-28 Underwood Street, London N1, or Greenpeace, 30-31 Islington Green, London N1. £2.50.

Nirex Responses Misrepresented

Further evidence that the University of East Anglia (UEA) report **Responses to The Way Forward** distorted the views of organisations responding to the Nirex consultation has emerged from local authorities.

Nirex carried out their consultation into nuclear waste disposal last year, and the results were analysed by UEA. Very few respondents were in favour of deep disposal; the vast majority are categorised as 'not specifying a solution' - most of whom will be totally opposed to any kind of radioactive waste facility locally.

Of the Scottish Regional and Island Councils in this latter category, both Grampian and the Western Isles chose only to address the possibility of a nuclear waste facility in their own area.

Grampian concluded that "acceptance [of such a facility] will not be forthcoming in Grampian." Western Isles noted that a repository is "neither desirable in the local or national interest." Hardly the neutral responses suggested by UEA.

Cllr Groom, chair of Fife Region's Civil Defence Nuclear Free Zones Sub-Committee said that Fife had resolved that "at present nuclear waste . . . should be stored . . . above ground on site" and that as a long term solution "the production of nuclear waste . . . should be phased out over the shortest practicable time." Nirex were informed of this decision in June 1988.

Tayside and Orkney are both categorised as giving 'qualified support for deep disposal.' Cllr Jim Glover of Tayside Regional Council said they "are just as opposed to deep disposal as any other Scottish Authority, and our submission to Nirex said so."

Orkney Islands Council have accused Nirex of using devious tactics. Orkney's response was that they would favour "an easily accessible national waste repository, above or below the ground, in mainland Britain, and sited as close as possible to the main areas of waste production". Members were astounded to be classified as 'giving qualified support for the deep disposal approach'. Convener Edwin Eunson accused Nirex of turning "an argument to suit themselves."

Fife, Tayside and Orkney have clearly been incorrectly classified, which brings into question the credibility of the entire UEA report. Of the remaining Scottish Regional and Island Authorities Borders Region gave no response, but all the rest supported 'On Site Storage.' With such a unanimous response from Scotland, it is difficult to see how Nirex can justify continuing with their search for a deep disposal site.

The National Steering Committee of Nuclear Free Local Authorities (NSC) were angry that UEA "did not assess the level of demand for an inquiry, nor indicate the wide-ranging scope of the inquiry requested by many local authorities."

The NSC wrote to Nirex and asked them how they can conclude that local authorities "on the whole appear to favour some form of deep disposal" in the light of the actual statistics. Of the 48 County or Regional Councils which responded, only 17 are classified as giving 'qualified support for deep disposal.' Of the 204 District Councils, only 51 are shown as giving support for deep disposal.

Cllr Ian Leitch, Chair of the NSC points out that "The UEA Report concludes that local authorities support Nirex's preferred option . . . but the actual figures do not provide support for this assertion. To suggest this is a travesty of the truth." Nirex replied simply that "The conclusion appears to be supported by the tables referred to."

Leitch concludes "If as expected, the nuclear industry uses the UEA report in a multi-million pound advertising campaign in favour of deep disposal, there are likely to be strong grounds for complaint to the Advertising Standards Authority. The report lays Ministers and Nirex wide open to criticism. It distorts the total picture and provides support for the option which Nirex favoured before this so-called consultation process began."

Study Extended

Kerrier District Council's Planning Committee have granted a two year extension to Harwell's experimental field programme at Reskajeage Quarry in Cornwall.

The experiments, funded by Nirex, are to validate theoretical models of water flow and radionuclide transport in fractured rock. The original permission, granted in 1985, was limited to three years because of adverse public reaction.

Computer Modelling

Nirex have been criticised for their heavy reliance on computer models to predict what might happen to buried nuclear waste. Modelling complex geological and ecological systems is fraught with difficulties.

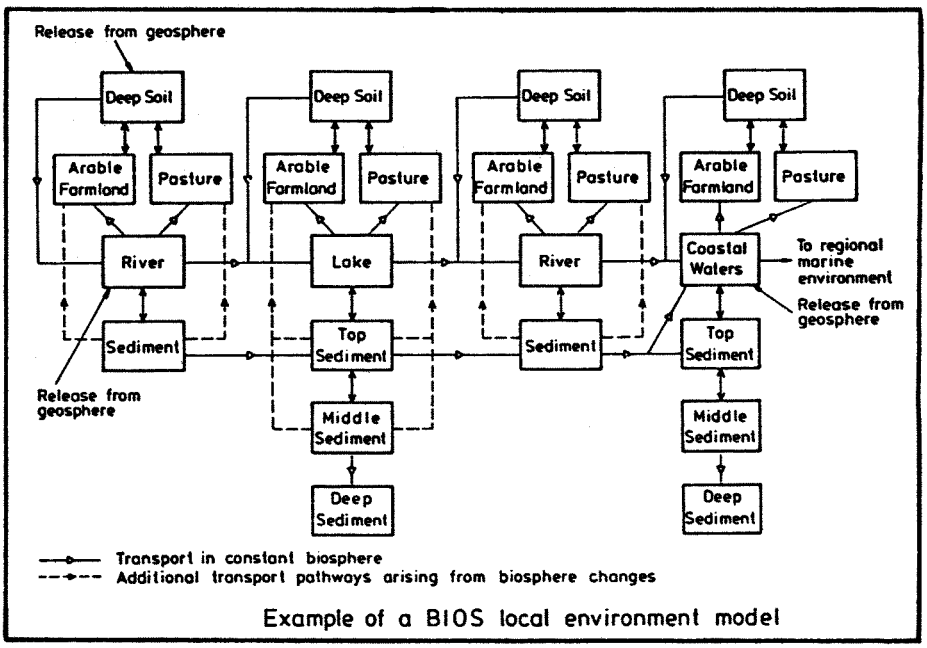
The NRPB have a large number of models for calculating the rate of radionuclide transfer through the environment following routine or accidental releases, or leaching from a deep repository.

A recent report looks at how they evaluate the validity of their computer models.(*) Ideally they should be checked with field observations and experimental results, but when it comes to models of geological radioactive waste disposal, it is very difficult to obtain quantitative data. The Board, therefore, talk about "qualitative validation," which can only really check their "conceptual model."

Chernobyl should have been a rare opportunity to collect quantitative data to check the validity of their terrestrial ecosystem models, yet there is no mention of the failure to predict the length of time radiocaesium would persist in upland soils, and the post-Chernobyl monitoring data were "disappointing for detailed model validation."

The validity of models describing radionuclide transport by groundwater will be evaluated by participation in an international project to compare different models, and "improving the confidence" in biosphere models will be done in the same way. They have also yet to consider the transport of radioactive gas from deep disposal facilities.

Given the modelling problems identified in this report, from fairly simple models of uptake of radionuclides in food to extremely complex models of geological and ecological systems over long periods of time, it is difficult to see how the public can have any confidence at all in Nirex's deep disposal proposals.



Example of a BIOS local environment model

*** Verification and Validation of NRPB Models for Calculating Rates of Radionuclide Transfer through the Environment. M D Hill (Ed) NRPB-R223. HMSO. £6.**

Radon Report

British safety limits for the concentration of radon gas in houses are too high, and the government proposals for financial help to those at risk are "penny-pinching and restrictive" according to the Institution of Environmental Health Officers (IEHO).

They want the action level of radon concentration to be halved from 400 to 200 Bq/cu.m. The NRPB estimate there are around 20,000 houses with a concentration higher than 400 Bq/cu.m. This is likely to result in an annual dose of over 20mSv. IEHO claim there are 50,000 houses affected.

The US action level is already 150 Bq/cu.m and a reduction is being considered. Britain is the only country in Europe to have a standard, so the European Commission are thinking of adopting it.

NRPB say that the large investment to reduce radiation exposure from Sellafield is not matched by comparable spending to reduce radon in homes.

Paul Watts of FoE welcomed the NRPB report, because it highlighted the dangers of radon. But he said that "comparisons . . with Sellafield are not relevant. Radon can be solved with relatively inexpensive and simple engineering techniques. But the routine discharges from Sellafield will be with us for many thousands of years."

[A longer article on radon will appear in the next issue of SCRAM.]

RIMNET Launched

The Chernobyl accident three years ago highlighted the inadequacy of the UK's radiation monitoring. As some sort of a response to this, phase 1 of RIMNET (Radioactive Incidents Monitoring Network) was launched by DoE Minister the Earl of Caithness in March.

46 Meteorological stations throughout the UK will monitor gamma radiation and send the data to a computer - the Central Database Facility. The Scottish data, from 16 sites will go first to a linked computer at HM Industrial Inspectorate, Edinburgh.

In the event of an "abnormal rise in radiation" a Technical Coordination Centre will be set up to coordinate the UK response. The Government have stressed that RIMNET is for overseas accidents. However they do admit that, should an accident occur in the UK, RIMNET data would be made available to those running the emergency plan.

Phase 2 of RIMNET - enhancing and automating the monitoring and increasing the number of sites to between 80 and 90 - is due to be implemented progressively over the next two years.

It was feared, initially, that councils would be excluded from the RIMNET system. However, they are now described as an "important point of contact for members of the public" and they will now "receive information bulletins regularly"!

European Fast Reactor

France, West Germany and the UK finally agreed to co-operate on the development and design of a commercial-sized European fast reactor (EFR) at a meeting in Bonn in February, but progress beyond the conceptual design phase is still in doubt. Italy and Belgium were both prevented from making a similar commitment by political and financial problems.

The signing was made possible by Cecil Parkinson's confirmation, late last year, of the UK's continuing support for British participation in the collaboration. Although the UKAEA will be making deep cuts in breeder research and development, they will still make a significant contribution to the European programme.

In June 1987, European utilities agreed to pursue a common breeder design. The conceptual design phase should be completed by March 1990. Theoretically this should be followed by a three year detailed design phase, but nobody seems prepared to commit themselves. Not even the French government have given an assurance that they will approve the next phase.

Even if EFR design work is successfully funded through to its conclusion, there is no guarantee that a site will be selected. Officials from Britain and Germany at the Bonn meeting suggested that France would be the most likely host. However, French officials view this prospect with "a certain trepidation."

Prospects for participation by Italy and Belgium look bleak. Participation of the Mol Nuclear Research Centre in the Bonn meeting was scuppered by an instruction from Belgian Economics Minister, Willy Claes, for the Centre to redirect its budget away from fast reactors.

The Italian Chamber of Deputies has charged the government to stop the state utility Enel making any new spending commitments concerning FBRs and to take all necessary initiatives to get Italy out of breeders. The decision was supposed to resolve one of the questions left open since the 1987 referendum. There is, however, still disagreement over whether Enel's involvement with Superphenix is now barred. Enel have so far provided one third of the 27 billion francs investment in the project, and they have made clear that they have every intention of continuing.

Lords Critical

A House of Lords Committee have criticised the Government's lack of a coherent policy for long-term nuclear research, in a recent report. (*)

Lord Nelson of Stafford, chair of the Science and Technology Committee, argues that "Long-term research seems to be a missing element in the privatisation of electricity. But we need it to guarantee a secure electricity supply for this generation and the next."

Proposing a costly restructuring of the UKAEA the report concludes that the agency "will always depend on public funds (because) nuclear R & D carries such high overheads."

The Committee are critical of the Government's decision to wind down the fast reactor work at Dounreay. They suggest that it should be kept going until the end of the century.

*** House of Lords Select Committee on Science and Technology; Research and Development in Nuclear Power; HMSO £5.10.**

Hinkley Inquiry

The history of the 2 US reactors closest in design to the British PWR has been "a recital of chaos and corruption," according to seasoned anti-nuclear campaigner, Prof Kemp Houck. He flew in from Kansas to give evidence at the Hinkley Inquiry.

In 1973 eight US utilities commissioned six Westinghouse PWRs of a new design known as SNUPPS (Standardized Nuclear Unit Power Plant System). Wolf Creek in Kansas and Callaway in Missouri were the only stations to be completed. They have been plagued by faulty construction, escalating costs, alleged corruption, poor operating performance.

Houck told the inquiry that, despite the CEGB's confidence in being able to "mitigate the horror story that has been the past decade of the American industry. It can nevertheless be said categorically that no American utility ... would consider buying another Wolf Creek." Houck believes the UK modifications to SNUPPS represent no significant change.

In the light of US experience, a cost of £2000m for Hinkley would seem more realistic than the CEGB estimate of £1470m; the CEGB reckon on a 78 month construction period, compared with 96 months for the two US PWRs; and the Board's projected availability is 75%, compared with the current 51.8% average for Westinghouse reactors.

Since there are only 3 nuclear plants in the US more than 20 years old, it is hard to see how the CEGB can assert that Hinkley will have a 40 year life.

Houck concludes the UK Government, in proposing a series of Westinghouse PWRs, "is buying into technology that is 15 years obsolete in US energy practice."

Radiation Monitoring

A new report from Greenpeace (*) highlights the inadequacies of MAFF radiation monitoring near naval nuclear bases. Greenpeace's findings point to the need for monitoring of subtidal areas as well as the intertidal area covered by MAFF.

The crew of the Moby Dick took sediment samples near Faslane, the Holy Loch, Rosyth, Devonport and Portsmouth last summer, and the results have just been released.

A considerable discrepancy exists between the Greenpeace results and MAFF's for both Faslane and the Holy Loch. This suggests that the Ministry's sampling and reporting procedures are too narrow, and do not provide a comprehensive assessment of radioactivity around these bases. Nor do their figures allow an evaluation of the dose to individuals as a result of the discharges from naval bases.

Because Cobalt-60 and Antimony-125 were found, both of which are associated with reactor coolant water from nuclear powered submarines, and don't move far from the point of discharge, Greenpeace conclude that these must have been discharged either directly from a submarine or from the refit facility.

At Rosyth, Greenpeace's findings were similar to MAFF's, but they found an increase in Caesium-137 towards the dockyard lock gates - and this is an area where lower levels might have been expected because sediments are continuously being removed by dredging.

Since the Greenpeace samples were taken, a few samples of seaweed taken from the Forth by the Forth Local Authorities' independent consultant have shown levels of Cobalt-60 up to 41Bq/Kg. This seaweed, Fucus vesciculosis, is monitored because of its ability to concentrate radionuclides from the environment. It is detectable before it is found in silt or shellfish, for example.

These results show that if monitoring can pick up a small trace of Cobalt-60 in seaweed, then if there is any release of radioactivity from Rosyth or Torness, it will be discovered by the local authorities.

Until such time as nuclear power is no longer used at sea, Greenpeace are calling on the Navy, MAFF and local authorities to carry out more comprehensive radiation monitoring, and are demanding a drastic reduction of all discharges from naval nuclear bases.

*** Survey of Radioactivity in Sediments in the Vicinity of Naval Establishments in the UK, by Dr Paul Johnston.**
Radioactivity Around Naval Nuclear Bases: Summary and Background.
Summary £1.50, both £2.50, from Greenpeace 30/31 Islington Green, London N1 8XE.

Letter

Back in 1983, when Yorkshire TV screened **Windscale - the Nuclear Laundry**, a rather pedantic (some would say meaningless) debate started.

One of the arguments surrounding the high incidence of leukaemias was that these were not a "cluster". Most people did not know the meaning of the word then (indeed, do they now?) and I remember we spent some time explaining the phenomenon that is a "cluster" to the numerous members of the media and public who contacted our office.

A "cluster" is a given number of cases - of any type of disease or illness - which arose within a given physical area and time-span. The time factor was, we were told, the most important aspect. A "cluster" could not really be a "cluster" if it persisted for more than two years. One of the reasons for the constant argument over the use of the word "cluster" was the fact that it had become the pro-nuclear lobby buzz-word. "Clusters" are unexplained phenomena which happen without explanation. They are recognised as such by the medical profession. A "high incidence", on the other hand, which persisted for a number of years (30 years in Seascale's case) was something which had a causal factor and could not be dismissed as a statistical aberration.

Certain people who were heavily involved with the YTV programme were most anxious that the high incidence at Seascale was not described as a cluster - this would be too easy a let-out for BNF. One person said he would scream if the word cluster was used. Imagine our joy and happiness when, in paragraph 2.1, Black had written "The word cluster, which has a technical meaning related to a concentration of cases in space and time, will not be used in this Chapter because we are concerned with an extended time period."

Over the past few years, due to constant propaganda from the nuclear industry or because of lack of space, the word "cluster" is now commonly used. It appears everywhere, it gives the nuclear industry the opportunity to point out areas away from nuclear plants where genuine "clusters" have appeared.

We were once asked why we get so het up when people use this word. After all, a word is just a word, people know what we mean, don't they? The answer is, no, they don't. If I am in debate with someone who is challenging the nuclear-power-equals-leukaemia argument and they blithely start muttering about "clusters" I can stop them in their tracks. I can point out that that person is looking at an entirely different phenomena from the one that the Black Report and COMARE investigated.

This may only seem a small matter. In fact I wrote this letter in order to stimulate debate (and hopefully to stop the use of the word "cluster" where it does not apply). However there is a serious angle to all this. Misuse of language makes for sloppy debate. BNF et al are funding research programmes into "clusters" quite a different beast from what we are looking at.

Jean McSorley.

Ed's Note: The SCRAM Journal has obviously fallen victim to a nuclear industry plot. We will endeavour to use the word "cluster" correctly in future - although it will make headlining stories more difficult!

Late News

The US DOE agreed in early March to spend $30 billion over the next 30 years to clean up the Hanford plutonium production complex in Washington State (see page 12). Problems include 149 leaking high level waste tanks.

Considering the 'Incredible'

Despite major reappraisals of emergency planning arrangements by the international nuclear community since the Three Mile Island and Chernobyl accidents, UK plans remain far short of the basic requirements. The emergency planning zones in this country are more restricted than almost any other country possessing a nuclear power industry. STEVE MARTIN assesses the recommendations of a recent UK report.(*)

As part of their campaign to draw attention to nuclear power safety and to protect the public, over 50 Nuclear Free local authorities commissioned a major study from Earth Resources Research (ERR) to examine the likely effectiveness of current UK emergency planning arrangements for nuclear power accidents. The result is the most comprehensive investigation of its kind ever carried out in this country.

Current emergency plans are based on what the nuclear industry calculate as the **maximum credible accident**, that is the most serious accident they believe might happen - any accident more serious is therefore 'incredible'.

To calculate the chance of an accident the industry rely on theoretical estimates because there is not sufficient information from actual events. This is done by analysing possible sequences of events which could lead to an accident. The probability of each stage in the sequence failing is then estimated, and these individual probabilities are multiplied together to arrive at the probability of an accident.

Methods of predicting nuclear plant integrity are open to question. Operating experience has shown that:

- systems and components are not necessarily as reliable as was thought;
- unpredictable events have occurred which have escaped technical analysis;
- human error, which can neither be predicted nor overruled, is of primary importance.

Because of these observations, ERR believe there is every reason to doubt nuclear industry safety assertions: "nuclear installations are not as safe as the industry claims."

THE 'WHAT IF?' APPROACH

A different procedure is possible. Instead of calculating probabilities, which ERR point out is "inherently difficult" to do reliably for nuclear reactors, a 'what if?' approach can be taken. In this case the **consequences** of a given accident, no matter how probable, are assessed. This is the procedure taken in the study.

ERR constructed possible accidents which could result from sequences of events that have individually been recognised as possible by the nuclear industry - the combination of these events, leading to an accident, have however been dismissed as "incredible" by the industry. The consequences of these accidents for the communities living around nuclear power station sites were determined using different weather patterns.

Following a serious accident resulting in radioactivity being released into the environment, a cloud, or plume, would be blown downwind of the damaged reactor. People may be exposed to radiation directly from the cloud passing overhead or from material deposited on the ground, or from eating or breathing in contaminated material.

COUNTERMEASURES

There are a number of measures which can be taken to reduce the effects of radiation exposure. Some should be rapidly undertaken but others may be delayed until a better impression of the extent of the contamination has been worked out. Emergency measures include:

- **Sheltering** simple and rapid to implement in the event of low contamination, it attracts minimal risk, but the speed of implementation is crucial and depends on public confidence and awareness;
- **Iodide** iodide tablets, preferably predistributed, should be taken before or very soon after the cloud arrives to block the uptake of radioactive iodine by the thyroid gland;
- **Evacuation** the most effective measure, it should be performed before the cloud arrives but can still be of benefit if carried out soon after and in combination with the above.

Longer-term measures include placing bans on foodstuffs - it may be necessary to implement bans on rain-water and milk much sooner, although prob-

Threshold	Distance for countermeasure				Action
	Magnox		AGR		
	light wind	moderate wind	light wind	moderate wind	
30mSv	160km	1000km	130km	750km	sheltering and iodide should be considered, and implemented if practicable.
300mSv	30km	175km	35km	150km	sheltering and iodide must be implemented, and evacuation considered.
3000mSv	5.5km	25km	-	4.5km	evacuation must be undertaken urgently in all cases.

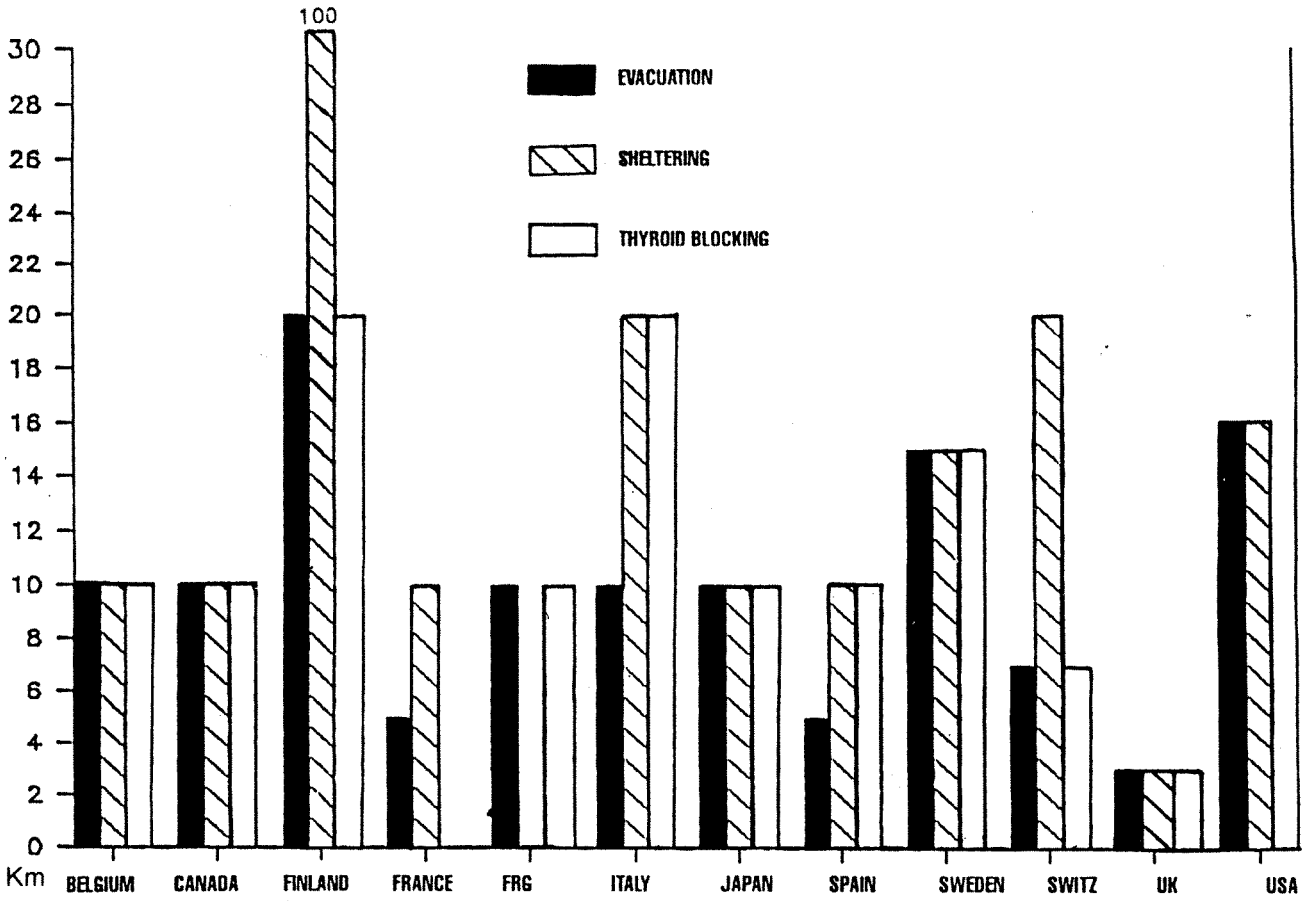


Chart showing the extent of emergency preparations in countries with major nuclear power programmes.

ably not as soon as the above emergency measures.

Because radiation exposure is cumulative, it may eventually be necessary to **relocate** communities for weeks, months or even years. The town of Pripyet, 6km from Chernobyl, is still abandoned nearly three years after the accident. Although the initial contamination may not have required moving people from their homes, as time progresses the radiation doses they are exposed to will build up. This should be weighed against the cost of decontaminating land and buildings.

How far each countermeasure zone should extend is determined by the degree of radioactive contamination. This in turn is determined by so-called **emergency reference levels (ERLs)** which are based on 'acceptable' risks. These are recommended by the National Radiological Protection Board. The **table** indicates the threshold doses and approximate distances from a damaged reactor that each countermeasure should be implemented according to ERR's more serious accident scenarios.

PROPOSED CHANGES TO UK EMERGENCY PLANS

The study cites emergency planning zones in other countries with a nuclear power programme. As can be seen from the **chart**, the UK's EPZs are more restricted than all the others indicated.

The Nuclear Free local authorities have taken up the recommendations for change in the study. The nuclear industry maintain that the limited emergency plans they have in force can be extended to deal with the unlikely event of a more serious accident. This study argues that this is not possible, and instead calls for far more extensive statutory plans.

There should be three zones for countermeasures:

- **a 10km EPZ** with extremely rapid warning systems to notify the population within 20 minutes, and detailed arrangements for emergency countermeasures;
- **a 25km EPZ** with rapid warning systems, detailed arrangements for sheltering and iodide administration, and less detailed evacuation plans;
- **a 100km EPZ** with emphasis on improved public education and awareness programmes, and outline plans for sheltering and possibly selective administration of iodide.

The coordination of off-site emergency arrangements should be taken from the site operator and an 'emergency director' should be designated instead. Public authorities should be allowed a greater involvement.

Government persistence that no improvement in emergency plans is required has met with public scepticism since Chernobyl. They are now faced with a 'Catch 22' situation - the longer they refuse to admit the possibility of a serious accident, however remote, the less the public will believe their pronouncements about nuclear safety; but if they now admit that serious accidents are possible, and implement improved plans, the public will be even less willing to accept an expanding nuclear programme.

Nuclear Facilities and Emergency Planning in the UK by Earth Resources Research. Available from Nuclear Policy Unit, Town Hall, Manchester.

River Esk Revisited

Levels of radioactivity detected in soil samples around the Esk Estuary near Sellafield are up to five times the recommended limits, according to a Friends of the Earth survey. The nuclear industry and regulatory agencies claim their regular monitoring programmes have already discovered these areas of contamination and there is nothing to get alarmed about. PAUL WATTS, who co-ordinated the surveys, argues that these readings show cause for concern, and asks why, if they knew about the levels, the agencies did not report them in their publications.

"There is no need for anyone to be alarmed by the FoE report. More than 10,000 samples are analysed for radiation each year around Sellafield", reassured British Nuclear Fuels (BNF). "Alarmist", cried the Ministry of Agriculture and Fisheries and Food (MAFF).

Such were the responses to the release of preliminary results from a survey conducted along the River Esk by Friends of the Earth's Radiation Monitoring Unit. These responses were made despite the fact that the results showed large areas of contaminated land up to three miles inland, which in places exceeded National Radiological Protection Board (NRPB) limits by a factor of five, and of which no mention has been made in the official monitoring reports.

FoE's SURVEYS IN CUMBRIA

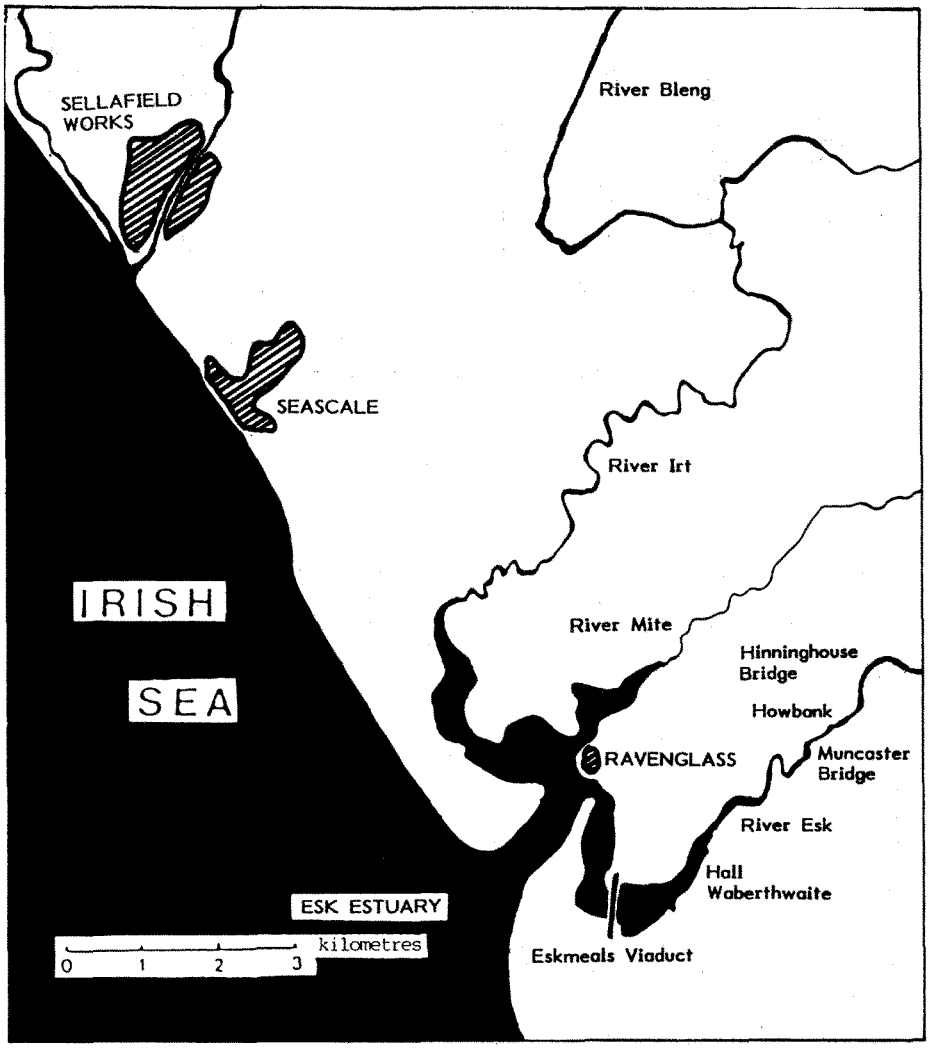
FoE's interest in the River Esk began in 1986 whilst on a Chernobyl survey of Cumbria. A sample taken from Hall Waberthwaite revealed particularly high levels of caesium. Further analysis also identified the presence of high levels of americium-241 (an alpha emitter with a half life of 432 years), indicating that the source of contamination was not the Ukraine but Sellafield, five miles up the coast.

Rumours surrounding the Scottish Universities Research and Reactor Centre's (SURRC) recent Cumbrian aerial survey, carried out on behalf of MAFF prompted FoE's return to the Esk.

FoE returned to the area in January and monitored a 3.8 mile stretch of the river, from Hinninghouse Bridge, a fresh water section of the river, to the Eskmeals Viaduct, an intertidal area near the estuary at Ravenglass. Areas of low lying land which have been subject to periodic flooding were also monitored.

Contaminated areas were located by using a Mini-Instruments Series 900 contamination monitor attached to a scintillation probe, which is particularly sensitive to detecting americium. Contamination was found to build up rapidly over three miles inland, about 250 yards downstream of Hinninghouse Bridge.

The marked delineation of contamination was governed by the height of the land surrounding the river, most of which is used for grazing, and is periodically flooded during high tides. Marine sediments are suspended in the flood water. Because about 90% of the actinides from Sellafield effluents are bound to sediments within about 10km of the outflow, and because there are high sedimentation rates of up to 4cm per year in the Esk Estuary (1), areas of land which have been flooded display correspondingly high levels of contamination.



Map of the River Esk area showing where FoE took samples

DOSE RATES MEASURED IN PARTICULAR AREAS

Having located the contaminated areas, gamma-radiation dose rate measurements were made using a Mini-Instruments 6-80 exposure rate meter.

The locations of the measurements were chosen to account for both the dose rates, and levels of oc-

cupancy by members of the public. In the contaminated areas, measurements varied between 0.25 and 0.59 microGrays per hour, compared to a 0.11 microGrays/hour measurement taken in an apparently uncontaminated area at Hinninghouse Bridge.

Ignoring the internal exposure pathways, these external dose rate measurements could lead to a person who spends 20-30 hours each week in the more contaminated areas, receiving up to 0.92 milli-Sieverts a year (for gamma radiation, a Gray is equivalent to a Sievert) - more than the NRPB's annual site specific limit of 0.5mSv. Such a person would most likely be a farmer or fisher.

During the summer months, as the sediment deposits, mud banks and fields dry out, the inhalation of resuspended radionuclides, particularly americium-241, could significantly reduce the occupancy time associated with the 0.5mSv recommended limit, as alpha radiation is 20 times more biologically damaging than gamma radiation.

Twenty samples of various environmental materials have been independently analysed by gamma-ray spectroscopy, at St Bartholomew's Medical College, in order to establish the concentration of radionuclides.

The results showed no obvious trends associated with distance upstream from the estuary. In fact, the highest activities where found in sediment three miles upstream from the viaduct at Howbank. The results can be put into the context of environmental contamination limits, in order to assess the potential radiological hazard implications of these concentrations.

NRPB RECOMMENDATIONS EXCEEDED FIVEFOLD

The NRPB have derived such limits, which are based on an annual dose limit of 1mSv - Generalised Derived Limits (GDL). Each particular radionuclide has a limit set, above which the annual dose limit is exceeded. However, because an exposure may be due to several different radionuclides, in combination they may exceed the 1mSv limit. The NRPB have recommended that critical group doses should be examined more closely if each individual radionuclide concentration exceeds 25% of its GDL.

Examples of GDLs for well mixed soils, and the more sensitive 'further investigation levels', are shown in the following table:

Radionuclide	GDL	'investigation level'
Caesium-134	400Bq/kg	100Bq/kg
Caesium-137	900Bq/kg	225Bq/kg
Americium-241	1,000Bq/kg	250Bq/kg
Plutonium-241	30,000Bq/kg	7,500Bq/kg

The soil samples contained, on average, the following levels of radionuclide concentrations:

Radionuclide	Level
Caesium-134	100Bq/kg
Caesium-137	3000Bq/kg
Americium-241	2000Bq/kg

The soil samples therefore contain twice the permitted concentration of americium-241, and over three times the permitted concentration of caesium-137. Because of the combination factor, the samples contained over five times the recommended limit, and over 20 times the investigation level. A member of the critical group could therefore be exposed to an annual dose of over 5mSv in these contaminated areas.

Similarly, grass samples contained concentrations on average approximately twice the GDLs, corresponding to 8 times the investigation level.

MAFF's MONITORING RESULTS SUPPORT FoE

MAFF's recent aerial survey report (2) has vindicated FoE's concerns regarding the contamination upstream of the viaduct. The report stated that contamination at Muncaster "is regularly assessed by MAFF and was not a new discovery." However, MAFF's annual reports (3) make no reference to contamination at Friday Point, Muncaster or Howbank, which are on a par with the worst areas of contamination in the vicinity of Sellafield. On the River Esk, the furthermost upstream that MAFF apparently monitor is at the Eskmeals Viaduct and Newbiggin.

If MAFF have been "regularly assessing" the Muncaster area: when did they start their assessments; what do those assessments reveal; and why have they failed to make reference to them in their annual reports?

ADEQUACY OF BNF's MONITORING IN DOUBT

As part of BNF's statutory monitoring programme, they monitor between Eskmeals Viaduct and Muncaster Bridge. As with MAFF, BNF have omitted to make reference to the high levels of radioactive contamination over the extensive area three miles inland. Does BNF consider radiation concentrations in these areas, which are five times the NRPB limits, not worthy of mention, or are BNF purposefully not disclosing their results?

Ten thousand sample analyses each year may well be carried out, but if BNF have not been taking samples in the right locations, or not publicising the results, then the credibility of their monitoring programme must be in serious doubt.

The inadequacy of the official monitoring programme around Sellafield has raised a number of questions regarding the Sellafield critical group doses. In particular if other similar contaminated areas are discovered, which the official monitoring has failed to detect or publicise, then it might provide some explanation for the increased incidence of childhood leukaemia on the west coast of Cumbria.

References:

1 **Chemical Associations of Artificial Radionuclides in Cumbrian Soils - Livens & Baxter. 7, 75-86 Journal of Environmental Radioactivity (1988).**

2 **Aerial Radiometric Survey in West Cumbria 1988 - Sanderson & Scott. SURRC/MAFF N611, January 1989.**

3 **Radioactivity in Surface and Coastal Waters of the British Isles - Hunt. Annual Aquatic Environment Monitoring Report, MAFF, Directorate of Fisheries Research.**

PAUL WATTS is the co-ordinator of FoE's radiation monitoring unit, and a lecturer in Physics at the South Bank Polytechnic's Centre for Industrial Safety and Health.

US Network of Disaster

The US Government's nuclear weapons production programme faces serious difficulties following an unprecedented deluge of publicity, revelations about inadequate safety measures, and unpublicised accidents. Each of the 17 main sites which produce, store or conduct research into nuclear weapons have problems. PETE ROCHE takes a look at the cycle of disaster.

In the US radioactive waste dumps and toxic chemical leaks that were once swept under the carpet are now gaining widespread attention, and the public are demanding action. Run by the Department of Energy (DOE), the ageing network spreads across 12 states, and is plagued by environmental and safety hazards, and managerial failures.

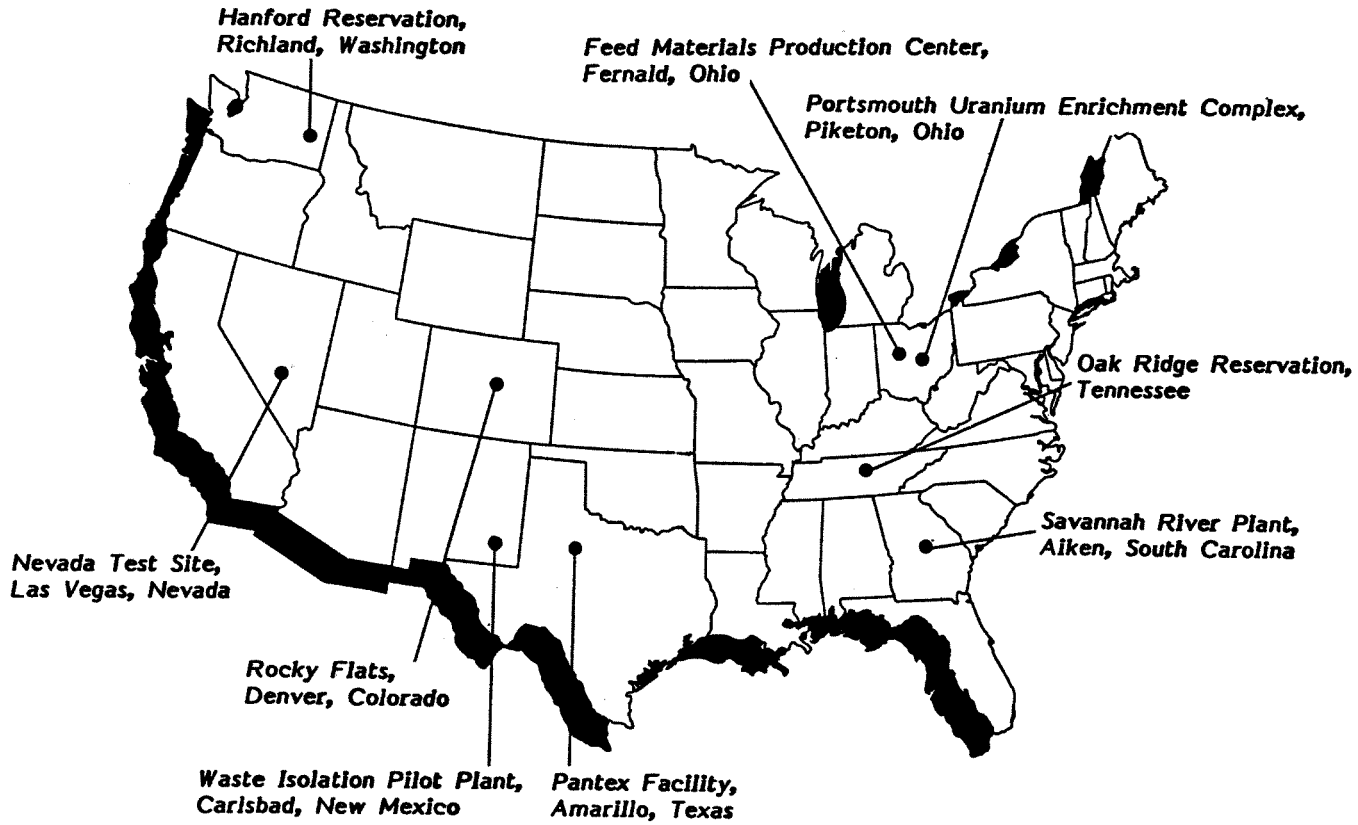
In order to meet nuclear weapon stockpile requirements, to maintain technological superiority and to comply with environmental and safety requirements, the defence complex is going to have to undergo major modifications.

waste spills which are leading to massive groundwater contamination across the country.

The DOE solution, basically, is to cease activities at certain 'hot' locations and concentrate the modernisation effort at fewer sites. The report suggests phasing out operations at Hanford, Rocky Flats, and Fernald, and transferring the work elsewhere during the 1990s.

They want to build two new production reactors at Savannah River and the Idaho National Engineering Laboratory (INEL), to produce plutonium and tritium. Construction of a Special Isotope Separation Plant at INEL, to "convert existing DOE-owned fuel grade plutonium to [weapons grade] plutonium as needed for the stockpile and contingency reserve," is due to begin in April. In addition, they will invest $2.1 billion in an improved uranium enrichment plant at Oak Ridge.

However, a question mark now hangs over the plan to build the new production reactors. A report submitted to DOE suggests that a huge linear proton accelerator for the production of tritium would cost less to build and operate, and would avoid the safety concerns associated with nuclear reactors. The irony is that, because the linear accelerator would use an estimated 775MW of power, it would probably have to be located at Hanford to take advantage of cheap hydropower!



Map showing some of the US sites where serious radioactive contamination has been recorded

In January the DOE released to Congress a censored version of their report, **Nuclear Weapons Complex Modernization Report** - known as the **2010 Report**. In it they recommend spending an extra $81 billion to deal with the problems over the next 20 years. Despite this huge cost, environmentalists are furious that only $29 billion of this is to be spent on the cleanup. The DOE originally estimated that $110 billion would be required to clean up

Nuclear weapons production in the US has become nothing less than an environmental time bomb. Environmentalist ask: "what good will it do us if, to protect ourselves from our adversaries, we poison ourselves in the process."

NUCLEAR WEAPONS - CYCLE OF DISASTER.

Site.....Portsmouth Uranium Enrichment Complex, Piketon, Ohio.

Function.....Uranium Enrichment:

Uranium hexafluoride gas (hex) is bought from private companies. The low concentration of the fissile U-235 isotope is increased by enrichment.

Problems

DOE announced a cleanup in November 1988, following a court order. Wastes contaminated with uranium have been burnt in an incinerator with no pollution control or radiation monitoring equipment. Hexavalent chromium, a carcinogenic chemical is being released into the atmosphere, and groundwater has been contaminated with solvents.

- -

Site.....Feed Materials Production Center, Fernald, Ohio; Oak Ridge Reservation, Tennessee.

Function.....Ingot production:

Enriched gas from Portsmouth is converted into powder and then into ingots for military reactors.

Problems

Uranium dust and radioactive wastes from Fernald have contaminated water and air, exposing thousands of workers and nearby residents. DOE have admitted deliberately misleading the public. Local residents are pursuing a $300 million lawsuit and will accept nothing less than a total cleanup. At Oak Ridge poorly-maintained toxic and radioactive waste dumps continue to leak.

- -

Site.....Hanford Reservation, Richland, Washington; Savannah River Plant, Aiken, South Carolina.

Function.....Plutonium and Tritium Production:

Non-fissile U-238 is converted to Pu-239 in the reactors. Tritium is produced by bombarding lithium with neutrons. It is used to increase warhead yield.

Problems

The last of 9 reactors at Hanford was closed in 1986; most reprocessing has stopped. Congress ordered a health study of local residents near Hanford in 1988. Experts estimate some local people have received a dose 10 times greater than Chernobyl residents. Cleaning up the pollution caused by 45 years of plutonium production is expected to cost more than $50 billion.

Of 5 reactors at Savannah River, 2 are permanently disabled, and the others closed indefinitely. The Pentagon may have to cannibalise warheads to salvage tritium unless a reactor is repaired by the autumn. Other problems include equipment failure, massive environmental contamination and near catastrophic accidents.

Site.....Rocky Flats, Denver, Colorado.

Function.....Shaping Plutonium:

Plutonium from Savannah and Hanford is shaped into triggers for thermonuclear bombs.

Problems

Much of Rocky Flats is now closed down because of safety problems. Groundwater and soil are so contaminated that the cost of a complete cleanup will be staggering - there are fears that it may become a 'national sacrifice zone' and be simply closed off. Transuranic waste has been piling up since last October, and is expected to reach the legal limit by May.

- -

Site.....Pantex Facility, Amarillo, Texas.

Function.....Warhead assembly:

Plutonium, tritium and enriched uranium are assembled into nuclear warheads along with mechanical and electronic components. Existing warheads are also refurbished.

Problems

The site is contaminated with high levels of toxic waste which have been dumped into an unlined pit for 26 years and may be leaking into the main source of Amarillo's drinking water.

- -

Site.....Nevada Test Site, near Las Vegas.

Function.....Testing:

Atmospheric tests were carried out until 1962, when testing was moved into underground caverns.

Problems

About 75 square miles of land are contaminated with plutonium, caesium, strontium and other radionuclides.

- -

Site.....Waste Isolation Pilot Plant, Carlsbad, New Mexico.

Function.....Waste disposal:

DOE intends to ship plutonium wastes to the WIPP site at the rate of one truck every 6 hours.

Problems

Proposed legislation could allow the DOE to place wastes at WIPP without complying with Environmental Protection Agency standards, which require transuranic waste to be isolated from the environment for 10,000 years. Water is seeping into the repository. A reservoir 800 feet below is filled with brine and hydrogen sulphide. This highly corrosive gas could enter the repository, via a drill hole through the centre of the site, and eat through the steel and concrete. It won't be on stream before August. Waste continues to pile up at Rocky Flats.

Holiday in the Ukraine

Almost three years ago, Chernobyl experienced the world's worst nuclear power station accident. Its repercussions were felt all over Europe - farming industries were seriously affected, official and unofficial agencies were inundated with calls from a worried public, nuclear power programme expansions were reconsidered, nuclear accident emergency plans were hurriedly rassessed. Much has been written about the accident and its aftermath, and officials from many countries have visited the site. JANE MITCHELL visited the area last year, and conveyed her experiences to JULIAN GOODARE.

Chernobyl is not the kind of place you'd want to spend your holidays. How did you get to visit the power station?

I was part of a delegation from Edinburgh Trades Council, who have had links with Kiev Trades Council for many years. We asked before the visit whether we could discuss the Chernobyl accident. Chernobyl is further from Kiev than Torness nuclear power station is from Edinburgh, and we wanted to discuss emergency planning issues. They took us very seriously, and two days of our two week stay were spent in and around Chernobyl.

On our visit to the power station itself, we first had a meeting in the administration centre with the Head of Information and Foreign Relations Department, together with some of the station's trade union representatives. Also present were a delegation of top West German fire-fighters who were visiting at the same time.

THE SARCOPHAGUS

Our questions were answered frankly and openly. This was a useful meeting despite the practical difficulties of conducting it in three different languages. I asked about the evacuation zone around Soviet nuclear power stations: it is presently 5 kilometres, but they were reconsidering this. There is a 30 kilometre exclusion zone round Chernobyl.

The accident occurred in reactor number four which is now entombed in lead and concrete and is referred to as the 'Sarcophagus.' The other three reactors are back in production. We were taken into the control room of reactor number two and met the engineers working there.

We were also shown the fire station on the site. The West German fire-fighters commented on the impressive equipment and staffing. I know there is a fire-fighting team at British nuclear power stations, but this was a fully equipped and staffed fire station. Inside there is a memorial to the six fire-fighters killed fighting the fire in the initial stages. They are regarded as heroes in the Soviet Union.

What was the surrounding area like?

It has been totally changed. Before the accident, the reactor was in the middle of a forest; but the trees were killed, and they have been removed for about two kilometres around about, except two dead trees left as a reminder. The topsoil has been replaced over this area to a depth of 1 metre, and in some places to 6 metres. They plan to replace all the soil in the 30 kilometre exclusion zone.

The main roadway within the zone is continuously hosed down by water wagons, vehicles which never leave the zone. Standing immediately outside the Sarcophagus, we were shown levels of radiation measuring 4 rads on the dose-meters.

In most of the zone, from the guard post at the border, there are few signs of change. Most of the land used to be farmed, but this has now stopped. However, the grass, trees and bushes seem to be growing normally. The only noticeable change is that the farmworkers' houses by the roadside are clearly uninhabited.

PRIPYET - GHOST TOWN

We were then taken to see the small city of Pripyet, about 6 kilometres from the power station. It was evacuated after the accident and will never be lived in again. With about 30,000 people, it had been built in the early 'seventies specially to house the Chernobyl workers. It was a young city, with an average age of only 27. We were given a photographic guide produced early in 1986, which showed what it had once been like. One of the young fire-fighters from Chernobyl came with us. Pripyet had been his home, and this was the first time he had been back, over two years after the evacuation.

It is a devastating experience to stand in a modern ghost town. Soviet towns and cities are very clean and neat; but in Pripyet, two years' neglect have taken their toll. Weeds grow knee-high, drain covers and pipes are rusted, windows are cracked and broken. We walked past a children's playground, overgrown with weeds, a child's football still lying where it had been abandoned.

We walked past a children's playground, overgrown with weeds, a child's football still lying where it had been abandoned.

It was the overwhelming silence of the place that I found most moving. It was eerie to stand in the middle of a city in the middle of the afternoon, and hear only the buzz of an insect on the other side of the street.

So where are the people living now?

A pre-fabricated town was set up outside the exclusion zone within a couple of months of the accident; it would house the evacuees from Pripyet temporarily until the new city of Slavutich is completed. This is being built 40 kilometres from Chernobyl, and was expected to be finished by the end of 1988. Each of the Soviet republics is building one sector of the city in their own style. Slavutich will be an experimental traffic-free city, with car parking on the outskirts and a rail link to Chernobyl.

Were you worried about radiation during your visit?

I had mixed feelings going into the exclusion zone. We weren't allowed to leave the road or even get out of our vehicle. That's the unnerving thing about radiation - you can't see it or smell it. The vegetation was green and lush, it looked quite normal.

They have a biological research station there, which they'd built before the accident to do general research. They decided to keep it working, to study the effects of radiation on the plants and animals. They've already found some mutations in grasses. So far, they have found no adverse effects in babies born since the accident. The scientist in charge assured us that the food grown within the unit, which is enclosed, was safe to eat - we took their word for it and ate some!

The burning core of no 4 reactor

COMPARISON WITH ROSYTH & TORNESS

The people we met had mixed reactions too. The workers are still pro-nuclear, seeing no viable alternative to continuing the nuclear power programme. But there's also a phobia around. We were given medals to commemorate our visit. One of the delegates showed one to a porter in our hotel, and he ran away from it.

I ask myself if the radiation I was exposed to was any worse than the radiation levels I encounter every day in Edinburgh. After all, I'm close to the Rosyth nuclear submarine base and Torness nuclear power station, from which we're soon to get nuclear waste trains through the city. It's up to every individual to assess what risk they are prepared to accept.

How easy was it to evacuate Pripyet?

There were problems with the evacuation. In times like that there will always be people who panic. There were also the people who didn't want to go; how do you persuade old people to leave villages they've lived in all their lives?

We were told that the 30 kilometre zone was evacuated within 24 hours of the accident: 60,000 people, half of them from Pripyet. It was an enormous task to find homes, food and clothing for so many. The local trade unions were involved in this, and also in keeping records of where people had been evacuated to so that relatives and friends could contact them.

They showed us the river-boats which were the first homes for many of the people who were evacuated. They stressed that nobody was left homeless, but the problems were enormous.

What about compensation?

Everything had to be replaced. People left all their possessions behind them when they were evacuated, taking only the clothes they stood up in. There was compensation from the State, with help from the trade unions. I don't think it was such a major issue as it would be here. In Britain, the first you would hear would be: who is going to pay.

What about parallels with Torness? The thought that there could be a similar disaster there ...

It doesn't bear thinking about, does it?

What can Lothian Regional Council learn from the disaster at Chernobyl, to improve emergency planning?

To be honest, I came away very depressed about emergency planing for an accident like that. The Russians said themselves that you really can't deal with an accident on that scale. They're still trying to come to terms with it, nearly three years later. I was impressed by the amount of cooperation in the face of disaster, and the determination to overcome it. The scope of what they have had to do is mind-boggling, even in a country the size of the Soviet Union. This country simply couldn't do it.

"Danger: Radiation Keep to the roadway"

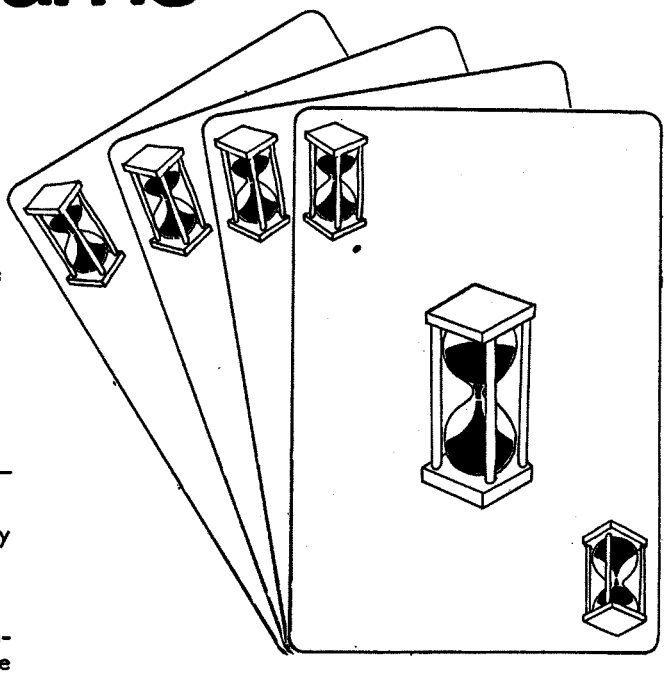
Emergency planning here does have to be looked at more carefully. There's a three kilometre evacuation zone around Torness, effectively covering only the one village of Innerwick. The town of Dunbar isn't much further away from Torness than Pripyet is from Chernobyl.

Where there is human involvement, there will always be human error. The fact is, we cannot afford to continue planning on the assumption that an accident will never happen. At Chernobyl, it did.

JANE MITCHELL is a Lothian Regional councillor; JULIAN GOODARE is editor of Scottish CND's newsletter.

The Tide Turns

As gloom and despair pervade the world of energy efficiency, born of unfulfilled promises and significant reductions in the budget for the Energy Efficiency Office, ANDREW WARREN detects a glimmer of hope on the otherwise cloudy horizon of Government backed initiatives.



There is a tide in the affairs of men,
Which taken at the flood, leads on to fortune,
Omitted, all the voyage of their life
is bound in shallows and in miseries
(Julius Caesar)

That tide is now flowing for the Energy Efficiency Office (EEO).

Some six years after the concept was first conceived, the reality of creating an influential voice within Whitehall to promote the cause of energy conservation in all its facets is at last coming to fruition.

'GLAD-TO-BE-GREEN'

At the beginning of 1982, the Prime Minister asked one of her senior external advisors, Lord Rayner, then the managing director and now the chair of Marks and Spencer plc (purveyors of underwear to the world), to investigate how the Government administered its energy conservation programme. Such initiatives from 10 Downing Street of course do not happen in a vacuum. Just like the Prime Minister's seminal Royal Society speech officially permitting Conservatives to be Glad-to-be-Green, acceptance that all was not well in the world of energy conservation only came about because a range of influential voices and committees, both inside and outside Parliament, had long been saying so.

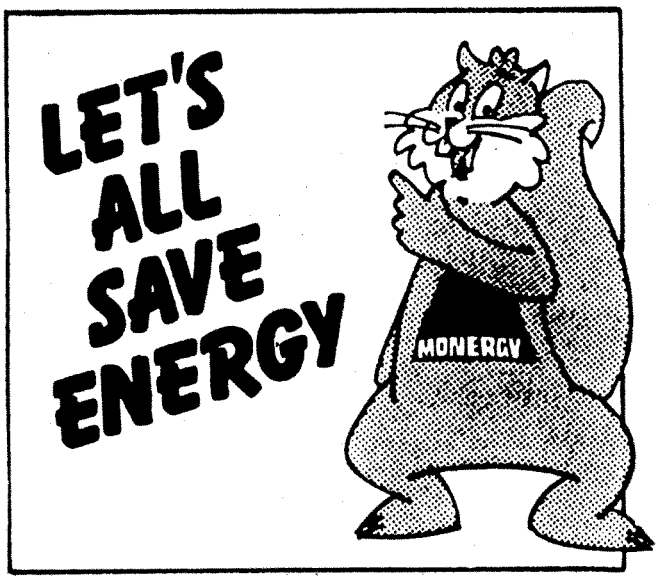
Lord Rayner, of course, did not undertake all the detailed work on his study himself. Instead he delegated it to an Assistant Secretary plucked from the Gas Division of the Department of Energy, one Elliot Finer. If that name sounds familiar, it is not surprising: some six years after he produced the blueprint for the way Britain should be running its drive for greater energy efficiency, the aforesaid Dr Finer has received his reward. This June he was appointed Director General of the EEO, and asked to put his concept into practice. In the interim the Office has had to weather a variety of vicissitudes.

Its formation was announced by the then Energy Secretary Nigel Lawson, with its arrival duly trumpeted in the winning 1983 Conservative General Election manifesto. Concern that the new Office would consist of little more than changes of notepaper for the old and battered Conservation Division of the Department of Energy soon vanished when, after the election, a new Energy Secretary was appointed.

WALKER NOT A 'TRUE BELIEVER'

Peter Walker had already established himself as the **enfant terrible** of the Cabinet in his previous incarnation as Minister of Agriculture: clearly he was not a 'true believer' in the Lawsonian creed which stated that, once energy prices found their true market level, appropriate investment in energy conservation would follow as surely as the night and day, and the Government would just be a passive observer. The deliberate promotion of the nexus between financial outgoings and potential savings fitted well within Mr Walker's personal philosophy which considers man as fundamentally motivated by financial considerations, and whose apparent purblindness to energy efficiency was purely a case of ignorance which could be solved by a high profile publicity campaign.

And so the Monergy campaigns, and Energy Efficiency Year 1986 were born, amidst much hullabaloo of Breakfast Specials, 2000 Events and special business advisers. Throughout his four year tenure at Energy, Peter Walker worked on the philosophy that so long as enough businesspeople heard the energy efficiency message - preferably from his own lips - then the admitted problems of Britain's dire energy performance would be solved. Over and over, he kept saying how he intended to



1	Continue the co-ordination established in 1986 between all involved.	8	Make every architect aware of need for energy efficient design.
2	Build on the prestige and training of the energy manager.	9	Create an inexpensive home energy audit system.
3	Substantially expand the monitoring and targeting programme.	10	Prepare an energy efficiency check list for the home purchaser.
4	Encourage use of the energy efficiency survey scheme.	11	Expand the community insulation programme for low income families, to reach 460 projects by the end of 1987.
5	Increase the number of energy efficiency demonstration schemes and the effort in marketing the proven technologies.	12	Double the number of building demonstration projects.
6	Seek improved performance in the public sector.	13	Allocate research and development funds to energy efficiency.
7	Promote energy efficiency in the home, with special effort on its inclusion in major housing rehabilitation schemes.	14	Persuade building societies and banks to recognise the importance of financing building efficiency.

Peter Walker's Fourteen Point Plan for the Energy Efficiency Office (1987)

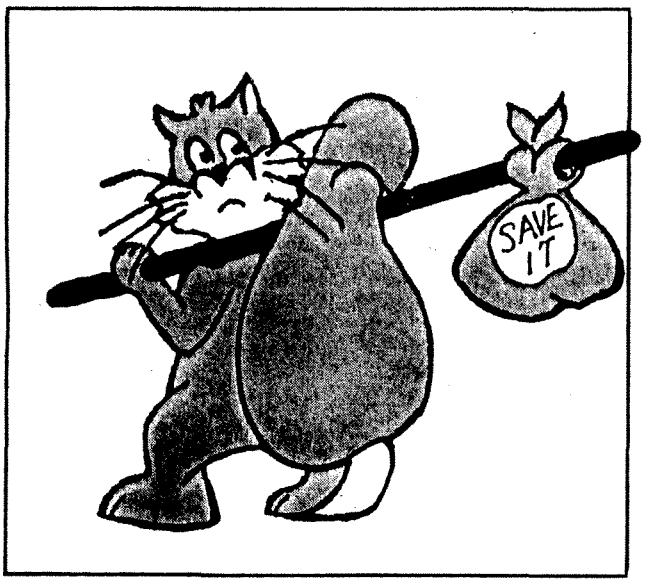
lift Britain from the bottom of the international energy efficiency league to the top by the end of the decade.

WALKER'S FOURTEEN POINT PLAN

At the close of Energy Efficiency Year, less than two years ago, Peter Walker set out a 14 point plan for the future activities of his EEO. They were announced with great fanfares at the (as it turned out, last) National Energy Management Conference to be run exclusively by his Department. It is distinctly sobering to inspect them now. (See Table)

Clearly the ensuing two years have not seen much of this happen. Indeed many of the moves have been in the exact opposite direction. Just taking the first few items on this list.

The "prestige and training of the energy manager" was dealt a heavy blow by the decision to remove even the tiny seedcorn funding for local groups; the energy efficiency survey scheme has been discontinued; the monitoring and targeting programme is being wound down.



During this period, whatever the public statements of continuing commitment to the cause from Peter Walker's successors, both the budget and most particularly the morale of the Energy Efficiency Office plummeted. There was a haemorrhaging of some of the brightest staff, who have left for pastures new. The whole existence of an energy efficiency initiative from Government, headed by an effective office, was severely questioned. Doom and gloom was the order of the day.

And then the tide turned. To put a precise moment upon its alteration would be difficult. Perhaps it could be simply when Elliot Finer was appointed Director General, and everyone both within and without Whitehall recognised the Office was at least being run by someone who empathised with its objectives. Perhaps it also occurred when other issues beyond the simple Money/Energy/Monergy equation raised their heads, and only energy saving could provide an answer: like the Greenhouse Effect, the hole in the ozone layer, and worries from carbon poisoning.

These are all matters to which the balloons and razzamatazz which epitomised the EEO of 1983-88 would have found difficulty responding, forced to regard the issues as purely a financial one. In practice the arguments surrounding Government's role in the promotion of energy efficiency are likely in the future to concern far more the quality of our life and atmosphere - as evidence from the Prime Minister's astute Royal Society speech. The opportunity to turn energy conservation back into the mainstream political issue it could have been following the 1973 and 1979 oil price hikes is presenting itself again.

Those charged with running the EEO have an awesome opportunity ahead to achieve this metamorphosis. Dr Finer's team are undoubtedly sending out strong signals regarding a desire for action. But as the tide turns, we have to ask ourselves: Are they waving or drowning?

ANDREW WARREN is Director of the Association for the Conservation of Energy (ACE).

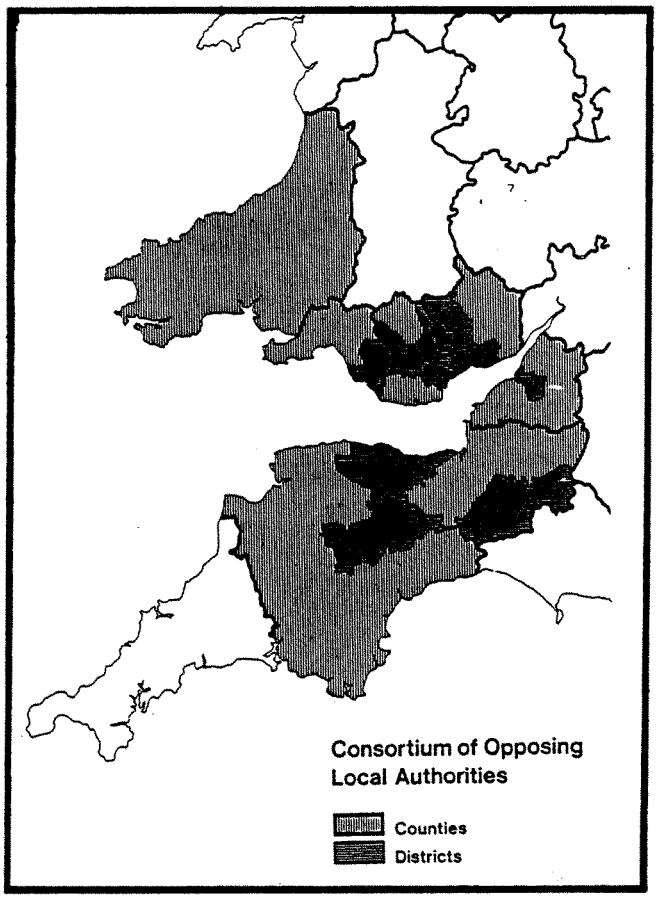
COLA - The Real Thing!

The major objector at the Hinkley Point C public inquiry is a grouping of 22 local authorities. Cola, the Consortium of Opposing Local Authorities, is a major step forward - it is the first time that democratically elected councils, representing nearly four and a half million people, have pooled their resources to oppose a nuclear power station. Their evidence includes a detailed account of alternatives to the PWR. MIKE TOWNSLEY has read their evidence.

There is a rule of logic - Occams Razor - which advises: don't look for a complicated answer when a simple one will do. It could be applied to public inquiries - at Hinkley, it isn't.

If logic were the language of public inquiries then the simple solution for the Pressurised Water Reactor (PWR) inquiry at Hinkley Point in Somerset would be energy conservation: it is cheaper than any other power source; more environmentally benign; and it can be 'brought on' at a rate which is compatible with today's most pressing environmental problems.

Unfortunately, by some perversion, the inquiry will not reach this logical conclusion. Objectors are being forced to extend their solution well beyond the simple, and to address many arguments against the CEGB's plans.



The Consortium of Opposing Local Authorities - Cola - are the major objector (by virtue of being the only ones with a QC). As part of their wide-ranging and comprehensive case, which includes energy conservation, and an excellent proof of evidence on least cost planning, by Ian Brown of the Association for the Conservation of Energy, they put the case for alternative energy sources.

Alternative energy sources are those, excluding nuclear, which fall into the non-fossil fuelled fraction or 'ring fence' as it is being called. Cola focus on four alternatives: wind, waste and small hydro, backed up by imports from Scotland, France and Iceland. Their case has attracted some criticism for not including everyone's favourite renewables: wave, tidal, offshore wind, solar. Many of these are excluded because, in Cola's opinion, they would be unable to meet the turn of the century deadline set by the CEGB's demand forecast.

"There has been very little development in the UK of generating plant using waste, wind and hydro resources which might be taken as indicating their unviability. However, these have all been developed on a major scale in various other countries," argue COLA. They continue: "In the past legal and institutional impediments have stood in the way of these technologies, including notably the CEGB's plant references, buy back rates offered to private producers, and the onerous local authority rating suffered by independent electricity producers."

Privatisation, they hope, will wipe the slate clean, and put all forms of generation on an even footing, depending on which side of the 'ring fence' they fall.

WIND ENERGY RESOURCE

Onshore wind provides the thrust of the case. Using medium sized turbines - 2-300kW 'off-the-shelf' machines, because they have established themselves commercially - they show that 3000MW is available on sites with wind speeds above 7.9 metres per second, and observe that "available wind resource is not constrained by cost when compared against the CEGB's own estimate of costs for the PWR ... except at the lowest discount rate of 5%." A 5% discount rate is much lower than that normally demanded by the private sector.

They promote a "conservative" installation scenario: 3000MW could be installed between 1990 and 2005, with 1700MW of turbines in place by 1998. This would give a firm winter peak of 668MW, at a cost of 3.4p a unit at a 10% discount rate.

METHANE GAS FROM LANDFILL

Waste disposal is now a subject of considerable concern: there have been several reports of exploding landfill sites, and many injuries. Waste dumped in landfill decomposes to form methane gas. This gas can be harvested, if the landfill is properly sealed, via a system of pipes. The gas can be used to generate electricity. The Consortium judge the potential from 'live' landfill sites, those still being used, at 135MW, with a further 90MW available from 'dead' landfill. The costs are comparable with the PWR.

Landfill currently accounts for 90% of domestic waste disposal in this country. However, as the number of available sites diminishes, incineration

may gain increasing currency. This can also be used for electricity generation. But, because hazardous gases such as dioxins can be produced, Cola include the cost of cleaning the flue gases when calculating the price of the electricity generated.

The CEGB argue that Hinkley C's power will cost 3.9p a unit (at a 10% rate of return). Under such conditions of cost and rate of return, Cola show that 200MW firm capacity from waste could be generated by 2000.

CONSIDERABLE SMALL HYDRO POTENTIAL

During the mid 19th century some 20,000 sites were exploited for hydro power. In fact, of all the available sites, very few have not been used at some time or another. Small scale hydro - between 5kW and 5MW - has considerable potential throughout the UK. This is the shakiest part of the Cola proof.

Although it does not seem outrageous to make claims for small hydro, Cola produce no actual figure for the potential, although they hope to present a comprehensive study of the resource in England and Wales, when the University of Salford has concluded the work. Indications are that the resource available will be more economical than Hinkley C.

However, as a temporary measure, they conjure up a figure of 100MW for small hydro in England and Wales, which they believe to be broadly in line with partial surveys commissioned by the Department of Energy: "Although much of the existing hydro resource has been exploited, there is still significant potential for various sizes of hydro power, and in particular run-of-the river schemes." They admit that power from such schemes would be intermittent but, during the winter months when demand is high, they claim a very high availability - in the region of 90-95%.

ELECTRICITY IMPORTS

Scotland, France, and Iceland could provide England with more than enough power to render Hinkley C irrelevant. Imports are included in the non-fossil fuelled quota, regardless of the means of generation. As the principle that environmental problems are globally pervasive is becoming increasingly accepted, such an attitude is nothing less than irresponsible, and parochial in the extreme.

Scotland

Scotland could become the power house for England. Cola note that "On the most conservative estimate at least 1750MW" are available for export to "England and Wales well beyond the turn of the century." This is currently limited by the capacity of the existing power lines. The Secretary of State for Energy, Cecil Parkinson, has declared his intent "to strengthen the interconnector", and refers to the "2000MW of capacity already available with a strengthened interconnector." This could be available by 1994, before Hinkley C, and at a discount rate of 8%, the power would cost about 3p a unit.

France

The French Connection, a 2000MW DC transmission link, originally intended to permit balanced two-way flows of power between the CEGB and EdF (Electricite de France), is another example of how Hinkley's quota could be met. The reality is that surplus 'cheap' French nuclear power has been streaming across the channel almost continually.

Source	Capacity (MW)	Completion Date	Cost (p/kWh)
Wind	668	1998	3.4
Waste	200	2000	3.9
Hydro (1)	100	-	-
Imports:			
Scotland (2)	1750	1994	3.0
France	1500	1998	2.6
Iceland	500	1998	5.4
Hinkley C (3)	1200	1998	3.9

Notes:
1 No detailed figures available
2 Using an 8% discount rate
3 CEGB figures

Sources of power as alternatives to Hinkley C

Electricity currently obtained from France costs the CEGB 25% less than home-produced power. Cola estimate that, given the investment required to extend the capacity of the link, the electricity would cost 2.6p a unit. Given an 8% discount rate, 1500MW would be achievable.

Both Scottish and French exports would rely heavily on their own nuclear overcapacity. Relying on such imports can only be justified if they are used as a bridge to a sane energy strategy based on benign renewable energy sources.

Iceland

Imports from Iceland would be a more palatable alternative. They can offer electricity generated from renewable energy sources - geothermal and hydro. Currently only about 13% of their hydroelectric potential, and only a very small fraction of the geothermal potential, is exploited.

Iceland have been considering the possibility of supplying power to the UK for some time. A report commissioned in 1976 estimated the cost of supplying power to central Scotland, via a 2000MW DC cable, at between 1.9p and 2.6p a unit. In January this year, a report commissioned by the Icelandic Power Company estimated that, with a 500MW link, a unit delivered to London, would cost 5.37p at a 10% discount rate.

DIVERSITY AND SECURITY OF SUPPLY

Given the need for diversity of supply, in an attempt to promote greater security of supply, Cola argue: "There can be little doubt that a judicious mix of renewable generating sources is superior to a programme of nuclear power stations."

Nuclear stations, being highly complicated and centralised, are more vulnerable to industrial or terrorist action, or a major accident, than the much smaller and simpler, diverse and dispersed renewable plant. Indeed in some cases they provide power a good deal cheaper.

Overall, the Cola line is that a mix of renewable sources and imports are preferable to Hinkley Point C as contributions to satisfying the non-fossil fuel obligation, on economic and wider grounds. Their case although not pioneering, more plodding, gets there in the end, and offers a viable alternative to Hinkley C.

CHP - The New Opportunity

Concern for the environment and privatisation of the electricity industry are just two reasons why the time is right for combined heat & power and district heating to take their rightful place in the UK electricity industry. DAVID GREEN puts the case for CHP, and advises on how we can help.

In the past month two major Combined Heat and Power (CHP) schemes have been unveiled. After years in the doldrums, there is now a new found sense of opportunity amongst those who have long been promoting the development of such schemes; which both produce electricity and capture and use the heat created in the process.

So, as BP Energy announced the first ever scheme to be developed by a turnkey contract energy management company, swiftly followed by Shell subsidiary Emstar, what has created this new level of interest in energy efficient CHP schemes?

PRIVATISATION PROVIDES A SPUR

Essentially, four major factors have come together to put a new vigour in the CHP industry. Firstly, impending privatisation of the electricity supply industry has, together with the Government's new found interest in the environment, spurred a fundamental reappraisal of how the nation's energy needs are met.

Clearly there is a great opportunity to secure better insulation and heating measures - but to do that alone would ignore the significant benefits of capturing heat from power plants and using it in local areas. According to the Open University's Energy and Environment Research Unit (*), this could significantly cut greenhouse gas emissions in the UK by boosting the overall energy efficiency of a conventional power station to 70% or more. As the market for new generation equipment opens up in the UK, then so too will the scope, in appropriate locations, for Combined Heat and Power schemes.

MAJOR SCHEMES PLANNED AND RUNNING

Already two major cities have invested a considerable amount of time and effort into large scale CHP developments - Sheffield having gone 'live' on the first stage of its scheme in 1988, and hopefully Leicester Energy will get of the ground in 1989. Each of these schemes represents a clear example of the diversity of opportunity open to CHP developers: as Leicester concentrates on electricity production with heat to follow, Sheffield takes heat first, and goes to full CHP operation in its proposed third phase.

Elsewhere in the UK, larger 'city' schemes are being considered. In Newcastle, a shift in development emphasis has created a new impetus behind the prospects for CHP, with a potential 'inner city' CHP scheme now being looked at by a grouping which includes the North Eastern Electricity Board (the future NEE plc). This scheme would most probably be based on a high efficiency gas combined cycle plant, designed to integrate with the regeneration of the City's quayside, pioneered by the City Council, and now adopted by the Government's Urban Development Corporation.

Virtually three hundred miles to the south a further local opportunity is under review. A south east group of inner city London Councils is looking to the private sector to develop a CHP-based 'energy-from-waste' scheme designed to cope with their own need for an improved and cost effective means of waste disposal. While it is too early to tell if the investigations now under way will bear fruit, it is already clear that the area of energy-from-waste schemes is set for a new era of opportunity - a challenge examined in more detail below.

Yet CHP schemes are not just based on so-called 'big city' schemes. The concept of 'mini-power stations' that enable major facilities to declare energy independence is developing rapidly.

The Department of Energy have identified over 4000 sites where CHP schemes under 1MW (electricity) in capacity could operate. The combined output would total some 320MW of electricity - equivalent to one typically sized power station. Indeed, this is one area ripe for local activity. More and more local authorities, for example, could be striking a blow for the environment and a rational energy policy by going 'mini-CHP' and linking up with some of the exciting ranges of equipment and services now available in this field.

TENANTS BENEFIT FROM DRAMATICALLY REDUCED ELECTRICITY AND HEATING BILLS

An example of what can be done is the London Borough of Waltham Forest. In this instance, they have won one of the prestigious British Gas Premier Housing Awards for their application of CHP technology.

A group of 25 homes, which form sheltered accommodation for the elderly - inherited by the Council from one of east London's nineteenth century philanthropists - is now benefiting from dramatically reduced electricity and heating bills as a result of small scale CHP systems. The tenants also have the advantage of new 'pre-paid' combined heat and electricity meters. Indeed, both the engine and the innovative metering systems have been supplied by Combined Heat and Power Association (CHPA) member companies. Many more such sites around the UK could benefit from CHP technology.

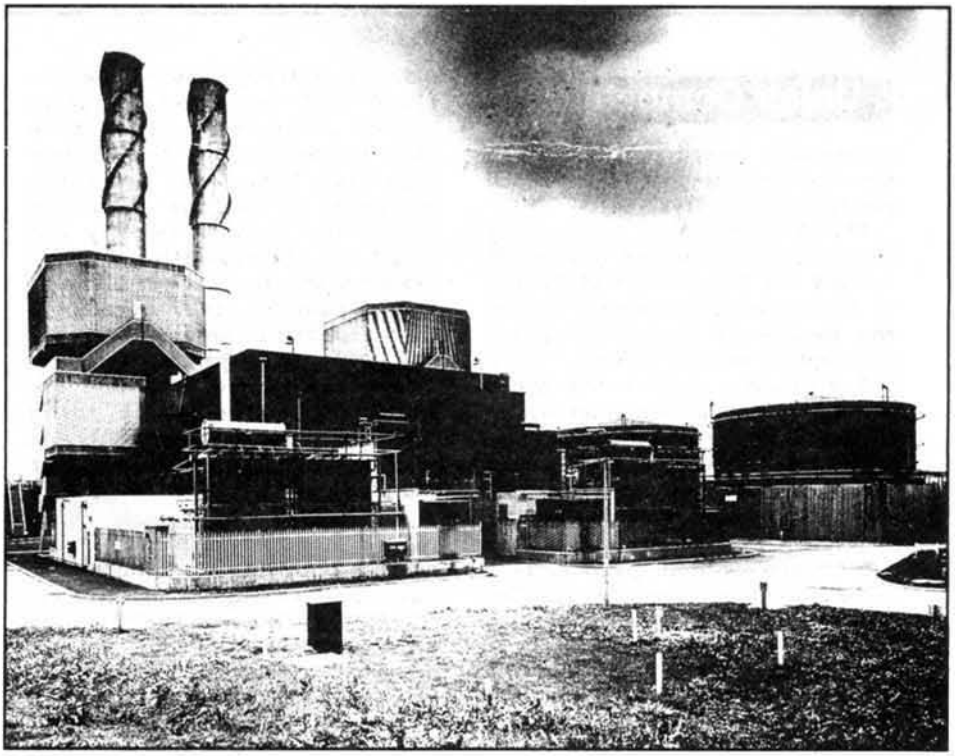
Yet elderly people are not the only local authority tenants set to get the benefits of CHP. The inheritance of 'sixties tower blocks provide energy experts with a major challenge. Insulation can work miracles - provided there is a cost effective source of heat. In a number of areas in the UK, local authorities and their private sector partners are turning to 'mini-CHP' schemes as the heating solution. As these come to fruition the potential will be clearly demonstrated.

Similarly, where a public landlord has a significant problem with an old style district heating system,

rather than rip it out, now is the time to go CHP. On-site conversion to a localised CHP system could not only stimulate and revitalise the system, but it could also enable local authorities to become sellers of electricity (an opening created by the CHPA in its lobbying prior to the publication of the Electricity Bill!).

ENVIRONMENTAL CONCERNS

All these examples of the scope for CHP development underline what is in fact the second major reason for the new sense of purpose in the CHP field - the environment. With Energy Secretary Cecil Parkinson raising the CHP interest as part of his strategy to cope with the greenhouse effect, it is clear that much can be gained through such a route.



CEGB gas turbine station in Leicester's city centre - the core of their scheme.

According to the Open University, a 10 per cent cut in the UK's greenhouse gas emissions could be achieved by taking the CHP route. It is a point echoed by many others in their presentations to the Commons Energy Select Committee.

What else then is influencing the future of CHP? Born of environmental concerns, the third effect on the CHP field comes from the need to improve and renew Britain's ageing incineration stock.

Assuming concern over the physical environment places a limitation upon tipping in the countryside, then more waste may be incinerated. With the introduction of new emission control technologies, and tighter controls from Brussels, there may well be an upsurge of investment in incineration. Significantly, such an approach will itself be counted inside the 'non-fossil fuel' ring fence of the electricity industry post-privatisation. Much could be gained by incineration operators through this in the future.

REORGANISATION OF THE CHP ASSOCIATION

How are these opportunities to be exploited? It is important to recognise that a fourth factor in the CHP market is the CHPA itself.

Refreshed from a period of major internal reorganisation, and backed by the new generation of CHP companies and local authorities, the Association is now able to ensure that the industry is effectively represented in Whitehall, and able to take a central role in the debate on the future of energy supply in the UK. Such a voice is needed to sustain the new sense of optimism present in the field - an optimism already shown by the growing order books of most major companies active in the CHP field: a demonstration of the economic benefits that flow from a national and effective approach to energy supply.

Environmentalists have long urged commitment to CHP - it is therefore a unique time to take up the issue from the perspective of local environmental/ energy groups. What, therefore, can you do to help turn CHP into a reality. Why not:

- contact a number of local authorities, particularly through councillors, to find out if they have considered small scale CHP applications in their own buildings;
- find out which local authority committee deals with refuse disposal, and write to its Chair to see if they have any plans to upgrade or install an incinerator that operates as a CHP plant;
- ask a major institution in your area to host a one day event on CHP - the CHPA can usually help out at such events with speakers and so on;
- talk with local tenants groups about problems they may have with district heating. Why not get in touch with tenants groups in Sheffield to find out how they successfully worked to build up their council's commitment to CHP.

Such practical steps will help advance some of the statements and concerns not only of local authorities, but also of your group. They will all help to create new opportunities and bring about the sustainable approach to economic development which Heads of Government, including the UK Prime Minister, are now calling for.

Combined Heat and Power has a unique and practical contribution to make to the development of an environmentally benign energy strategy for the UK. Much is already happening and more can be done. Indeed, as the environment moves centre stage, it is clear that CHP advocates now have the platform of opportunity they have been seeking for so long.

Let's get going!

* **The Greenhouse Effect and Energy Policy.** Evidence prepared for the House of Commons Energy Select Committee inquiry into the Greenhouse Effect by The Energy and Environment Research Unit, The Open University.

DAVID GREEN is Director of the Combined Heat and Power Association.

Unfair Competition

Renewable energy will not be free to compete in the privatised electricity industry.

The Association of Independent Electricity Producers (AIEP) informed the Department of Energy of their "serious concern" over the degree of protection being afforded to nuclear power.

The problem lies in the quota system which is being set up to induce diversity, in that the distribution companies are being forced to purchase a set percentage of non-fossil fuelled power.

Steve Andrews, director of the AIEP, believes that given current Department of Energy (DoEn) plans, renewable energy sources could be crowded out for at least the next 10 years.

The DoEn hope to have the quota set by 1 January - 15-20% is expected to be the non-fossil portion, the majority of which will be consumed by the nuclear industry. Although many alternatives will be cheaper than nuclear power, they will not be able to replace all the nuclear capacity. Therefore, when the contracts to fill the quota are signed the nuclear industry will insist on all or nothing; thus marginalising renewables, although they would be free to compete with coal fired stations.

A DoEn spokesperson admitted: "When the nuclear contracts are set it's true the whole thing could be sewn up. We are trying to sort out a system to prevent that."

Fair competition was dealt another body blow in March. It has come to light that although Cecil Parkinson, the Energy Secretary, had said that private producers should be "rated on a basis comparable to the rest of the electricity supply industry," this will not happen immediately.

According to a Department of Environment consultation paper on business rating, future rating changes should be phased-in so that adjustments amount to no more than 10-15% annually. Applying this to power stations would mean "it could be a least 6 or 7 years before private generators enjoy the parity they are seeking," say the AIEP.

One private power station, valued recently, faces a rates bill of £14,800, whereas, if it were rated in the same way as a CEGB station the bill would be only £2,400. The Association comment that the situation in Scotland is even worse.

George Rutherford, the AIEP's chair, said "The Government wants our members to provide competition when the Boards are privatised. Electricity Boards already get away with paying independents much less for their power... We welcome competition if the rules are fair but it will be nothing but a sham if independents are to be pushed aside like this."

Severn Barrage

Costings given at the Hinkley C Inquiry, by the Severn Tidal Power Group (STPG), have seriously damaged the prospects of the proposed tidal barrage; but buried deep in the statement of the Group is evidence that the real cost of a unit of electricity from tidal power would be 0.4p, "less than a halfpenny," writes DAVID ROSS.

The Inquiry has been told it would cost far more than 0.4p/kWh. The STPG estimated costs of 3.79p, for a discount rate of 5%, and 6.73p, if the more common commercial discount rate of 8% is invoked. Whereas the CEGB estimate a unit cost of 2.24p for a PWR.

Yet the Group's evidence provides the lie to their own figures. They say that the design life of the Barrage is 120 years and add, "with reasonable maintenance the actual life could be indefinite."

Their calculations make no allowance for these facts. It could fall down in thirty years, the ambitious lifetime allocated by the CEGB to their nuclear plants, or even forty years which they allow for Hinkley C: it would make no difference to the book keeping costs of a unit of electricity, which is based upon capital costs and return on investment. Long after Hinkley C has been handed over for the expensive process of decommissioning the Barrage will be generating electricity, using free fuel supplied by the rise and fall of the tide.

How does one arrive at the figure of 0.4p? The report of the STPG says that the operation and maintenance (including major refurbishment of turbine generators on a 30 year cycle) will cost £70 million a year. The Barrage will have an annual output of 16.7TWh. This means that 1TWh will cost £4,191,616 which gives a unit cost of 0.4p.

This coincidentally is the figure given by the Hydro Board for its hydro-electric plant; so the figure is far from unrealistic. Scotland's hydro plant was built years ago and so the capital cost has receded into the past, and can therefore be discounted when working out the unit cost.

Although the STPG had not intended to present evidence, they did so at the request of the inspector, Michael Barnes QC. In an attempt to take no sides in the dispute about the PWR, they decided to update the figures in their 1986 report. The resultant document has many failings and should be submitted to the Inquiry for examination.

For instance, it makes no provision for profits that could be earned from a road running along the top of the Barrage. The roadway would create a short route between South Wales and Southampton; giving trading prospects with the EEC and rejuvenating the depressed steel and mining areas. It is a facility which could be used by the Barrage utility itself or put up for sale for £600 million or more.

It has provided for large locks in the Barrage to accept ore carriers of up to 100,000 tonnes for the Linnwood steelworks, and 25,000 tonnes ships bound for Bristol. This is to meet, purely ornamental, archaic legal requirements. It would be much simpler to request a revision of the Law when parliament considers a Barrage.

It also allocates a cost of £850 million to reinforce the grid - a figure provided by the CEGB and accepted without question. It is considered by some experts to be grossly exaggerated.

The better solution for the Inquiry would be to invite Canadian experts, who are building a tidal barrage on the Bay of Fundy, to come to the UK and explain why their country believes tidal power is superior to nuclear.

Why should the STPG be so modest in presenting their case? The members are McAlpine, Balfour Beatty, GEC, Northern Engineering Industries, Taylor Woodrow, and Wimpey. All are engaged in work for the nuclear industry.

Islay Waves

The Department of Energy have given the go-ahead for the third phase of research and development into the 'Shoreline Rock Gully' wave power station on Islay. (SCRAM 68)

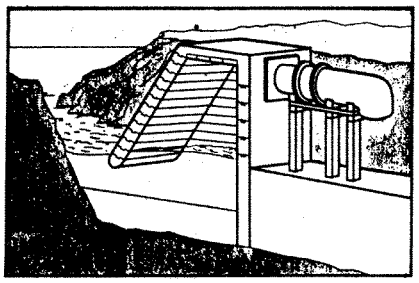
The contract to complete the station - to build and install the turbine, to link it into the island's supply network, and to carry out extensive monitoring - was awarded to Queens University Belfast, who designed and installed the plant in March.

The contract is estimated to be worth over £100,000; by the time the project is complete it will have cost them over £600,000. The DoEn will make an announcement "shortly".

A Wells 'biplane' turbine will be used and Howdens of Glasgow are building it, under licence.

It is hoped the turbine will be in place by the end of the year and that the plant will be delivering electricity to the island's inhabitants next year.

Originally it was hoped the contracts would be placed in July last year. However, severe weather conditions delayed the completion of the oscillating water column, which will harness the sea's energy and channel it into the turbine.



The device has been built into a naturally tapering gully, which it was believed would make the device less expensive. However because of the weather conditions much time, and money, was lost. They are now considering the future possibility of blasting a wedge into the cliffside, and building the chamber in it; only then will a channel be cut to let the sea in.

Dr Whittaker, the device's architect and head of the Queens team, said: "The machine will demonstrate the credibility of wave power. At present most people, including civil servants, seem afraid of the sea, despite its vast potential."

"A detailed survey will be undertaken of the UK potential using both natural and man-made gullies," say the DoE. However, a DoEn spokesperson said they are "proceeding with this project because we believe that it represents the best available option for the UK" but "it is very much aimed at island communities who rely on diesel generated electricity."

Once completed, those involved hope the station will act as a 'shop window', attracting interest from what is seen as a considerable export market for wave power, especially from developing countries where a unit of electricity can cost between 20 and 30 pence.

Wind Power Development

Capel Cynon, in Dyfed, will be the site of Britain's first full scale wind farm, if the results of tests started at the beginning of April prove favourable.

The CEGB have installed a test wind farm, which consists of three masts, ranging in height from 40m to 50m, which will calibrate wind speeds and direction. They are also planning to measure solar radiation, rainfall, relative humidity, temperature and lightning strikes.

Testing will last for one year, and if favourable the farm will eventually have 25 medium sized turbines, each rated between 300kW and 500kW, with a total output of 8MW.

Visual impact is considered the greatest pollutant from wind farms, but Dr Jim Halliday of the Rutherford Appleton Laboratory, who is working on the Dyfed farm, said: "The turbines can be designed to look very elegant, and to blend in with the landscape. Part of the test will be to asses the public attitude towards wind farms."

The people of Dyfed appear keen to have the wind turbines. But, for the other two sites, in Cornwall and County Durham, which make up the Board's trio, opposition is mounting.

Langdon Common in County Durham is an Area of Outstanding Natural Beauty, and the Countryside Commission are objecting to the proposal to built a wind farm there. Also no local farmers have yet been persuaded to host any turbines.

In Cornwall the problem is the landowners, or rather the CEGB's 'laissez-faire' approach to consultation. Local landowners reacted to their treatment late last year by refusing to allow the Board access to conduct tests. At one point the CEGB appeared ready to invoke the right of compulsory purchase.

However the Board have had an apparent change of heart, and after paying for the local landowners to visit their demonstration site at Carmarthen Bay, they have now been allowed to conduct their tests.

● Plans to build a windfarm in the Dounreay area have received encouraging support from the Secretary of State for Scotland, Malcolm Rifkind, and the Commons Energy Select Committee.

The Committee agreed to examine the potential of renewable energy in Caithness and Sutherland prior to visiting Dounreay in May.

The idea was brought to the Committee's attention by Alex Salmond, their only SNP member, and only Scot. In fact the idea hails from Kerr MacGregor, a senior lecturer in Energy Engineering, and the SNP's energy spokesperson.

The idea is that by installing between 240 and 300 wind turbines the 240MW capacity of the prototype fast reactor could be replaced. Also jobs can be created to help cushion some of the blow from the rundown of Dounreay. It offers the prospect of 500 construction jobs, and 200 long term jobs.

The area, arguably one of the best in Europe for wind power, could also host a renewable energy research and development centre. Nationalist Euro MP Winnie Ewing has added her voice to the call: "The immediate pool of skills and knowledge at Dounreay must not be wasted and such a research centre could lead to the creation of an advanced 'Technical Institute of the North' securing the future of Caithness economy."

Hungary Hydro

The Hungarian Parliament's resolve over plans to build the Nagymoros/Gabicikovo hydroelectric dam are faltering.

Prime Minister Miklos Nemeth said they were considering holding a national referendum, in response to evidence presented to parliament in early March.

Legislation on the referendum and a new report on the costs of the project will be presented to Parliament during its May-June session.

Cornwall Energy Plan

£62 million could be cut from Cornwall's annual fuel bill by the turn of the century, according to the Cornwall Energy Action Plan, which was published at the end of February by the Cornwall Energy Project. (SCRAM 68)

Energy conservation is at the heart of the plan. It calls for a saving of 14% of 'non-transport' energy (10% of all energy), which would save about £25 million a year; this would require an annual investment of £8m. This is on top of savings which will occur naturally, as old equipment such as boilers are replaced with new more efficient equipment.

By using "commonsense conservation measures and harnessing some of the County's abundant sources of renewable energy," the Action plan would "stimulate Cornwall's economy by directly creating up to 800 jobs locally."

Public information will play a vital role in achieving their goal. The Plan urges prompt action to establish an energy centre to co-ordinate, harness and promote the improvement of energy efficiency in all sectors. An energy label for each house, as is already the case in some Scandinavian countries, is suggested, and monitoring and targeting in industry and the service sector, including the preparation of appropriate finance packages, will also be undertaken.

Renewables

Renewable sources of energy also have their part to play. Wind turbines are economic now, and Cornwall has a better than average wind climate, with average wind speeds on "the sites investigated" of 8m/s. "Wind generated electricity could theoretically provide for 60%" of Cornwall's electricity needs.

However, the Plan adds that the precise "level of development would depend critically on the availability of quiet machines." The Cornish countryside is particularly quiet, with ambient noise levels of around 30db during the day. Companies are now working towards reducing noise from wind turbines.

The average generating cost for sites studied was 2.9p/kWh, using a 5% discount rate (as do the CEGB) - considerably lower than the 3.4p/kWh the Board charge the South Western Electricity Board.

The largest technical potential for the area is offered by geothermal power. The Plan notes that "although the Camborne School of Mines are making good progress in understanding the technology, it is unlikely to be demonstrated commercially during the ten years covered by the Plan."

Biomass also offers considerable potential. Currently only 4% of the total Cornish land area is woodland, compared with 10% nationally. Farmers should be encouraged to diversify into this area, comments the Plan.

Combined heat and power could generate 171MW and provide an annual saving of £28.3m. Over the ten years of the programme, as many as 30% of boilers in the area will need replacing. At such a time the extra capital cost of CHP can be recovered very quickly, "giving effective paybacks of about 2 years."

25MW could be obtained from refuse derived fuel, 7.2MW from landfill gas, and a further 55MW from incineration of processed waste. This would also go some way to help solve the increasing problems of waste disposal.

Water, tides and waves

Cornwall has a high annual rain fall and a rolling landscape, which leads to many fast flowing streams and rivers. The Plan has identified over 180 rivers offering at least one possible small hydro site - about 5MW of hydro power is available, with an estimated payback of 6 years. Lack of education is cited as the main reason why this resource has not already been exploited.

Tidal power could also add to the renewable generation in Cornwall, but it requires further investigation. A potential of 75MW was identified by Binnie and Partners, who surveyed the west coast for the Department of Energy.

Cornwall is influenced by massive atlantic rollers, and has an excellent wave climate for electricity generation. Work in this field for the duration of the plan would mainly focus on assessing the relevance and potential of wave power.

The Cornish initiative shows the potential for renewables is far greater than Government estimates, and if the Plan is carried out it could lead to other areas, post-privatisation, setting up similar projects - and returning the power to the people.

NEA and the ET-EDM

A Parliamentary Early Day Motion, tabled on 28 February, calls on the Government to ensure the survival and expansion of the "national network of energy projects, initiated and developed by Neighbourhood Energy Action (NEA)." It has attracted cross party support from 108 MPs, including several members of the Energy Select Committee.

The EDM is intended to highlight the severe effects of the Employment Training legislation on the viability of community projects. (SCRAM 69)

A meeting to publicise the EDM, and the plight of energy projects, was held in the House of Commons on 21 March, and was attended by several organisations: Age Concern, the National Fuel Poverty Campaign, NEA, Heatwise, Energy Action Scotland, FoE and the Association for the Conservation of Energy.

NEA point out that "they have allowed the destruction of a highly successful programme to insulate the homes of low-income households across the nation" in response to the Government's pronouncements on combating global warming.

Other participants at the meeting described the likely consequences of ET for the elderly and the poor: "fuel debt, higher fuel bills and thousands of pensioners at risk from hypothermia and other cold related diseases."

Andrea Cook, Director of NEA, told the meeting, "Employment Training is not a suitable vehicle to deliver energy efficiency measures. We are asking for an alternative, publicly-funded programme to deliver a comprehensive range of heating and insulation measures to assist the old and cold."

She suggests that: "The £50m which currently supports the project network could be channelled through the Department of Energy or an independent charitable trust to ensure a more stable and efficient community insulation programme."

NEA intend to keep pushing the Government to see sense, and to withdraw the unworkable ET legislation which is being forced upon insulation projects.

The next issue of SCRAM will feature an article from NEA outlining their campaign to establish a fair and workable regime for insulation projects.

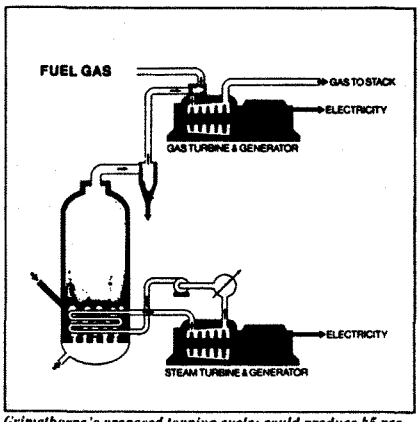
Coal Cleanup

The first contracts for the flue gas desulphurisation (FGD) plant to be fitted to Drax, Europe's largest coal fired power station, were announced by the CEGB on St Valentine's Day.

The plant costing over £550m, one third more than originally anticipated, will be Europe's largest. Babcock Energy, who licence the limestone/gypsum design from Hitachi, have won the first contract valued at £300m. Work on the plant will start later this year.

European legislation, calling on member states to cut emissions of acid gases from coal fired power stations, has created the notion of a 'smoke tax' to be built into the privatised industry. Adhering to Government interpretation of the 'polluter pays principle' as 'the consumer pays', the tax will be levied on all UK coal fired power stations without FGD and will be passed on to the consumer.

Head of the CEGB, Lord Marshal, believes it will add about 2% to electricity prices after privatisation: "All of the cost will be passed on to the consumers." As yet the exact details of the tax are unknown, as with a great many other things regarding the private electricity industry. It will depend on how much FGD has to be fitted to comply with the EEC, how the regulator allows the tax to be passed onto the consumer, and the cost of FGD at individual power stations.



Grimethorpe's proposed topping cycle: could produce 45 per cent efficiencies.

However, the Board have reversed their decision to fit a regenerative Wellman/Lord FGD plant, considered more environmentally acceptable (SCRAM 62), to Fiddlers Ferry power station. Circumstances have changed, claim the Board: "The new private companies cannot be bound by what was decided by the CEGB two years ago."

The Wellman/Lord process is more expensive to run, but requires less limestone, which is used in both processes, because it recycles it. The process also produces sulphuric acid as a by-product, which could be used in industry; limestone/gypsum has no such useful by-product. It does, however, produce a large quantity of toxic sludge which will have to be dumped in landfill.

FGD is not the only way to reduce the sulphur dioxide emissions from coal fired power stations. Fluidised bed combustion (FBC) offers an alternative. British Coal have called on the Government to pay £110m towards completing their work on FBC at Grimethorpe, where BC have been conducting research for 8 years. A Finnish company, A Ahlstrom, will provide £5m and BC the remaining £7m.

"We have followed the Government's suggestion and attracted private funding," say BC, "We think there is a strong case. Without Government support the benefits of 8 years work will be lost and somebody abroad will take it up."

"The Government provides £170m for civil nuclear research, and only £1m for coal research," complained BC, "Yet coal provides 75% of Britain's energy."

Although BC admit that their design would be of no use in large coal plant of 2,000MW or above, but are quick to point out that after privatisation smaller units of 400MW or so will become the norm. At this rating FBC would be cheaper and more environment-friendly.

Greenhouse Debate Warms

The global warming hypothesis has taken one step closer to realisation: 1988 has been officially confirmed as the warmest year on record.

The 1980s can now boast the 6 warmest years since reliable records began about 100 years ago. According to Dr Phil Jones of the University of East Anglia's Climatic Research Unit, "The upward trend this century is highly significant, but we can't say for certain that it is due to the greenhouse effect. If these high average temperatures continue through the '90s, there will be some point when we can be certain that it is happening."

The political climate has also warmed over the last month. Mrs Thatcher's well publicised conference on ozone, and a rival conference held in The Hague, reached contradictory conclusions.

Only a week after Mrs Thatcher, erstwhile scourge of the litter world, informed delegates at 'her' conference that she saw no need for any new legislation or organisations to help in the fight against the greenhouse effect, 24 nations agreed at The Hague to call on the UN to establish **Globe** - an organisation to formulate environmental protection legislation, to police that legislation, and to co-ordinate research into global pollution.

Evidence submitted to the cross party Select Committee on Global Warming indicates the growing disagreement on how the UK should respond.

Baroness Hooper, Under Secretary of State at the Department of Energy, claimed the Government were already taking steps by "encouraging energy efficiency and the nuclear programme." She also declared that no firm targets could be made or new legislation drawn up until the full extent of the problem was known.

On the subject of reducing carbon dioxide emissions from fossil fired power stations, she asserted: "We feel extremely sceptical about agreeing that a 20% target would be either feasible or necessary." And finally, she observed that "Unilateral action would have little effect in the global context, and it might effect our economic health."

CEGB director Derek Davies expressed the desire to see the Government "go beyond free market activity." He advocates increased research and a "pollution tax."

NERC, the National Environmental research Committee, need no reassuring over global warming: "There is a consistent scientific consensus that a significant global climate change will be induced," concluding that research should continue but "this must be in parallel with policy and management decisions."

The Hydro by Peter L Payne. Aberdeen University Press; 354pp, £25, 1988.

The sub-title of this book is 'A study of the development of the major hydro-electric schemes undertaken by the North of Scotland Hydro Electric Board.' Interested? Well I wasn't. As it turns out the book is somewhat more than this title would lead you to expect. Payne's obvious (and self-confessed) enthusiasm for his subject communicates itself, and makes the story quite gripping.

The book opens with an account of the development of hydro schemes in Scotland before the setting up of the Board in 1943. These were small-scale private, industrial or philanthropic schemes which increasingly met with opposition from many quarters. The large estate owners and the, as yet, still private coal industry were, as one might expect, particularly vociferous. Even Scotland's own representatives in Parliament, though aware of the received logic that power in the highlands would mean more jobs and a slowing of emigration, seemed to be suspicious that private enterprise generation could exploit the highlands even more ruthlessly than the landlords.

There follows a remarkably lively account of the successful efforts of the Secretary of State for Scotland, Tom Johnston, to steer the Hydro-Electric Development (Scotland) Bill through Parliament in 1943. The Bill was of interest in many ways, including the famous 'Social Clause' which put an obligation on the predecessor of the SSEB to buy surplus electricity so that the Hydro Board could use the profit to reduce the cost of electricity distribution to the more remote areas of the Highlands, and to carry out economic development and social improvements in the north of Scotland: much more than simply the generation of electricity.

Several of the vast construction schemes undertaken by the Board are dealt with in some detail, and many surveyed in less detail to highlight particular features of interest, or problems encountered. Here we meet the personalities involved and a wealth of technical detail which, backed up with extra information in appendices, is very coherently presented.

The heyday of the construction of hydro schemes drew to a close with the 'Mackenzie Report' in 1961, which questioned the rationality of further, now hugely expensive, hydro schemes in the context of other means of generation including nuclear power which would make hydro generation "as obsolete as the horse and carriage."

In the first 20 years, did the Hydro Board fulfil their objectives? Mr Payne tells us yes and no. Certainly, population decline continued and manufacturing industry showed, as it still does, a reluctance to move north. Construction work brought temporary employment to many, but little or nothing in terms of permanent jobs. Nevertheless the Hydro Board won a place of esteem in the minds of many Highlanders, because of its identification with the need to extend the supply to remote settlements.

All quite gripping stuff and well worth a read. To be picky though, I wish that the whole thing had been seen less in the context of giant personalities, from Tom Johnston down. There are wee glimpses of others involved but they are, tantalisingly barely mentioned. We are told for instance that contractors Balfour Beatty, in 22 months in 1948, had a turnover of 1,884 employees just to maintain a population of 200 men on site.

Why? What was it really like on site? Are these men not part of the history of the Hydro? Was it really simply because of the rain that so many left? Trades Unions don't even make it into the index. What, too, of the poor prisoners of war on the same site? We are told that it was only after the appointment of Polish overseers that these men abandoned the most blatant of their 'adopted customs', one of which was the tea break! I feel short-changed in other areas too; for instance the loss of our archaeology, and who knows how many waterside settlements, stone circles, crannogs and so on that rate not a mention. Could this be because Mr Payne was invited to write this book by the North of Scotland Hydro-Electric Board? Indubitably.

And all you silly environmentalists out there? I'm afraid you were simply minor obstacles on the road to full utilisation of all suitable sites for Hydro generation. Oh well, we'll get our history written one day, if other forms of electricity generation haven't killed us all off by then that is.

TIM PUNTIS

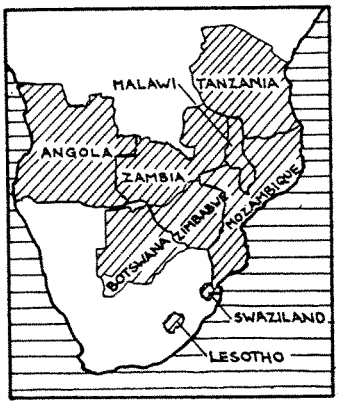
The Fuelwood Trap: a Study of the SADCC Region by Munslow et al. Earthscan Publications; 181pp, £8.95, 1988.

An increasing population, a declining resource; a familiar problem. But **The Fuelwood Trap** looks at its subject with a fresh insight. The study examines the region of the SADCC (Southern African Development Co-ordination Conference) - 9 countries pledged since 1980 to work together to tackle their development problems by increasing regional co-operation.

More than 60 million people live in the SADCC region, a figure expected to rise to over 100 million by the year 2000. The vast majority rely on fuelwood (woody biomass) as the major fuel for domestic use, but supplies are diminishing rapidly as consumption grows.

The book format, of what is effectively a study report, is one which this reviewer found awkward. It does not have the readability of a book, but loses some of the advantages of a report. It is, none the less, well worth reading. While dealing with a specific problem in a particular region, the approach could well be applied elsewhere.

The report does not pretend to have all the answers, but it does show the change in approach that is needed to solve the problem. Previous strategies, bureaucratic and centralist, focused only on increasing fuelwood production. They failed to appreciate the complex interaction between fuelwood and other agricultural demands and did not tap the considerable knowledge of local people in each area. By consulting local people and sharing information a much more integrated strategy, tailored to local needs, can be produced.



The difficulties faced by urban populations are significantly different from those in rural areas. The decline in living standards throughout the region has meant that the growing numbers of town and city dwellers, rather than moving up the "fuel ladder" to kerosene, LPG and electricity, continue to use fuelwood. Once again, solutions will have to take account of the complexities of the situations.

The energy crisis facing southern Africa, though real, is not as bleak as sometimes painted, the resourcefulness of the people often being underestimated. However, urgent but considered action is needed if fuel shortage is not to become another crippling burden for the region.

GRAHAM STEIN

Solutions to Global Warming: Some Questions and Answers by Stewart Boyle. ACE, 9pp, 50p, 1989.

"Advocating patience is an invitation to be a spectator at our own destruction" - Genedy Golubev, UN Environment Programme.

Stewart Boyle, former Energy Campaigner for FoE, gives both a description of the greenhouse effect and a list of possible solutions. It is very useful, and at 50p a copy, well worth the investment.

The greenhouse process, or effect, is a natural one whereby the gases in the earth's atmosphere regulate its temperature: "carbon dioxide and other gases allow the sun's energy to penetrate to the earth, but trap heat radiated from the earth's surface." We have not created a Frankenstien's monster, we have unbalanced one of the earth's fundamental regulatory systems.

The dynamics of global climate are complicated. Although people are talking about global warming, Britain could get colder. This could result from ocean currents being altered and it is feared that the positive effects of the Gulf Stream could cease; bequeathing Britain a "colder and wetter climate rather like Iceland."

The implications of global warming are very serious, and extend further than rising sea levels. Climate pervades almost every level of the ecosystem, and if it is altered then the other balances within nature will also shift: "major cereal growing areas, such as in North America, are likely to shift northwards and coffee-growing areas in Africa may disappear" - the economic, and therefore social, implications of which do not bear thinking about.

CO2, as everyone should now be aware, is carrying the can for 50% of the effect. Its levels must be reduced. Yet, "a recent study on the electricity sector by the Science Policy Research Unit (SPRU) has demonstrated that the present policies of the UK Government would, despite a near quadrupling of nuclear capacity costing £45 billion, lead to a 20% increase in CO2 emissions in the year 2020 (a 7% increase in total UK CO2 emissions).

However, by using energy conservation such a situation need not be. "£ for £, energy conservation provides the quickest and cheapest means of reducing CO2 emissions. The SPRU study suggests that £1 spent on saving electricity would reduce consumption by at least 38kW, cut 42 kilogrammes of CO2 and save the customer £1.90 per year in electricity bills."

ACE propose three main priorities to tackle the greenhouse effect:

- To introduce national and international programmes on energy conservation to reduce fossil fuel combustion.
- To phase-out CFCs and other substances which are depleting the ozone layer, by 1995.
- To reverse the current level of deforestation, through the protection of the rainforest and large tree planting programmes.

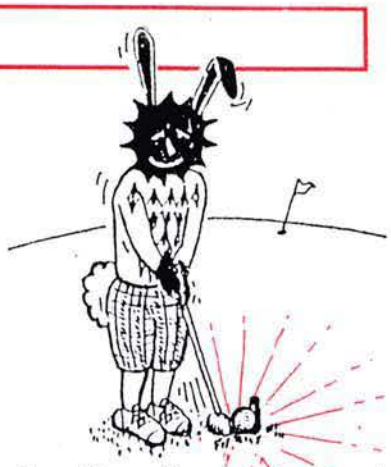
Although uncertainties do exist over the exact chemistry and significance of the greenhouse effect, the potential, and credible, effects warrant action now, and ACE's plan would be a good place to start.

The Report is available from ACE, 9 Sherlock Mews, London W1M 3RH.

- It is interesting to note reference in this report to **The Greenhouse Effect - a Practical Guide for our changing climate**, by S Boyle and J Ardill, to be published in June by the New English Library.

MIKE TOWNSLEY

LITTLE BLACK RABBIT



After years of painstaking burrowing LBR has finally uncovered a use for the nuclear industry: irradiating golf balls.

The Atomic Energy Authority of Canada has now irradiated more than 3,000 balls at the request of golfers.

LBR overheard Larry Christie of AEAC, at the 19th hole saying, "We did more than 3,000 balls last summer," adding, golfers claimed they "bounced further" - the balls that is. "It seems to rejuvenate the balls," observed Christie. "I'm not sure how it works, but it makes for a great bit of conversation."

LBR wonders how many irradiated golf balls constitute a critical mass.

O O O O O

Meanwhile the CEGB have been indulging in their own carnivalesque PR.

Their ageing magnox station at Bradwell was the unlikely venue for the inauguration of Guides into the 1st and 2nd (and probably last) Battalions of the Burnham Guide Troupe. And where you may ask did this take place? Why on top of reactor pile number one ofcourse.

What next? Christenings in the core!

Its just as well they weren't boy scouts, or they may have ended up with a particularly Canadian disorder.

O O O O O

On his way to the Hinkley Inquiry Professor Kemp Houck, was interrogated by an immigration official at Heathrow: he wanted to know which public inquiry Kemp was going to and "was I for it or against it?" Whilst stamping the Prof's passport, he confided "I also am a registered objector."

Good thing the CEGB don't need to bring in expert witnesses from abroad, at their own expense - they might not get in.

O O O O O

Freshwater biologists will be disappointed that Berkeley nuclear power station is closing following disclosures by Sydney Chapman, Tory MP for Chipping Barnet, that he has discovered a new colony of fish living in the cooling ponds.

A valuable opportunity to study this new species could be lost. In a letter to a worried constituent he asserts that "such are the safety measures taken [at Berkeley] that in fact the cooling ponds of the power station contained fish which had less radioactivity than the other fish in the River Severn. I suspect the same sort of situation arises in the Irish Sea."

O O O O O

Lord Thurso could well have been listening to the Member for Chipping Barnet. According to the man who offered his land for the disposal of radioactive waste, it "is not dangerous stuff. It is not actively dangerous like dynamite or gas or some of the more virulent chemicals. It is not mobile. It is not likely to move from where it is put unless something moves it. It is not likely to move through other substances by some sort of osmosis." Perhaps Lord Thurso should tell Nirex, because they are certainly under the impression that "radioactivity will migrate from the repository." Perhaps Lord Thurso is planning to go into fish farming.

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