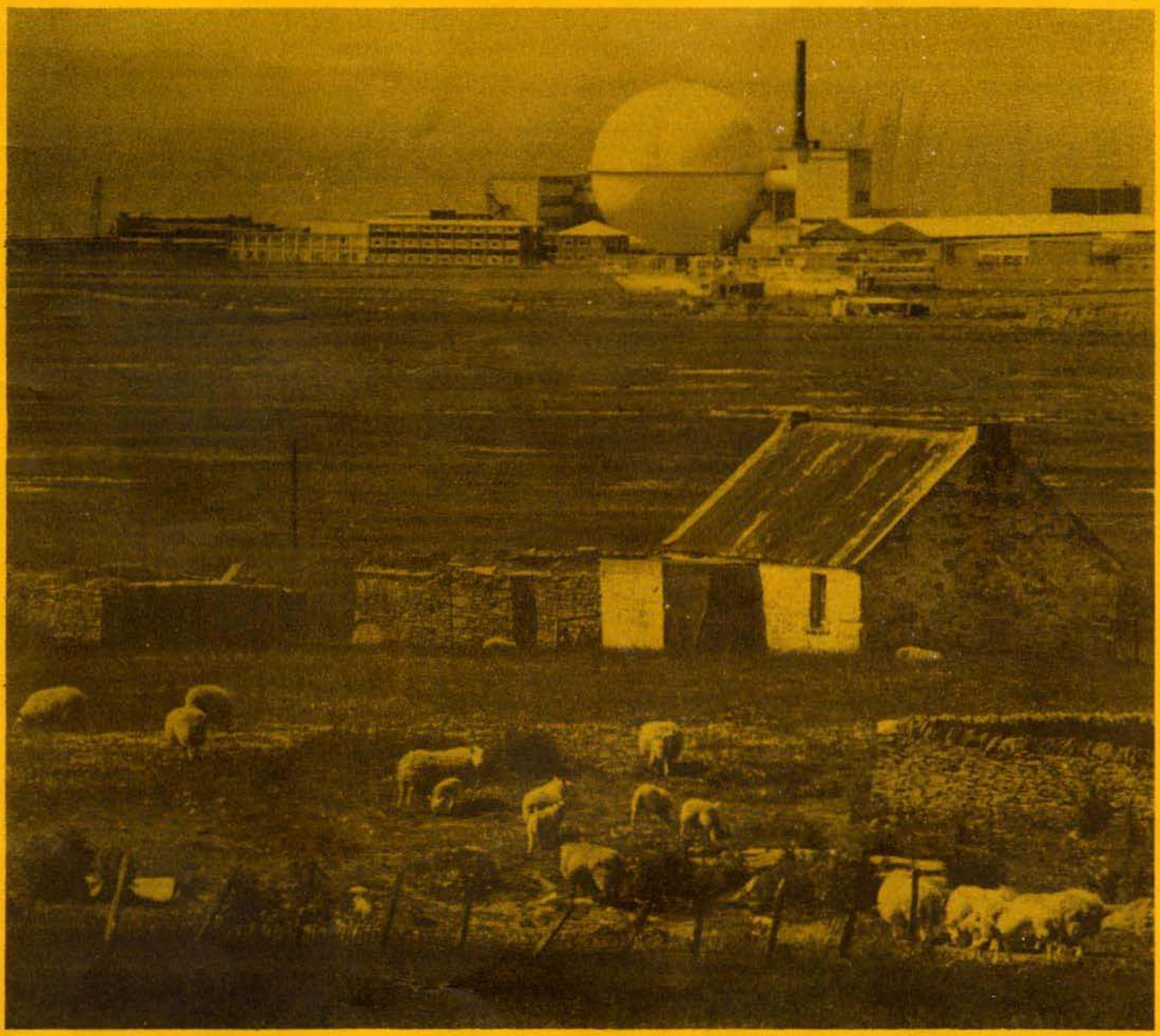
The Anti Nuclear & Safe Energy Journal

SCRAM

NUCLEAR POWER? NO THANKS

61 60p



CONTENTS

PATRICK GREEN is FoE's radiation consultant.
JOHN LARGE & PAUL DRAPER work with Large & Associates, independent nuclear consultants.
MYCLE SCHNEIDER works with the Paris office of World Information Service on Energy.
FRED BARKER works for Manchester's Nuclear Free Zone Unit.
RICHARD KERLEY chairs Edinburgh District Council's Economic Development Committee.

This Journal is produced for the British Anti-Nuclear and Safe Energy movements by the Scottish Campaign to Resist the Atomic Menace.

Editor: Steve Martin
News Editor: Thom Dibdin
Features Editor: Pete Roche
Appropriate Technology: Mike Townsley

We welcome contributions of articles, news, graphics and photographs.

Deadlines for next issue:
Articles (900 words/page), 16 Oct.
News & Graphics, 23 Oct.

ISSN 0140 7340 Bi-monthly.

Cover photo of Dounreay and the culture it threatens by Greenpeace.

COMMENT

At the time of writing, Edinburgh is in the middle of the International Festival. This always brings anti-nuclear visitors from groups all over the world, on holiday but not above a visit to SCRAM to tell of a demonstration at Wackersdorf (8-10 Oct), or to discuss views on privatisation. We've also been visited by the Greenpeace boat, *Moby Dick*, on its way up to Dounreay to collect some samples for radiation monitoring. As usual there is a spate of anti-nuclear plays; theatre groups wanting discounts on their photocopying and demanding attendance at their latest production which is going to change the world.

We always remind visitors that this will be the last nuclear-free Festival in these parts if Torness starts up according to the SSEB's latest amended schedule. In fact we said the same last year but commissioning was delayed by a few problems they've been having. Torness, as observed by David Fishlock in the Financial Times in 1983, is involved in several different races: against Heysham, the PWR and SCRAM. Heysham has caught up - fuel loading began only two days after Torness; the AGR has been scrapped now that Sizewell has been given the go-ahead; and SCRAM have won the moral argument time and again.

The Festival, like Christmas, tends to delay things for a month or so, while tourists and residents alike, cram a year's worth of culture into a few short weeks. Perhaps this goes a long way to explaining why Reporter Bell has decided to extend his deadline for the submission of comments on his Part 1 report on the Dounreay Planning Inquiry.

The Joint Islands Councils had asked for an extension from 25 August to 16 October. Mr Bell didn't go as far as this, but he has extended it until 22 September. The Islands Councils have also requested that the Inquiry be re-opened to consider new evidence, but no decision has been made on this yet.

Judging by the mess that the European Collaboration on the Fast Reactor is in at the present time, there is no hurry to come to a decision. With the licence for Kalkar still uncertain, and the problem of the sodium leak at Superphenix still unresolved, the Fast Reactor has a serious credibility problem, if nothing else. If I was Mr Bell, I would take some time off to enjoy the Festival, and the rare sunshine as well; and try to find an honourable way to recommend refusal of planning permission.

Testing Torness

Work on fuel loading into reactor one at Torness nuclear power station in East Lothian began on 21 July, almost 9 years after contractors started work. It has been a catalogue of corporate insensitivity and heavyhandedness, from the demolition of Half Moon Cottage on 14 November 1978, up to the day fuel loading began. PETE ROCHE reports on recent developments.

At the end of June 1986, the South of Scotland Electricity Board (SSEB) advised Lothian Regional Council that they intended to complete fuel loading of Torness Reactor 1, and carry out a fuelled engineering run during October 1986. They actually began fuel loading on 21 July this year; the plant is therefore almost a year behind schedule. (Hunterston B holds the AGR record for the closest adherence to schedule - and that was four years late).

The main reason for the delay was the discovery last October of a design weakness in the control rods. During tests, involving pumping high pressure CO_2 through the channels, the rods began to spin and bang about inside their steel guide tubes. The Board announced in May that modifications to rectify the fault had been completed, at a cost of £3.5m. The same fault was also discovered at Heysham 2, Torness' sister plant being built by the Central Electricity Generating Board near Lancaster.

The modification programme was co-ordinated by the National Nuclear Corporation (NNC), a consortium of nuclear industry organisations in which the Government has the largest stake. They discovered, using a half scale model of the guide tube, that the problem occurred because of the way in which the gas entered the channel, and removal of certain castellated nuts cured it.

The addition of the nuts was a change from the Hinkley/Hunterston plant design to protect the gas inlets from cross-flow effects. It was apparently not possible to remove the nuts from the reactors, so instead holes were drilled further down on the guide tubes away from the region of cross-flow. These modifications appear less than perfect, however - there is still some residual movement of the control rods. Alan Turner of the NNC's Risley Laboratories said: "What we have done is to reduce the movement of the rods dramatically so that they will no longer have any significant wear. The rods will now last the planned life of the stations."

The NII approved the modifications and gave the go ahead for both stations to begin fuel loading. Torness began on 21 July and Heysham followed on 23 July.

On 10 June the SSEB were granted authorisation by the Industrial Pollution Inspectorate to discharge small quantities of liquid and gaseous radioactive wastes. Similar authorisations exist for all nuclear power stations. Perhaps because of the difference in statutory control between Scotland and England, the Heysham station does not require a discharge certificate before fuel loading begins. Comments on the application for Heysham's certificates need to be lodged by 4 September. Authorisation could be granted by late October.

The date the Torness certificates were issued, the day before the General Election, caused some speculation that the SSEB were attempting to get the commissioning process as far along the road to completion as possible before the Election. Observers questioned the need for the certificates to be issued so long before the station was ready to make any discharges. The Heysham timetable emphasises this curious situation.

The actual level of discharge allowed is also a focus of criticism. The normal practice is for the plant operator to discharge far less than allowed in the certificate. However, the Environment Committee on Radioactive Waste attacked present limits because they can "too easily accommodate unusual events or accidents." Eire is pressing for zero discharge from plants, and the EEC is urging member countries to agree. Although the EEC has no power to enforce such a policy, it is apparent that the UK government is involved in hard bargaining with the electricity boards to reduce the discharge authorisations.

Torness became an important election issue, with Labour candidates promising to mothball the plant if it was not already on line on the return of a Labour Government. The SNP also had a policy of not commissioning the station, but the Alliance were split on the issue. Tories fully supported Torness - they lost 11 of their 21 seats in Scotland.

A Systems Three Scotland opinion poll, commissioned by Greenpeace, was published at the beginning of June. Of the respondents questioned in six Lothian constituencies, 53% thought that Torness should be dismantled, mothballed or temporarily halted. The SSEB carried on regardless.

Because of the delays caused by the control rod problem, SCRAM wrote to the SSEB to ascertain their new commissioning timetable in May this year. The Board, not surprisingly, refused to answer any of our questions and claimed that they "have a very close liaison with people and organisations in East Lothian" and "do not accept . . . that there is great concern locally about Torness."

The leader of Edinburgh District Council wrote on 1 July in another attempt to find out when the Board expected to be granted a licence for final fuel loading of reactor one. The Board's reply was dated 22 July - the day after fuel loading began. They did, however, make a 'courtesy' telephone call to the Chief Executive of the Council on 21 July to let him know that fuelling had begun.

The SSEB claimed they sent a telex to the press on the morning of fuel loading. However, SCRAM was told by the *Scotsman*, *Glasgow Herald* and the BBC that they had heard nothing from the Board. In their report the next day the *Scotsman* wrote: "news that loading of fuel had begun was made public, not by the Board, but by the anti-nuclear group SCRAM." The SSEB denied they had tried to keep the development quiet.

The SSEB have refused to make concessions on the emergency planning issue. Despite repeated protests from Lothian Regional Council, the evacuation zone around Torness is only 3km and would involve moving only 400 people. The fact that the town of Gomel, 125 miles from Chernobyl, with its 300,000 inhabitants had to be evacuated, has not been lost on the councillors or the Lothian and Borders Fire Board.

Lothian Region was the prime mover, along with Shetland Islands Council, in getting nuclear power onto the agenda of the Nuclear Free Zones movement (because of Torness in Lothian's case, and Dounreay in Shetland's), and they succeeded in making it part of national and international Nuclear Free Zones policy.

Although the SSEB hope to begin electricity generation from reactor 1 at Torness before the end of the year, there are still hurdles to cross: further technical problems are not impossible; their discharge authorisation may need to be changed; the important question of adequate evacuation plans may yet prove decisive.

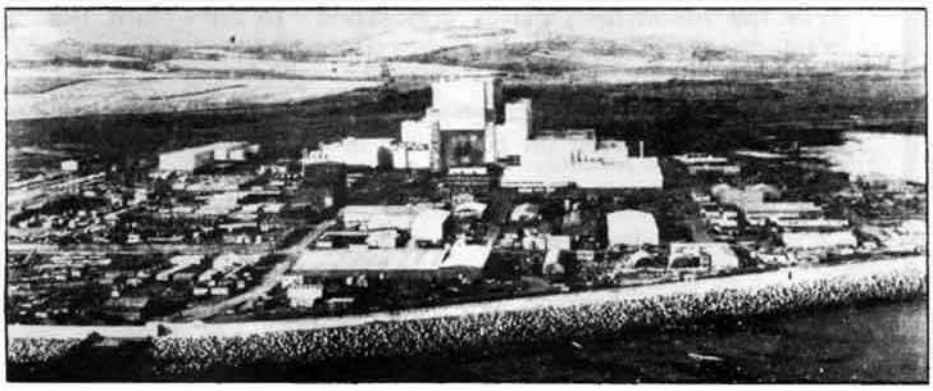


Photo: Paul D Viola

News in brief

TUC CONFERENCE

The TUC's Nuclear Energy Review Body has recommended that this year's conference does not take any motions on nuclear power.

The Review Body has produced an interim report for this year' conference to "set the context within which hard decisions about energy policy must be considered." They have asked for a further year to complete the review.

SCRAM understands that some Unions are very unhappy with the report, as it does not take their representations into account, while considering those made by environmental organisations.

NAMIBIAN URANIUM

The United Nations have instituted legal proceedings against the Dutch firm of URENCO, for enriching Namibian uranium at the Almelo plant in Holland.

This is the first legal action to be taken by the United Nations Council for Namibia, under its Decree No.1 for the protection of the natural resources of Namibia. The writ issued by the UN is against three defendents: Urenco Nederland VOF; UCN; and the Dutch Government. They have been summoned to appear at the civil court in La Hague on 1 September.

LAMB BAN

The recent reimposition of restrictions on the movement of sheep because of high caesium levels has fuelled criticism of Government policy on this issue.

Stewart Boyle of Friends of the Earth told SCRAM that the new restrictions, particularly of farms not previously affected, highlights the "gaping holes in the Government's monitoring scheme" and strengthens the argument for independent monitoring. Thirty two farms in Scotland that were not included last year are now subject to restriction. Contamination of sheep on some of these farms is over 3000 Bq a kilo.

ITALIAN REFERENDUM

Gains by environmental candidates in the Italian elections are likely to ensure that a referendum on nuclear power does take place after all.

The referendum, originally scheduled for June 14 (SCRAM 58 & 59), had to be delayed because of the election. Normally the referendum would then have to wait two years, but anti-nuclear elements in the new parliament are reported to be pressing for a legal amendment which would allow it to take place in six months.

Anti-nuclear feelings run high in Italy, and a yes vote would put a virtual block on the nuclear industry.

ARGENTINIAN EXPORTS

Argentina has finally signed a contract with Iran to supply 20% enriched uranium for the research reactor at Teheran university (SCRAM 59).

The contract comes at a time when Argentina is actively seeking to increase nuclear exports. The new President of the CNEA (Comision Nacional de Energia Atomica): Emma Ferreira, said in a press conference, shortly after taking the job, that she is strongly in favour of exporting nuclear technology. This includes to countries with "nondemocratic ideologies" such as Iran and Albania. Other countries which are understood to be negotiating with Argentina include Mexico, Algeria, Indonesia and Morocco.

LOCAL DIFFICULTY

The Government have announced that in future "all nuclear incidents" will be published, although circulation will be limited.

While the new arrangements appear to allow maximum access to information on accidents at nuclear sites, anti-nuclear groups have pointed out that the new procedures only apply to local news media and "interested Departments". Magazines such as SCRAM will not be eligible to receive this information.

Fast Breeders

The future of the fast reactor at Kalkar in North Rhine Westfalia remains uncertain. Despite pressure from the Chancellor and the Research Minister on Klaus Toepfer, Bonn's new Environment Minister, to force the state to issue a licence, he is refusing to make any rash moves.

Toepfer says that doubts about safety cannot just be swept away, and he cannot guarantee that Kalkar will be granted a licence to load fuel by 31 January 1988, when public funding for the breeder runs out. With the delay costing around DM10m a month, the electricity industry is unlikely to take over the finance of such an expensive lame duck. Further discussions are due in September when a safety report produced by a Swiss engineering company will be ready.

There has been some speculation that Bonn would be willing to sacrifice the fast reactor if Germany's Social Democratic Party (SPD) dropped its anti-nuclear stance. The Christian Democrats are believed to think that the fast reactor is not as crucial as the problem of creating a coal/nuclear generation consensus in the near term.

On the other hand the Environment Ministry may just be gathering evidence to force North Rhine Westfalia to issue the outstanding licence. This procedure was used by Toepfer's predecessor, Walter Wallmann, in 1985 when he ordered the state of Hesse to issue a licence for the Hanau fuel fabrication plant.

FRANCE

Novatome, the French breeder reactor builders, could go bankrupt if delays with Superphenix continue.

Novatome's books currently carry a loss of FFr100m. Framatome, which owns 70% of the company, is considering declaring it bankrupt. The other alternative would be for Framatome to absorb Novatome, but they are only prepared to do this if the government will let them set Novatome's losses off against their own 1987 profits.

The leak in the fuel storage drum at Superphenix is still unresolved, although fuel in the drum has been removed into the reactor core. A decision is expected at the end of the summer on whether Superphenix can be restarted and run at about 50% capacity for the next two or three years while the storage drum is being replaced or repaired in the adjacent building.

Whether or not the reactor is restarted, the leak has seriously undermined the future of the fast breeder in France. The present Government has stated that no decision wil be taken on a follow-on breeder until Superphenix has operated at full power for at least one year.

E.D.R.T

An application for outline planning permission to build a European Demonstration Reclining Tower, (EDRT) in Caithness has been made to the Highland Regional Council.

CADE, who are making the application, believe that they will have no problems obtaining consent, following the precedents set during the Dounreay inquiry. The 545m high, ten times scale model of the leaning tower of Pisa, will be used for rented accommodation. This, say CADE, conforms with Government policy for providing accomodation in the private sector. The merits of Government policy cannot be subject to any review.

Opponents to EDRT are outraged at the whole idea. Sgnr. Touristi Promozionni of the Campaign Against Pisa Export (CAPE) told SCRAM that it will cause untold damage to the Pisa tourist industry. He is also concerned that, as with EDRP, the plans are sketchy, with no transport, waste disposal or safety analysis.

CADE are dismissive of these objections. They claim that waste disposal problems will be solved in time for a detailed planning application and that there is no need for a detailed emergency plan, as EDRT will be much safer than conventional houses. The prototype tower is over 600 years old and has not fallen over once, while many non-reclining houses have fallen over in this time.

Although the application is for only one tower, CADE do not rule out the possibility of a Reclining Tower Estate. All the towers in the estate would lean away from each other, "thus in the impossible event of one tower failing to stay at the correct angle, and becoming a Horizontal Tower, a chain reaction could not lead to other towers suffering the same change of description".

Copies of the planing application are available from CADE, Albert Buildings, Lerwick, Shetland.

Sizewell

The High Court attempt by Friends of the Earth, to halt the building of Sizewell B on safety grounds, has failed because of a legal technicality.

The legal action was rejected both in the High Court and by three Court of Appeal judges because of a technicality involving a time limit for submitting the application. The decision led FoE to describe the nuclear industry and the government as "effectively above the law".

FoE's case for a judicial review of the government's decision to build Sizewell B centred on their claim that the former Secretary of State, Mr Peter Walker, had erred in law by relying on the 1974 Health and Safety at Work Act, rather than the more exacting safety standards of the 1965 Nuclear Installations Act. (see SCRAM 60 p3)

Mr Justice Kennedy admitted in the High Court on 6 July that FoE had an "arguable point of law". However, he refused to allow a judicial review, on the technicality that there had been an undue delay in submitting the application. This was despite its being lodged within the specified three months period. He claimed that FoE were aware of the huge sums of money being spent by the CEGB on Sizewell and should therefore have brought the case earlier.

FoE took the case to the Court of Appeal on 20 July, where the three judges found that the time technicality was not an impediment to hearing the case, but that FoE had no arguable case.

Jonathon Porritt, FoE's director said after the decision that "Our case was treated in a summary and dismissive fashion, despite the major issue of public policy and safety at stake."

The case is likely to cost FoE in the region of £250,000. Had it been successful not only would Sizewell B have been halted, but all other nuclear plants licenced since 1974 including Torness would have been illegal.

Bradwell

The NII (Nuclear Installations Inspectorate) have given the CEGB "eight out of ten" in their assessment of the Board's safety case for continued operation of Bradwell.

The Long Term Safety Review (LTSR) reveals that a person standing at the station fence would receive "a radiation dose up to three times the current statutory limit.

The CEGB now have until October to establish that they can bring the station up to scratch on this, and 16 other key issues of safety. If this can be demonstrated to the NII's satisfaction, then they will have to carry out improvements by March 1989, allowing operation until 1992. Otherwise the CEGB will have to take "risk reducing measures".

The 17 key requirements of the assessment fall into three broad areas:

- The reactor pressure circuit integrity;
- The safety of the plant in comparison to modern standards;
- The ability of the station to withstand earthquakes.

Of these, the integrity of the pressure circuit, which must retain the CO_2 coolant circulating around the reactor core at 10 atmospheres, is seen as being of greatest importance.

A full assessment of the LTSR will appear in the next issue of SCRAM.

Waste Round-up

SCOTLAND

Rumours that the Island of Jura in the Scottish constituency of Argyll and Bute has been chosen as a high-level waste dump, circulating before the General Election, have now been virtually discounted by the Jura Community Council.

Following an article in the *Oban Times* on 7 May, the Council set up an Anti-Nuclear Waste Committee. The article, "Jura fits bill as bin for high level nuclear waste", seems to have been based on a 1976 Institute of Geological Sciences report, used in evidence at the Mullwharcher Inquiry, and long since overtaken by events. The Scottish Development Department have told the Council that "there is no programme to look at Jura or any other site in the UK for the disposal of high level waste."

Some observers believe that the *Oban Times* report was deliberately misleading and was intended to put pressure on the Tories in the run up to the General Election. (In fact the Tories lost the seat to the Liberals). However, the Council is now fully aware that Jura is a possible dump site for low and intermediate nuclear waste. The Anti-Nuclear Waste Committee has, therefore, decided to remain in existence and join with other groups affiliated to SAND (Scotland Against Nuclear Dumping) to make sure that nowhere in Scotland becomes a dump.

● Meanwhile, islanders on Raasay are worried by reports in the *West Highland Free Press* that their island, just off Skye, may become a nuclear waste dump. A public meeting is to be arranged for the near future. Another worry is that the uninhabited island of Rona, just north of Raasay and owned by the MoD, may be earmarked as a dump for decommissioned submarine reactors.

Nicholas Ridley said in his reply to NIREX, after the abandonment of the English dump sites, that "we may need to give seperate thought to the disposal of bulky, lightly radioactive decommissioning items."

CHAPELCROSS

Informed opinion suggests that Chapelcross in SW Scotland will be chosen from the two contending sites for a buffer store for spent AGR fuel. The other potential site is at Heysham in Lancashire. (see Waste Row: SCRAM 59)

A campaign against the proposed plant at Chapelcross has already started. District Councils have passed motions against the plant, and a local opposition group is expected to be formed. Their main argument centres on transportation. There is no rail link to the site, so highly radioactive spent fuel rods will have to continue from Annan railway station by road; as many as two transports a day could be expected if the 7 AGRs perform to plan.

Although anti-nuclear groups have always argued dry storage of spent fuel is preferable to reprocessing, the current proposal is not seen as a solution. They believe that permanent dry stores should be built at the site of production, rather than transporting spent fuel from all power stations to one central point.

SCRAM will cover the campaign against the Chapelcross dry store plans in more detail in future issues.

DRIGG

An £8.5m concrete vault has been approved by BNFL as part of their measures to upgrade the Drigg low-level waste site near Sellafield.

Further schemes approved include the provision of containerization, compaction, and emplacement of waste so that by 1989-90, "the current free tipping operation will cease." Additional concrete capping of existing trenches is planned over the next two years as part of an ongoing £3-4m programme.

In the past BNFL have simply tipped the waste into trenches - they are now onto their seventh trench. These will now be lined and capped with concrete. The change stems from a growing realisation at BNFL that in the past "the operation has not been as tidy as it should have been."

WEST GERMANY

The Gobi Desert is once again under threat as a dump site for West German nuclear waste (SCRAM 50).

Although the West German government has consistently denied such plans, in July this year the German nuclear power plant builders, Kraftwerk Union, announced a deal to bury waste in the Gobi Desert in return for giving West German nuclear technology to the Chinese.

USA

The budget requested for the US nuclear waste programme has been slashed from $725m to $500m by the House of Representatives.

The House approved a recommendation from the Appropriations Committee to ban spending on exploratory shafts at potential sites for the first repository; halt funds for a monitored retrievable storage facility because it has yet to be authorized; and limit funds for a second waste repository to non site-specific work.

The move reflects a lack of confidence in the Department of Energy who run the programme. Congressmen believe that before any more money is spent, the whole policy should be reviewed and a consensus re-established.

FRANCE

The French government have selected Soulaines-Dhuys, some 200kms east of Paris as the country's future low and medium level nuclear waste site. It will replace La Hague when the latter becomes full in 1991.

The site was originally proposed for Saint Priest La Prague, but ran into strong local oposition. ANDRA, the waste management body had then to find a site by the end of 1985. With weak local opposition, Soulaines was seen as being ideal. The site will have a capacity of 1.2m cubic metres.

Lying between three giant reservoirs which supply Paris with drinking water, and next to the vineyards of southern Champagne, Soulaines might not appear the ideal site, but geologists claim that the clay formations provide maximum safety for the storage of this waste.

BNFL

BNFL and five leading UK nuclear design companies have formed a consortium, British Nuclear Technology (BNT), to exploit the international market in reprocessing and waste management.

All five of the companies are involved in BNFL's £3.5 billion capital investment programme which is being undertaken at Sellafield, and includes construction of the thermal oxide reprocessing plant (THORP).

BNFL will be ordering most of the second stage of the effluent treatment plant for Sellafield next year. The Enhanced Actinide Removal Plant (EARP) is aimed at reducing discharges to the environment.

The first stage of work to decrease discharges involved a Site Ion Exchange Effluent Plant (SIXEP) and a Salt Evaporator Plant. These started operating in 1985, and according to BNFL, halved the amount of radioactivity discharged compared to the previous year.

Site preparation is now in progress for EARP, which is expected to cost around £500m. There will also be a £50m solvent treatment plant, a £50m segregated effluent treatment plant, a £5m THORP effluent system, a £45m packaging plant, a £35m effluent plant maintenance facility, a £30m services building, and another £50m for miscellaneous plant.

Three plants for solid waste encapsulation are already under construction. There is also a vitrification plant being built.

THORP's 6,000 tonne capacity over the first 10 years of operation has recently been upped to 7,000 tonnes, which means that BNFL are now looking for an extra 1,000 tonnes of business.

Accidents Will Happen...

TRAWSFYNYDD

● Two recent accidents at the Trawsfynydd Magnox station have fuelled criticism of the CEGB's so called "open information" policy.

The first occured on 1 August, when 100 gallons of liquid waste spilled from a pipe carrying it to a storage tank. Local MP, Daffyd Ellis Thomas, has complained to the CEGB that he was not informed of the accident until five days later.

On 10 August, an explosion in the turbine hall put two gas circulators in one of the reactors out of action. The CEGB originally denied that there had been an explosion, although they later confirmed that the blast had blown a door off its hinges and caused £20,000 worth of damage.

The loss of the circulators has meant that the reactor has been shut down, halving output from the station to 210Mw.

HEYSHAM

● The NII investigation into allegations of poor working practices at the Heysham 2 AGR (SCRAM 60), has given the station a clean bill of health, despite continuing criticism.

Mr J Elliot, who made the original allegations is, however, unhappy with the outcome, particularly because the NII did not carry out a full investigation themselves, but just examined documents provided by the CEGB and Babcocks. He regards it as a case of "cutting the paperwork to suit the pipework".

While Mr Elliot accepts some of the NII's findings, he still maintains that several of his original allegations hold. These mostly concern the witnessing of tests on welded gas circuits by official inspectors. The CEGB maintained to the NII that inspectors were always present when these tests were going on, but Mr Elliot disputes this.

SELLAFIELD

● An accident in the notorious building B205 halted reprocessing at Sellafield, less than one week after it had restarted following a three month break.

The incident occurred on Sunday 2 August, when a magazine containing 36 spent fuel pins fell ten feet to the floor. The decanned fuel was being winched into the top of a fuel dissolver during the initial stages of reprocessing. A spokesman for BNFL told SCRAM that no radiation was released and that no worker would be exposed to radiation during the clear up operation. The incident was, however, serious enough to halt reprocessing for over a week.

Last year's NII safety audit of Sellafield was highly critical of B205 which is central to BNFL's reprocessing philosophy. It is in this plant that spent fuel is dissolved before reprocessing can begin. Particular reference was made to handling of irradiated fuel.

HARWELL

● In June, a worker ingested some plutonium at the UKAEA's Harwell research laboratory in Oxfordshire.

The incident occurred when the worker was dismantling a glove box containing plutonium 238. Although no radioactive intake was observed during the work, follow-up tests showed that he had received a radioactive dose in excess of the annual limit for radiation workers.

TORNESS

● The AGR at Torness has already had its first accident, before completion of fuel loading.

Ten tonnes of carbon dioxide escaped from a storage tank when a safety release valve failed. Although the gas was not radioactive, operatives had to wear breathing apparatus to close the valve.

HUNTERSTON

● A fuel leak was discovered in reactor 1 of the Hunterston A Magnox station just before midnight on 9 July.

The SSEB told SCRAM that the leak was discovered when levels of a "short lived noble gas fission product" rose inside one of the fuel channels. The fuel stringer was removed from the reactor and placed in the cooling pond, where there is "no detectable leakage". The "tiny hole" was apparently caused by a "random defect", and the fuel will now be treated as normal.

NORTH ANNA-USA

● One of the Virginia Electric and Power Co's two 947MW PWR reactors at North Anna, suffered a radioactive water leak in early July. The reactor was shut down and a small amount of radioactive gas was released into the atmosphere.

TRANSPORT-USA

● A freight train carrying radioactive materials was derailed in the Columbia Gorge in Washington state on 12 May. Two wagons plunged into the Columbia river and thirteen others caught fire.

Although the train was carrying only 192 pounds of low-level radioactive materials, for use in smoke detectors and fire extinguishers, it is believed that in the future, high level waste will travel by the same route on the way to the proposed HLW waste site at the Hanford nuclear complex.

****

Whilst we would like this list of "incidents" to be comprehensive, we do not hear of every accident. Any information and press cuttings will be gratefully received.

****

U.S. Corruption

Trouble is brewing in Washington for the Nuclear Regulatory Commission (NRC), the government's nuclear safety agency, over illicit links with the privately owned U.S. nuclear power industry.

The controversy centres around Commissioner Thomas Roberts of the NRC and internal NRC papers from his office. The papers turned up during an inspection of the files of a private nuclear power company where one of the executives is a friend of Roberts. The papers were marked for restricted circulation in the company "to protect the source within the NRC". The inspector who found the files was made to pass them back to Roberts.

Ex-astronaut, Senator John Glenn, cross examined Roberts during a congressional hearing. He asked Roberts what he had done with the papers. Roberts replied that they "were all torn up and thrown in the waste basket", because he felt that it was the "appropriate thing to do". He admitted to being "somewhat paranoid".

Oddly enough the papers have turned up again, this time in Roberts' desk. The re-appearance coincided with Roberts having to testify before a Senate environment committee on nuclear regulation. The Chairman of this committee has joined other senior senators in calling on Roberts to resign. So far there is no sign of his doing so.

All this is bad news for the NRC and the Reagan administration. They have just got rid of the one NRC commissioner, J K Asselstine who had described his government's nuclear safety policy as "pretty feeble". He was alone in the NRC in feeling that the US nuclear industry should be pushed to meet higher standards. Asselstine's departure leaves a gap in the NRC which Congress is unlikely to fill whilst the controversy about Roberts continues.

The power companies were glad to see Asselstine's departure. No doubt they would like to see the back of Roberts, as he has become an embarrassment to them. Roberts however shows no sign of budging, neither, it seems, does Congress.

The Plans

Just before the summer recess, the Government introduced a bill to prepare the electricity industry for privatisation. The exact procedure is expected to be decided by the end of the year.

The Department of Energy have appointed Kleinwort Benson, as advisers while the CEGB have appointed Lazard Brothers. The scene is set for a battle between Whitehall and the CEGB. In Scotland the Secretary of State has appointed Barclays de Zoete Wedd and the British Linen Bank leading to a furious reaction from the Scottish financial community about the use of English advisers.

Although Cecil Parkinson is committed to introducing further competition (selling off electricity as a package like British Gas has been discounted), he has hinted that because they want to sell it off by 1990, the scope for change may be limited: the radical plan to split the CEGB into ten separate companies is also likely to be rejected. The other area of argument is whether the national transmission grid should be severed from the generating part of the CEGB. It could become a separate company or remain in public ownership.

One possible compromise is to sell the CEGB as a single entity, and the Area Boards as 12 separate companies. Competition could then be introduced gradually by encouraging the Area Boards to build their own power stations. Since Britain is expected to require between 10 and 12 new large power stations before the end of the century, the privatised Area Boards would become significant competitors fairly quickly.

The encouragement of private consortia is another possibility: discussions are already going on between British Petroleum, British Gas and the CEGB about building a 300MW station on the south coast fuelled by natural gas, mostly from Wytch Farm.

Nuclear Power

The Government's decision may be influenced by evidence that existing nuclear power stations may be difficult to sell to investors, and by warnings that future nuclear expansion could be jeopardised by any radical restructuring of the industry. The CEGB believe that only a state-owned utility would be able to afford to build new nuclear power stations: the 5% real rate of return which is the minimum investment criterion set by the Treasury for state industries was crucial to the CEGB's case for Sizewell; private sector firms typically look for a 10% rate of return at least. This would almost certainly have made Sizewell too risky for them to undertake. But Cecil Parkinson has made it clear that the Government want a "substantial nuclear content component in the UK's future energy provisions."

Meanwhile, John Collier, chairman of the UKAEA has warned that privatisation could make nuclear safety "more difficult to organise". He would prefer the generating side of the industry to be sold off as a single entity, because it would be easier to implement a safety framework.

On the one hand to increase competition you must have more, smaller generating companies. On the other hand the more you fragment the CEGB the more you expose the nuclear power stations to the attentions of sceptical investors. If privatised as a single unit the monopoly profits would distract attention from the low return on nuclear power stations.

The Coal Industry

The ultra right Centre for Policy Studies have published a booklet which argues the case for privatising coal, at the same time as electricity. British Coal have had very large subsidies, and these should not continue: the authors call for the market to be opened to foreign competition, and suggest that the CEGB should build a terminal capable of accepting imports of up to 15mt (million tonnes) a year. This would act as a bargaining counter in negotiations with home coal producers.

The cost of home produced coal will have to be reduced considerably for it to remain competitive. "Fortunately" according to the authors, "there is considerable scope for such reductions under a liberal scheme of privatisation which would provide competitive pressures to bring down the costs of producing coal in Britain." They argue for an increase in opencast production from the present 14mt or so to around 20mt a year.

Under privatisation the authors conclude that cost reductions of between 25&35% are possible. If so, then home produced coal would not be drastically reduced and replaced by imports. Although 20mt of existing deep mined capacity in high cost pits is likely to close, (out of a total of 70mt) it would be replaced by 10mt from new pits, 3 or 4mt from opencast and only about 8mt from new imports.

All this would lead to a total of 75,000 redundancies over the next 5 years in addition to the 80,000 redundancies in the last two years.

They assume that coal imports would not be stepped up in the next five years, thus giving home producers a breathing space to reduce their price to around £35 per tonne and £30 per tonne a few years later.

In their evidence to the Select Committee on Energy recently, the CEGB argued that on the basis of existing port facilities alone, it could import 10mt a year, and 15mt a year if the Thames Estuary stations were run on baseload. (Compared with imports in 1986 of 8mt). With some additional port investment, total CEGB import potential could be raised to 30mt.

Another dangerous assumption made by the CPS report is that, although world coal prices are low presently, by the time new port facilities are built they will be higher. The recent Colombian imports arrived at a delivered price of £23.50 per tonne. Large imports by the CEGB are bound to push up world prices, but if they don't rise as much as CPS expect, many more domestic mines would be under threat.

This begs the question should our coal industry be forced to compete with countries like Colombia and South Africa anyway? The human rights situation in Colombia has deteriorated rapidly over the last few years: Amnesty International estimates that there are more political killings going on in Colombia than in Chile or the whole of Central America. Over 50% of Latin America's coal resources are in Colombia, but it's not the Colombian people who benefit, but the multinationals. An Exxon subsidiary has exclusive rights to exploit the most important mine at El Cerrejon.

Despite all the coal being in foreign hands, Colombia is committed to providing 50% of the finance necessary to produce it, causing Colombia's foreign debt to rise by $1 billion. Some estimates state that Colombia stands to lose $166m a year if annual production is 15m tons. So if privatisation does lead to an increase in coal imports it's not just miners in *this* country that will lose out. Do we really want to involve ourselves in yet another Third World rip-off?

Chernobyl & the Media

The fourth European Environmental Film Festival took place in Birmingham in July. A seminar on Chernobyl and the Media provided some interesting insights into how the nuclear power is reported in different parts of Europe. THOM DIBDIN was at the conference.

A media event is a strange phenomenon, and a media disaster is even stranger. It takes on a life of its own, involving hundreds of journalists who have suddenly to become immensely knowledgable in a single subject on which they will report and comment for a relatively short period. More often than not, the event itself becomes lost behind the hyperbole of the coverage.

'Challenger' and the 'Herald of Free Enterprise' are excellent examples of media disasters. They represent a type which the mass media are particularly adept at covering. Chernobyl, however, despite containing all the necessary ingredients, (and more) was all wrong.

The disaster did not become an event until days after it had happened. There was no real 'human interest' because we are not conditioned to feel pity for Russians, even if thousands have to be evacuated. The media circus had no gripping central image to present. But most important of all, the journalists were largely unable to become even moderate experts in the complex web of issues involved, having to rely on scientists who nearly all had a vested interest in manipulating the available information.

GLASNOST, WHAT GLASNOST?

How the media coped with the disaster makes a fascinating and often revealing study. One year on, Ecovision 87 organised a day seminar in Birmingham on this subject. People from such diverse backgrounds as Forsmark nuclear power station, in Sweden where the disaster was first noticed, the International Atomic Energy Agency, the Russian film industry, French TV and SCRAM, debated and discussed their personal experiences and opinions of Chernobyl and The Media.

What soon became apparent from a revealing presentation of TV footage gathered from all over Europe, between 28 April and 10 May 1986, was that the real media disaster was not the accident itself, but the radioactive cloud. It could not be presented as a far away happening on the TV screen, but became a real life disaster, waiting on the front door step in a pint bottle.

Looking back, it is hard to remember the panic and lack of basic information during the first few days. These problems combined to give journalists a very real moral dilemma, not a common event: should they broadcast the possible effects of the fallout and risk mass panic, or should information be witheld for the sake of calm? The resolution of this dilemma illustrated individual countries attitudes to nuclear power.

Jay Tuck of ARD TV in West Germany was Editor on the evening news of 29 May, and was strongly aware of the dilemma. His main concerns then were the condition of the reactor and the health threat posed by the fallout.

The problem was that with no source material, rumours got repeated and given credence. Notorious among these was one, originating from the CIA and repeated through News Agency reports, that the accident had killed thousands of people and spread to a second reactor. The CIA had read what they wanted to see into a MIDAS satellite photograph of Chernobyl. More careful examination of the photo, with cross reference to maps of the site, showed the rumour to be unfounded. But many TV stations, working under very tight deadlines repeated the agency report.

ARD treated the MIDAS photograph in the same way as all other information: they did not withold it, but broadcast it with qualification. This allowed viewers to form their own views and ARD managed to provide some of the best and most balanced reporting in the early stages of the disaster.

By comparison, in France, where nuclear power is a source of national pride, TV reporting played down the accident for almost a week. Unlike West Germany, where opposition is vociferous, French journalists have a strong faith in the nuclear industry. This was compounded by government denials that any fallout problem existed. At the time it was said that just as the F-111 bombers bound for Libya were banned from French airspace, so was the Chernobyl cloud. It was not until 7 May that a French reporter showed a lettuce grown on the French-Belgium border, one half of which was legally edible, having been grown in France where there were no food restrictions, and the other half inedible.

Although government influence on reporting was worst in France, it was also obvious in other countries; most commonly in the "it can't happen here" syndrome epitomised by Lord Marshall, who said on TV that Chernobyl is "not comparable to anything we have in the West." As Lawrence McGinty of Channel 4 pointed out, even if the *same* accident could not happen here, other things could well go wrong.

Government influence in Finland was highlighted by the comments of Ari Jarvinen, head of news in the state-run YLE TV. He was happy with YLE's reporting of the disaster, believing that the Finnish audience was "informed quite well". This attitude was contradicted by Pekka Haavisto, a journalist and Green Party member of the Finnish parliament, who pointed out that the Finnish independent station, consistently led the reporting. What little YLE did cover, was only after it had been reported elsewhere.

Nor was the UK immune, as the original reporting of sheep restrictions compared to the current reimposition of restrictions has clearly shown. It is something that, as an anti-nuclear journalist, I have come to know all too well; the most common response when contacting nuclear organisations is "why do you want the information". "Glasnost" is not known to the nuclear industry. While background information, such as how much electricity is generated by nuclear power is readily available, the facts that lie behind the truth are not.

Nick Ross, who ably chaired the whole seminar, asked me what right I have to question the industry? My reply was that it is the same right as the right of the public to know - a central tenet of all journalism.

A repeated question during the seminar was "what lessons can journalists learn from Chernobyl?" One answer is not to depend so heavily on industry information, also to understand that Chernobyl was not an isolated event. As our regular "Accidents will Happen" column sadly shows, the world is full of potential nuclear disasters just waiting to happen.

DUMBARTON DISTRICT COUNCIL

congratulates

SCRAM

on their campaign for a

NUCLEAR FREE SCOTLAND

As Safe as Houses?

The Government are very fond of comparing radiation hazards, such as eating lamb contaminated after Chernobyl, with background radiation in Cornwall. The implication being that if it's natural radiation it must be safe. PATRICK GREEN has been looking at the Government's plans to deal with the radon gas problem, and is not surprised to find that they are ducking the issue.

Radiation hazards are frequently associated with the nuclear industry. Yet even natural background radiation can be a health hazard. Radon is a natural radioactive gas formed from the decay of uranium in the ground. It can enter houses through the floor and in some areas of the country it can accumulate to extremely high and hazardous levels. Radon decays to solid radioactive products (radon daughters) which adhere to dust particles and, if breathed in, will expose the lungs and increase the risk of developing lung cancer.

The United States Environmental Protection Agency estimate that radon is the second biggest cause of lung cancer next to smoking. In Britain the Government estimates that it kills around 900 people per year. A figure that is likely to be an underestimate.

HOUSES OVER THE LIMIT

In January this year the National Radiological Protection Board (NRPB) published the results of a survey of 2300 homes in areas likely to produce high radon gas levels. This was followed in February by a Government announcement of *action levels* to deal with radon gas. These are the annual doses from radon at which action should be taken to reduce a person's exposure: 20 millisieverts (mSv) for old houses and 5mSv for new.

The 20mSv level may be exceeded in around 20,000 houses, the majority in Cornwall and Devon. In about 2000 houses the occupants are likely to receive an annual dose greater than 50mSv. This is the maximum dose allowed for workers in the nuclear industry! Even the industry admit it is not a safe level.

However, areas affected by high radon levels are not just confined to Cornwall and Devon. They have been found in North Wales, the Midlands *and Peak District, and in areas like* Gloucester.

Whilst action levels have been proposed, no strategy exists for dealing with those houses identified as containing high levels of radon gas. In fact the Government maintains that corrective action is not required in the short term and that no risk to health is posed by waiting several years for a further survey of Cornwall and Devon to be completed. If one lives in other areas which may be affected then you have to pay to have your house surveyed. Statements such as these are both illogical and unscientific, one doesn't tell smokers they should give up in a few years time - continued smoking will add to their risk. Equally, continued exposure to high levels of radon gas will add to a person's risk. If this risk can be reduced now by stopping smoking or by reducing radon exposure, then appropriate action should be taken.

NO ADVICE GIVEN

Since radon enters a house primarily through the floor, the most appropriate action is to stop its entry by making the floor a more efficient barrier. Costs may range from £100 for sealing cracks in the floor, through £1000 for underfloor extraction up to £10,000 for a new floor. The exact action required depends on the extent of the problem.

Whilst the Government states that immediate action is not required, they do not even intend to pay for corrective action in the long term. It will be the householder who foots the bill. No advice has been given to private landlords or councils about who is responsible for ensuring that action is taken in rented property and who will pay for it. Radon is, therefore, another public health problem that overstretched and underfunded local authorities will not be able to afford to deal with, and which many private landlords will probably ignore.

Even those members of the public who live in areas likely to be affected, and who would be prepared to pay for corrective action, find it very difficult to get information about the exact nature and extent of the problem, and most importantly what they can do about it. The NRPB have produced some information along with the Department of the Environment's *leaflet; however these are not widely* available. Information gaps such as these only serve to breed fear, a situation that will benefit no one.

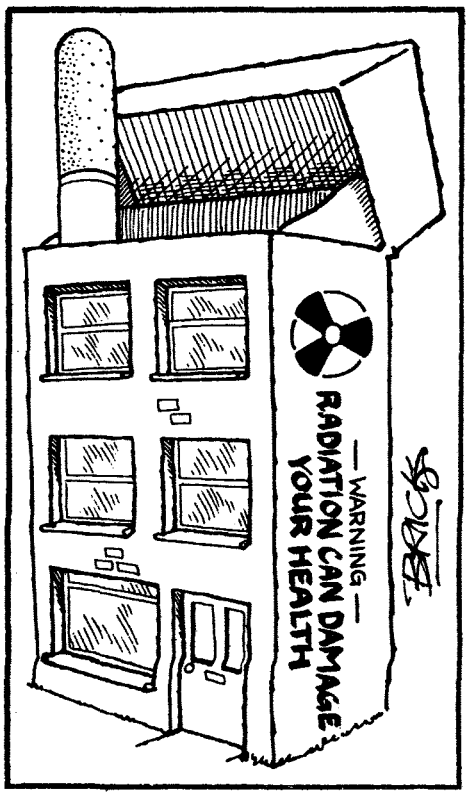
The action levels for old properties suggest that it is safe to do nothing until one's annual dose reaches a level 20 times the NRPB's recommended dose limit for members of the public! In countries like the USA, action is proposed at dose levels of 8mSv; and Sweden has proposed action at dose levels above 10mSv.

ACTION LEVEL TOO HIGH

A single 20mSv dose in a year, produces a fatal cancer risk which is roughly comparable, using official radiation risk figures, to the annual risk of a fatal accident in the coal mining industry! As SCRAM readers are aware, official radiation risk figures underestimate the risk by at least 2 to 5 times.

The action level should at the very least be equal to the current public dose limit (5mSv). This means that around 200,000 existing houses may be affected and 4000 new homes are currently built each year which exceed this level. There is no logical reason why the action level for new houses should not be equal to the NRPB's recommended public dose limit, or lower. Some scientists would argue that the levels should be set lower still because of new information which shows radiation to be more hazardous than previously thought (See SCRAM 60).

Radon is potentially a very large problem. What is needed is a proper strategy for dealing with the situation; one would be more prepared to accept a 20mSv action level if the intention was to deal with houses in order of priority as they were identified, ie the most exposed first. There are no indications that this is the case.



Furthermore the government should make a commitment to pay for the necessary action required in the houses already identified by the NRPB survey. Their occupants should not have to wait the results of further surveys or pay for the action themselves. However, as with most public health problems the government continues to duck the issue.

An earlier form of this article appeared in the April issue of "Roof", the magazine of Shelter.

Trumpets & Raspberries

Documents leaked, Dounreay Inquiry report published, and an International Conference in Shetland. All in all it has been a frenzied summer on the EDRP front. STEVE MARTIN takes a look at what's been happening, and looks forward to another kind of European collaboration - against fast reactors.

You could be excused for thinking that nuclear industry managers live on a different planet to the rest of us. The "outstandingly safe, environmentally clean, increasingly economic" fast reactor is a good example. The UK Atomic Energy Authority (UKAEA) are trying to convince themselves that all is going well as the fast reactor development programme is falling apart about their ears.

It is therefore jolly hard luck for them that a ream of confidential documents were leaked from their Winfrith establishment at a time of maximum sensitivity for the Authority. The first part of the Dounreay inquiry report was about to be released, and the UKAEA Annual Report was soon to be published.

The documents, which include the agenda and background papers for the 2 October 1986 meeting of the Fast Reactor Development Co-ordination Committee (FRDCC) and numerous internal memos from 1986, describe the political problems facing the fast reactor development programme. The concerns expressed in the documents are acknowledged in neither the UKAEA Annual Report nor the inquiry report.

"DIMINISHING ENTHUSIASM"

The Annual Report includes an 8 page glossy pull-out on Dounreay, from where the above quote comes. This is the first time such a supplement has been included and, with the benefit of the leaked documents, it can be seen as part of the "overriding need to convince the generating boards and the Government that the fast reactor programme is worth the money being spent on it." ("Note for the record" of a fast reactor programme review meeting at Risley, 30.4.86.)

The front page of the supplement states: "Fast reactors are the next generation of nuclear electricity stations." However, a Winfrith memo of 9 April warns that, because "well-informed questions are being asked, with the aim of identifying items that could be cut . . . the possible implications for the Authority's future fast reactor programme were potentially very serious." It is difficult to see how the glossy optimism of the supplement can be reconciled with the harsh political realities of Government cuts as expressed in the memo.

The same memo also states: "On the political front there was a diminishing enthusiasm for the fast reactor in Whitehall and, apparently, little support in the Cabinet. Neither had advice to Government from other parts of the UK nuclear industry always been helpful." This translates, in the Chairman's letter of the Annual Report, into: "The announcement by the Government of the increased financial support by the electricity supply industry in the UK to fast reactor development is a welcome step forward."

One claimed virtue of the fast reactor, repeated in the Dounreay glossy, is that it is "an inherently safe reactor". This claim was described as a "political minefield" by David Evans, the Fast Reactor Programme Director, during remarks at the FRDCC meeting of 31 July. A note of that meeting states: "by labelling these hypothetical systems inherently safe, there was a risk that existing systems would be seen as 'inherently unsafe'." Therefore, whoever drafted the glossy supplement had either not been informed of these fears, or had gone ahead regardless.

John Collier, UKAEA Chairman

In a letter to the *Guardian* on 1 August complaining about their front page story on the documents, John Collier, the UKAEA chairman, dismissed their importance because they were a year old. He also claimed they had been "reported stolen late in 1986" from the overnight bag of a UKAEA employee. But surely their age does not invalidate their contents; and just because they were "reported stolen" does not mean that they actually were stolen.

Mr Collier also asserted that the supplement was included in the Annual Report "as a fitting way of highlighting Dounreay's praiseworthy achievements" and not "in an effort to bring pressure to bear on the government." However, as Walt Patterson observed in his reply of 11 August: "after 13 years operation the PFR's best performance is less than 44% of its capacity. If this is what the AEA considers . . . 'well on course for technical and commercial viability', they are easily satisfied."

It is advisable to bear these documents in mind when one reads the first part of the Dounreay report. This document is meant to include information presented to the inquiry which the Reporter, Mr A G Bell, regards as factually indisputable. In fact, the report does little more than reiterate the case for the applicants.

ALL IS NOT WELL

From the second sentence of the introduction one gets the feeling that this report is not going to be the objective document it should be: "The plant *will* be built as part of a collaboration with European organisations jointly participating in the development of fast reactors" (emphasis added). The following 199 pages somehow seem irrelevant after that - Mr Bell could have done his bit for tree conservation and issue only that one page.

Apart from the insensitive use of the word "will", the reference to the joint participation of the European collaborators is optimistic. The leaked documents clearly give the impression that all is not well on that front.

In the cover note to a document, "Review of Safety Developments for CDFR: January - June 1986", presented to the 3 September FRDCC meeting the authors begin: "(this cover note) contains forthright remarks and policy points for the information of the FRDCC which are unsuitable for inclusion in the main text." Some of these remarks focus on "difficulties previously mentioned within the European collaboration in the Safety area (which) are still present", in particular "there is an unchangeable mismatch between the internal organisation established in France and that in the other countries", although the "climate is changing slowly" and "faltering steps" are being made. Why can these remarks not be included in the main text? Who are they keeping secrets from? Some collaboration!

BELL "LAYFIELDED"

The inquiry report attempts to justify its narrow remit: "the siting of EDRP at an appropriate location in the UK" accords with Government policy and that policy is "not appropriate for debate at the planning inquiry." The objectors knew this at the outset, which is why they called for a Planning Inquiry Commission which would have had a wider remit.

The Reporter could assume the Secretary of State is conversant with Government policy; instead he takes

17 pages to explain it. The section is littered with such terms as "it is hoped", "they would expect", "it is envisaged" and "it may be sensible". It seems that the policy exists, but there is no firm understanding of how, or even if, it will be implemented.

Nuclear waste is perhaps the most ridiculous policy area. Mr Bell has been "Layfielded": just as Sir Frank had to publish the Sizewell report without taking account of the single most important event in the history of nuclear power - the Chernobyl accident - then Mr Bell had to prepare his report without considering the vagaries of political expediency.

The report states: "The expectation is that a national repository for low level waste would be developed on one of the (Elstow, Fulbeck, Bradwell and South Killingholme) sites." These sites were abandoned on 1 May as an election gambit by the Government. Mr Bell did get one thing right: dump site selection is "not so much a problem of technical feasibility as political acceptability."

SHETLAND CONFERENCE AGREED STRATEGIES

1. To be represented at the 24-25 November North Sea Environment Ministers' meeting and to promote a resolution calling for the cessation of all reprocessing to stop further radioactive discharges into the marine environment.
2. To be represented at the June '88 Paris Commission meeting and to support the Irish Government's call for zero discharges from reprocessing plants.
3. To urge the European Parliament and the Nordic Council to call for a cessation of reprocessing.
4. To persuade national governments to take international legal action against the British Government because of the threat that the Dounreay development poses.
5. To encourage the represented bodies to campaign against the fast reactor programme and to refuse to co-operate with all the work connected with the programme.

In section 3, on the regulatory bodies, the report vindicates the stand of the objectors who refused to take part. Mr Bell writes "The prime submission for JIC (the Joint Island Councils) that the existing state of scientific knowledge cannot justify the deliberate emission of long-lived radioactive pollutants to the environment . . . is in clear contradiction of the government policy on radiological protection." He discounts their evidence even though it is correct, because it disagrees with policy.

The section on "The Proposed Plant" (more accurately titled "The Applicants' Case") is overly technical and is virtually without criticism. Nowhere is the objectors case outlined in such detail, and in such glowing terms. Although the plant's design is still at a very early stage, Mr Bell believes that the regulatory authorities will be able to oversee the detailed design phase. However, in Mr Bell's own words, "neither Authority is overstaffed".

The Reporter has virtually discounted the use of Cromarty Firth ports to bring in the spent fuel. On the surface this is a victory for the local campaign against those proposals. However, it leaves the option of entry port wide open.

At the outset, the applicants were urged to produce a short list from which the entry port would be chosen. This list included three ports on the Cromarty Firth, and Scrabster in Caithness. Logically, Scrabster must now be the choice. But, Mr Bell concluded that the options now "narrow down to the use of Scrabster national rail network permitting access to a wider range of ports."

TRANSPORT UNRESOLVED

Central Regional Council had suspected this result, and had presented a statement to the inquiry when it began to appear that the short list was not exhaustive. Their solicitor claimed "the opportunity to put forward such vigorous opposition (to rail haulage of materials bound for Dounreay through Central region) has been denied by the way in which the transport issue has been handled to date." This was on 6 May, only one month into the inquiry. The Reporter's conclusion seems to uphold the Council's position.

The other major area of controversy was the possible health impact. Detailed evidence was presented on the incidence of disease around Dounreay and other nuclear installations. The applicants provided a witness whose main task was to discredit the statistical data. As the Reporter decided that he failed to do so the evidence should stand.

OBJECTORS ANGRY

The interpretation of the evidence in the report's conclusions seems deliberately vague. Dr Heasman, who presented the statistical evidence on the Dounreay "cluster", believed that "It was more likely to have had some other cause" than to have occurred by chance. Mr Bell interprets this as: "The statistical evidence could support the claim that the . . . cluster may not be due to chance." He further refines his interpretation in the final conclusions to "the cluster . . . could have emerged by chance." This turning the evidence on its head has angered the objectors.

And, while all this was going on, the forces of opposition were grouping at the Shetland international conference organised by the Campaign Against Dounreay Expansion (CADE).

A great deal of work has been done by the opposition groups to raise awareness of the issue, both in Britain and in Europe. The CADE conference was a direct result of that international campaign; nearly 200 delegates from 9 countries were attracted to Shetland. The event was a huge success, and showed what can be achieved with the full support of the population and backing of the local authority.

The idea of the conference surfaced as a way of keeping the pressure on between the end of the inquiry and the publication of the report. The Scottish Office made the mistake of publishing the report the week of the conference, thereby creating a firm focus - there is nothing worse than debating in a vacuum.

INTERNATIONAL LINKS

At the final session a draft "Statement of Intent" was debated and agreed by all present. It urged bodies to follow certain campaign strategies.

A North Sea/Atlantic co-ordinating group on radioactive pollution and nuclear issues was established. The group will discuss progress and will suggest tactics for the coming year. To improve international links a six-monthly information bulletin will be produced and circulated to all concerned bodies. The first issue will be co-ordinated by CADE and the second by NADE (Norway Against the Dounreay Expansion).

The contacts made at the conference and the strategies and tactics adopted will have a significant effect on the European collaboration. The evidence of the leaked documents indicates that the battle may be as difficult as first thought.

Contact: CADE, Albert Buildings, Lerwick, Shetland (0295 4309).

The Sleeping Beasts of Windscale

Now that 30 years have passed since the outbreak of fire in the Windscale plutonium production pile in October 1957, there is mounting interest in the hulks which remain. JOHN LARGE and PAUL DRAPER piece together the events which led up to the fire from the limited information currently available from the Public Records Office. And they question whether the full papers on the subject will ever be released.

Today the nuclear industry dismisses the 1957 fire and earlier incidents at Windscale as tolerable penalties of pioneering a new technology and, particularly, these problems and deficiencies have been overcome by subsequent developments of the graphite moderated reactor. Study of the documents available suggest that the sleeping beasts of the Windscale piles may indeed awaken in future years to groan a knell for the graphite moderated reactor technology of today.

The first step in tracing the development decisions in the UK centre around the atomic piles of the US and Canada during and shortly following World War II. Britain's enthusiasm for an independent atomic weapon is well recorded, but official papers do not give insight into the short-cuts adopted in the UK to accelerate production of plutonium for the Hurricane atomic weapons test of 1952.

The first atomic pile in Britain was the Harwell experimental GLEEP pile of 1947 which was based on the Oak Ridge reactor in the US. The small graphite moderated pile had far too weak a neutron flux for the plutonium production target required for the UK weapons programme, so in 1947 design and development work began on the very much larger Windscale piles.

The factor dominating the initial design was the limited choice of nuclear materials, particularly the fuel and the moderator, coupled with the short timetable set by the Hurricane atomic weapon test of 1952. At that time, Britain had no access to enriched uranium and use of natural uranium limited the choice of moderator material. The only practical material was pure carbon or heavy water, since the other moderator candidate, ordinary water, absorbed too many neutrons and required enriched uranium to sustain a chain reaction.

COBBLED TOGETHER

The British scientific teams seconded to Canada during the war were familiar with natural uranium fuel, but they had worked on the design of a *heavy water* moderated pile. Other British scientists, working in the US, had concentrated on the chemical separation of plutonium from the *graphite moderated* Oak Ridge production pile. In the absence of heavy water manufacturing plant and uranium fuel enrichment facilities in the UK, the returning British scientists had no option but to cobble together their wartime experience to produce a natural uranium fuelled but graphite moderated design for the Windscale piles.

A pile fuelled by uranium and moderated by graphite must necessarily be large. The design demanded by the neutron flux of the Windscale piles required a very large containment for which then current pressure vessel technology was unsuited. So much so, that it was expediently decided to cool the Windscale piles by simply passing air through the pile channels, over the fuel canisters and thereafter discharging this air to atmosphere.

Indeed, such was the confidence in the reliability of the then untried aluminium canisters containing uranium fuel, that the initial design of the chimneys did not include any filters, although the filter galleries, the "Cockcroft's Follies", which characterise the Windscale chimney profile, were added during the later stages of the construction of the first pile.

The US had previously trodden the graphite moderated reactor route and were much in advance of Britain in graphite technology. From 1942 research programmes were initiated in the US with the object of determining the property changes of graphite and other materials when irradiated by fast particles. Of particular interest is the published work of Wigner who first identified the possibility of sudden and spontaneous releases of the stored energy of irradiated graphite at several distinctive temperature thresholds, often referred to as annealing. The results of this extensive research were, it seems, influential in the choice of future moderator materials, so much so that the US abandoned graphite moderation and concentrated on the water moderated Hanford type of reactor.

Britain may not have had access to this detailed research but they certainly received forewarning of the difficulties of graphite moderation. The US Atomic Energy Commission (AEC) stated at a 1948 Harwell meeting that they considered the energy stored in the graphite contributed significantly to the hazard of graphite moderated piles but Teller, representing the AEC at the meeting, must have been somewhat rebuffed to be told by Sir John Cockcroft that Britain considered a loss of water coolant to be far more onerous a risk than that associated with the *spontaneous* release of the stored graphite energy.

WIGNER ENERGY

It seems that the design of the Windscale piles progressed in the absence of detailed knowledge of the Wigner energy phenomenon for there is little to indicate that any fundamental research was undertaken in the UK in this area. Some account was taken of irradiation of graphite, particularly in providing compensation for irradiation growth and for this the pile assembly had to be completely redesigned at a late stage. Adaptions were also implemented to counter the changing reactivity worth and thermal conductivity of the moderator associated with temperature increase and irradiation ageing.

Problems were encountered with the burst canister or fuel cladding detection equipment, with the final installation comprising a moving complex of sniffers known as the Christmas tree; and there were construction problems and defects with the shielding in the chimneys. Nevertheless, by 1951, the No 1 Windscale pile was operating at full power and continued reliably until 30 September 1952, when, quite unexpectedly, a sudden rise in temperature was detected.

At a meeting in November 1952 the abnormal temperature rise was discussed in detail. The US had been consulted and they suggested the temperature excursion was indeed a

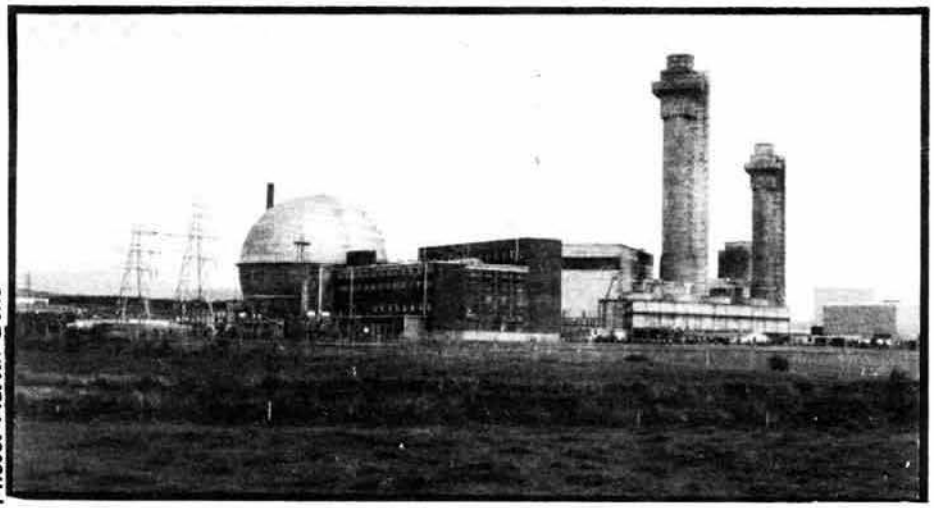


Photo: Martin Bond

Windscale AGR (left), Piles 1 & 2 (right)

Wigner energy release. This was confirmed by some rather hurried experiments with samples of graphite removed from the pile before the temperature excursion, but the results also revealed that not all of the energy had been released since the Oak Ridge reactor data indicated about one half of the expected irradiation energy remained. The situation with the twin No 2 pile was even more confused, for a similar Wigner temperature excursion had occurred in May but, in ignorance of just what was happening, the operators had halted this by increasing the cooling flow leaving the bottom half of the pile in a high latent energy state.

Researchers following these 1952 incidents cannot fail to be impressed by the sudden flurry of papers and research notes cited in the documents available from the Public Records Office. Significant are references to the proposed procedures for releasing or annealing the graphite energy in a controlled way. But, there is a specific reference which notes with some dismay that the Windscale piles did not include features to provide for the periodic annealing of the graphite.

FUNDAMENTAL DILEMMA

By 1954 the shortcomings of annealing the whole of each pile were recognised to include not only the difficulty of the overall control operations, but risk of leaving pockets of graphite unannealed. It seems that in the hurried development of the No 1 pile the late redesign of the graphite assembly had overcompensated for the expected volumetric growth, and gaps left between the graphite blocks, sometimes confusingly referred to as Wigner gaps, hindered the heat distribution throughout the pile. This meant that during the annealing operations, by then underway on a regular basis, local cold pockets of graphite persisted and did not anneal.

By the following year sufficient experimentation and analysis had been completed to identify evidence of dangerous levels of Wigner energy in certain pockets of No 1 pile. The pile operators must have received this information with dismay for they themselves had earlier reported, late in 1953, on the difficulties in maintaining and spreading an annealing temperature of 140° to 180°C uniformly throughout No 1 pile.

Here then was the problem: attempts at low temperature annealing of the pile left pockets of graphite cold and unannealed; but high temperature annealing could conversely result in high temperature pockets elsewhere, in which the aluminium fuel canisters could fail. Analysis, completed in early 1955, set a maximum fuel canister temperature of 500°C, just 50°C below the brazing temperature of the canister end cap and at which the canister would fail. Moreover, this analysis warned that accumulation of energy in unannealed pockets could, by the projected sixth anneal of late 1955, result in an excessive temperature rise beyond the canister failure maximum.

No information is available on the effectiveness or otherwise of reaching into the unannealed pockets by the successive sixth, seventh and eighth anneals. It is known, however, that during these anneals the pile operators developed a technique of bringing on a second nuclear heating during the later stages of the cycle. Indeed, such was the confidence in this two-stage annealing technique that, in July 1957, a technique paper by Bell and Bridges indicated that future low-temperature annealing would present no hazard and that, futhermore, temperatures within the pile would never rise 400°C above an anneal triggering temperature of 100°C.

So, for the ill-fated ninth anneal of 7 October 1957, operations proceeded with confidence, but things did not go according to the Bell and Bridges prediction. Following the first nuclear heating the pile temperatures dropped so the operators introduced the second bout of nuclear heating on 8 October in order to reach into any remaining dormant pockets. It was brought on too fast, and in areas where the pile temperature and neutron flux instrumentation was lacking. As a result, the poorly monitored areas progressively heated up throughout 9 October.

By late evening measures were implemented to cool the pile, but these failed for, by the following morning, the stack monitors detected a massive increase in fission product radioactivity. Even at this late stage the operators did not believe things were totally amiss: the pile temperature readings remained relatively low and the stack monitor readings could not be confirmed by the Christmas tree, since this vital equipment had jammed due to overheating associated with the Wigner release. In fact, a large and previously unannealed pocket was releasing heat in a poorly monitored section of the pile: fuel canisters failed in this pocket, and the additional cooling air pumped through simply served to fuel the flames by rapidly oxidising the exposed uranium, all adding to the heat generation.

CONTACT: CHARLES BARNETT (CO-ORDINATOR)
TUDOR HOUSE, DUNWICH, SAXMUNDHAM,
SUFFOLK IP17 3DU (TEL: 072 783 300)

CONTACT: CORE, 98 CHURCH STREET,
BARROW IN FURNESS, CUMBRIA.
(TEL: 0229 33851)

THE FIRE

Thereafter the uncontrolled and runaway performance of the Windscale No 1 pile is a matter of scant history: the fire raging in the pile was eventually extinguished and the second pile was closed down completely during the following months. So how do these sleeping beasts at Windscale rest?

We know that pile No 2 was completely defuelled but we do not know whether the graphite was completely annealed; and we assume that the fire temperatures of 1957 were sufficient to completely anneal the graphite of pile No 1, but we do not know whether it was possible to completely defuel the damaged pile.

There is a short paper from 1960 which yields clues to the post-fire and closedown condition of the Windscale piles. This refers to 5 to 10 tonnes of irradiated uranium, together with unspecified quantities of cobolt and other irradiated test material, abandoned in pile No 1. Pile No 2 was then fully instrumented to detect graphite temperature excursions and, in July 1960, there occurred two incidents that initiated the excessive temperature alarms, although the paper concludes that the temperatures reached within the graphite were not sufficient to trigger off a Wigner energy release.

So it seems that the sleeping beasts of Windscale continue to justify today, some thirty years after their closure, more than just academic interest. Who knows, and will the Public Records Office ever let us know, if the damaged fuel still remains in the No 1 pile and whether or not No 2 pile was ever satisfactorily annealed before removal of the fuel and its closure?

Breeder Bombs Out

With the imminent demise of the fast breeder reactor, nuclear supporters in Europe are looking for alternative supplies of plutonium for the increased stocks of nuclear warheads which they are planning. MYCLE SCHNEIDER assesses the current position of the European "civilitary" nuclear establishment. The "zero option" disarmament proposals have provided new impetus to a European defence system, and its advocates are mounting a new propaganda effort. This notion cannot come about without a supply of plutonium which, without the fast breeders, will have to come from new sources: mixed-oxide fuels and laser enrichment.

The existence of links between the civil and military wings of the nuclear establishment has been widely demonstrated in a great number of publications. Rather than return to a description of the technical and political interplay of military and civilian nuclear power applications, it seems more worthwhile today to review the current position, and examine it within a political context which has been strongly coloured by two events: first, the arrival in office of Mr Gorbachev and second, the Chernobyl accident.

This article will be restricted to recent developments in Europe. This in no way means that I decline to attribute suitable importance to recent events in developing countries, especially Pakistan and Brazil (recent statements on the acquisition of the relevant knowledge for bomb construction) or Japan (a contract for the provision of a French reprocessing plant). A number of topics, however, call for detailed consideration and a rapid response by the people of Europe.

EUROPEAN DEFENCE

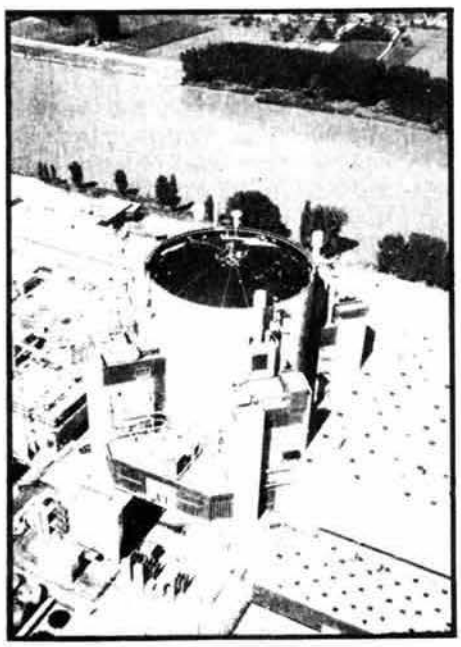
Firstly, a decision is imminent on mass production of the French neutron bomb. Prime Minister Chirac has declared himself in favour of its introduction; Defence Minister Giraud has intimated that the decision might be taken in secret; and the chairman of the defence committee of the RPR (Chirac's Party) is calling openly for deployment of the weapon. The Socialist Party (PS) has adopted a broadly similar position: its candidate for the 1988 presidential elections, M Rocard, has called for "neither a blinkered nor a naive attitude" to the neutron weapon. "While ruling out nothing arbitrarily", we should embark on "extremely careful discussions" with our German neighbours.*(Le Matin, 10.4.87)*

The advocates of a European defence system based on the Paris-Bonn axis have extended their activities. Mr Gorbachev's indisputably serious disarmament proposals have played some part in this. The European nuclear and military lobby have attempted to sway public opinion with a special propaganda effort. Ex-Defence Minister Hernu (PS) is among its champions: "France and Germany provide the cornerstone on which defence is built. We should reinforce it while there is still time. But we must act quickly because there have been new developments in the East since Mr Gorbachev."*(Le Monde, 17.3.87)* Furthermore, West Germany "is, as a country, a sort of hostage to the Soviets, and having said that, why should we regard the resulting 'national-neutralism' as better than national-socialism?"*(Le Monde, 18.3.87)*

"CIVILITARY" PLUTONIUM

The neutron bomb, equipping Hades missiles based in West Germany and due to go into service in 1992, is currently an integral part of the strategic thinking of both the military and politicians in France and Germany.

The neutron bomb would represent an apotheosis for France's "civilitary" establishment. Its mass production would require the massive "clandestine" use of civil reactors for military purposes. Chinon A3



Superphenix

(originally designated EDF-1), a gas-cooled, graphite-moderated reactor - shut down for the last three years for complex, costly and harmful repairs to the internal structure; the Phenix breeder reactor, run jointly by the Electricite de France utility (EdF) and the Commissariat a l'Energie Atomique (CEA); and lastly Superphenix, the successor to Phenix which was built and run by NERSA (51% EdF; 33% Italy; 16% SBK - 68.85% FRG, 14.75% Netherlands, 14.75% Belgium and 1.65% UK) - would obviously all be required. Breeder reactors produce excellent weapons-grade plutonium (97% Pu-239) within their core blankets, and Phenix has for years provided the military with plutonium. The French government have never ruled out the possibility of using Superphenix in the same fashion.

In the long-term industrial context, the breeder reactor is already dead. There has not been the slightest sign that it might one day operate commercially, and the nuclear lobby is well aware of the fact. The German Kalkar breeder reactor will never be commissioned, unless the federal government risks the use of political muscle which would be unpopular and therefore rather harmful to it.

DEATH OF EDRP?

In my opinion no plant for the industrial reprocessing of breeder reactor fuel, such as had been planned for Dounreay in the north of Scotland (EDRP) or Marcoule in the south of France (MAR 600), will ever be built, as there are insufficient breeder reactors to make such an operation economically viable. The CEA is currently looking at the possibility of reprocessing Superphenix fuel diluted with Light Water Reactor (LWR) fuel, at La Hague, or with graphite-gas fuel at Marcoule. This amounts to an admission of the failure of negotiations for the construction of a second-generation Superphenix (SPX-2) and matching reprocessing plant.

The recent leak of sodium from the fuel storage chamber at Creys-Malville - 5-600kgs have been pouring into the containment vessel each day since 8 March - has also released fuel for the heating of emotions. The media are calling into question the desirability of the reactor system, and therefore the safety of nuclear energy itself. This is doubtless a side-effect of Chernobyl. It is very regrettable that the substance of the debate within France has not been felt and echoed abroad, especially in view of the fact that Superphenix in particular does not concern France alone.

Given the complete absence of any likelihood of commercial operation of breeder reactors, who can justify the expenditure of hundreds of millions of francs to repair Superphenix, exposing the public to pointless dangers? Certainly, the military and plutonium lobby would then find themselves in an even more embarrassing situation.

Secondly, the growth of programmes dealing with mixed uranium-plutonium oxide fuels (MOX), for use in LWRs, is a cause of considerable concern. In autumn 1987

the first French 900MW reactor will be loaded with 16 MOX fuel assemblies. MOX is already being used in West Germany, Switzerland and Belgium. The plutonium lobby are attempting to bring about a large increase in production capacity of this type of fuel: COMMOX (60% COGEMA, 40% Belgonucleaire) at Dessel in Belgium and Cadarache in the south of France, and ALKEM at Hanau in West Germany.

The problems encountered with breeder reactors have necessitated a change of strategy for arguments in favour of plutonium reprocessing and production. Why build reprocessing plants such as UP-3 and UP2-800 at La Hague, THORP in Cumbria and at Wackersdorf in Bavaria, when plutonium is not used separately? Thank goodness that MOX can fill the gap! Yet all this is but a pretext. MOX, quite apart from being an economic absurdity, poses severe management problems in its spent state, and is particularly favourable to proliferation. Its large-scale production would inevitably entail widespread movements of plutonium in a form which would be directly or indirectly suitable for use in weapon fabrication.

REPROCESSING DOUBTS

UP-3 at La Hague, the only plant among those mentioned to have reached an advanced stage of construction, will go ahead for the simple reason that the project is entirely financed by foreign electricity companies. To date, less that 30% of LWR fuel reprocessed at UP-2 comes from EdF, who have always had a sceptical attitude towards reprocessing costs. UP2-800, which is intended to meet EdF's reprocessing requirement, will perhaps never be built. THORP, part-financed through foreign contracts, is currently no more than a shell of a building.

Wackersdorf has encountered strong local and national resistance. Its potentially military role is in accord with the hardline right wing logic of the "Bavarian Bull", F J Strauss, and Defence Minister Woerner. The simple addition at the Wackersdorf plant of a cell for dismantling fertile (radial blanket) fuel assemblies from the Kalkar breeder reactor, would provide excellent weapons-grade plutonium. The same result could be obtained by reprocessing slightly (a few reactor-weeks) irradiated LWR fuel.

In my opinion West Germany, in contrast to the developing countries, has no need to move into actual production of nuclear weaponry in order to derive political capital from its nuclear potential. Its present theoretical capabilites can hardly fail to impress the French and British negotiators (in so far as the concept of European defence in concerned, for example), the Americans (regarding the role of the USA in West Germany) and the Soviets (as regards the dismantling of medium and short-range missiles based in Europe, for example).

The German Government has yet to reply to questions on the reasons for its covert storage of quantities of plutonium in the Hanau bunker. The German anti-nuclear movement has succeeded in making the ALKEM affair into a national political issue, while at the same time exposing its military potentia'.

LASER ENRICHMENT

A third reason for concern is the accelerated development of laser isotopic separation technology. Feverish efforts are being made in this field, especially in the USA and France, but also in West Germany, Britain and Japan. France and the USA have from the start favoured the AVLIS process (Atomic Vapour Laser Isotopic Separation), which can be used for either uranium or plutonium. The Americans have recently published results with enrichment levels beyond all expectations. Production plants could be in service by the beginning of the 1990s in the USA, and a few years later in France.

The introduction of laser enrichment will bring about a fundamental change in perspective. Although reactor grade plutonium (about 60% Pu-239) can in theory be used in weapons, the military favour enrichment levels of more than 90% Pu-239. The critical mass then becomes smaller and the weapon yield more flexible, both of which charteristics are required in today's increasingly miniaturised armaments. AVLIS plants would provide the military with impressive quantitities of plutonium from the reprocessing of "civilian" fuel.

Little is known about the exact state of the industry in the various countries, and it is time that such information was procured. Our task now is to call for a halt to Superphenix, the non-commissioning of Kalkar and the abandonment of construction work at Wackersdorf, THORP and La Hague. Perhaps we can even forestall the felling of trees for the site of AVLIS. . .

French and German reactions to the Gorbachev disarmament proposals speak volumes. The old and almost forgotten myth of USSR conventional weapons superiority has been taken out and dusted off. According to Giraud, the acceptance of the "zero option" on missiles in Europe would be a second Munich, and Rocard has stressed "the dangers of creating a nuclear-free Europe." Mitterand appears totally unconcerned by current negotiations. West Germany is no different. *Spiegel* ran the story on its front cover on 27 April 1987: "Dread of Disarmament. Bonn fears superpower pact."

Quite apart from the fact that Euromissile disarmament would leave strategic arsenals untouched, one small detail tends to be overlooked: given the number of nuclear plants in both western and eastern Europe, we can make the continent uninhabitable without the hosts of nuclear bombs, not to mention chemical factories and other such filth . . .

BNFL's enrichment plant at Capenhurst

CIVIL CONTRIBUTION

The nuclear lobby was deeply shaken by the Chernobyl disaster. The order books for nuclear power stations in most European countries are empty. Efforts are now being directed towards maintaining existing plants, or adapting them as required. MOX is an example for both civilian and miltary plutonium lobbies. None of the world's nuclear weapons states aim to replace first generation reactors designed specifically for the production of plutonium for military use. This is obviously not an indication of the military's resolve to content themselves with existing bomb stocks, but rather a further sign that increasing weight is being placed upon the contribution of civil programmes.

Today, breeder reactors provide the greatest hope; tommorow it will be the turn of laser enrichment. Reprocessing will remain the essential link between the civil and military wings of the nuclear establishment. Supporters of the bomb give first priority to safeguarding the tools of plutonium handling and production. It remains to be seen whether the economic and political price will be too high. We must raise the ante . . .

Councils' Chernobyl Response

Following the article in SCRAM 60 about Somerset's plans to establish an independent radiation monitoring scheme, FRED BARKER reports on the growing number of local authorities who are setting up their own radiation monitoring facilities.

When it became clear that the radiation cloud from Chernobyl was spreading across Britain, local authorities started to receive hundreds of calls from a very concerned public. Should we drink milk? Should we go out in the rain? I'm pregnant, what effect will it have? And so on.

In the immediate aftermath, most local authorities were as much in the dark as their public. But if it happens again, a larger number of local authorities will now be able to utilise their own radiation monitoring facilities.

The National Steering Committee of Nuclear Free Zones has been in the forefront of the promotion of radiation monitoring by local authorities. In December 1986 they organised a well attended conference which discussed the type of monitoring that could be carried out, and the sort of equipment that could be purchased. This was followed up in April of this year with a conference for local government officers, which considered various case studies of local authority radiation monitoring facilities and began to tackle the question of co-ordination between authorities (1).

LOCAL DEVELOPMENTS

The main reasons why local councils have become involved in establishing monitoring facilities are: to provide local information (most national monitoring is undertaken on a limited regional basis at or around nuclear installations or at a small number of National Radiological Protection Board - NRPB sites); and to provide prompt results (there can be large delays in obtaining results from the established monitoring agencies).

Most schemes being established are following the recommendations of the Institute of Environmental Health Officers (2), and are geared around use in the routine situations. By and large, they are being used to establish background radiation levels, detect changes, and to compare levels and trends with Government published data. Most of the schemes involve land gamma monitoring to provide integrated gamma dose rates over periods of 1000 seconds at various sites, and gamma spectrometry for a limited programme of monitoring foodstuffs. A number of schemes involve arrangements for more detailed analyses of foodstuffs to be made at Universities, including alpha and beta contamination if necessary.

At the time of writing, schemes exist or are being set up in the following parts of Britain; Cleveland; Derbyshire/Cheshire/Shropshire/ Staffordshire; Dorset/Hampshire; Lancashire; Lothian; Manchester; Severnside; Tyne & Wear; West Midlands and Yorkshire and Humberside. The schemes are based on a variety of organisational forms: either across a county or region and with the involvement of various combinations of Environmental Health Officers, County Analysts and Emergency Planning Officers.

NATIONAL RESPONSE

The recently proposed 'National Response Plan' for dealing with the consequences in Britain of major nuclear accidents overseas, envisages a role for local authorities (3). The key features of the plan are:

* The Department of Environment (DoE) will act as co-ordinating department.
* Britain is to be covered by a network of monitoring stations based on existing facilities - information from these stations will be supplemented by that from mobile monitoring teams, local authorities, hospitals and universities.
* Data from all monitoring sources will be stored on a Central Data Base Facility (CDF) and be available to government departments and organisations responsible for making assessments about radiological hazards and counter-measures.
* Commercial electronic mail systems will be used to transmit monitoring information and disseminate radiological assessments and advice.
* Information and advice to the public will be routed through DoE 'hotlines', local authorities and health authorities.

A local authority role is envisaged in the monitoring network and in the provision of information and advice to the public.

LOCAL AUTHORITY ROLE

The potential for local authority involvement in the monitoring network is substantial. Although most local authority schemes are not designed for use in emergencies, they can be adapted to provide a quick response. The information local authorities gain from gamma dose rate measurements and gamma spectrometry could be a very useful contribution to the data stored on the CDF during an emergency emergency.

Local authorities who participate in the monitoring network and set up the required electronic mail systems could be informed when an accident has occurred, be alerted to the need to initiate emergency monitoring, feed local monitoring information back to the CDF, and receive up-to-date information about the radiological threat and decisions about counter-measures.

They would be in a good position regarding the provision of information to the public.

ACCIDENTS IN BRITAIN

Plans to cope with a nuclear accident in Britain are currently under review (see "Planning for Disasters", SCRAM 60). Mrs Thatcher has acknowledged that any accident in Britain would "almost certainly require implementation of parts" of the 'National Response Plan' (4). This could give local authorities a significant role in relation to radiation monitoring arising from a nuclear accident in Britain. Local authorities need to watch closely for the results of the current review, so that they can press for the widest possible improvements to current plans and procedures.

REFERENCES

(1) 'Local Authority Radiation Monitoring', Conference Documents, Manchester NFZ Unit, April 1987
(2) 'Interim Report', Institute of EHO's, 1987.
(3) see Hansard, 30 June 1987 for the PM's announcement, and the DoE discussion document 'An Outline National Response Plan' for further details.
(4) Hansard 30 June 1987.

NUCLEAR FREE LOCAL AUTHORITIES

Contact: Nuclear Free Zone Unit, Manchester City Council, Town Hall, Manchester M60 2LA (061 234 3244).

Edinburgh Heat Plans

The Edinburgh Combined Heat and Power consortium are about to start serious negotiations with the Department of Energy. Councillor RICHARD KERLEY, convener of the Joint Advisory Committee on CHP, reports on progress so far.

The consortium was formed in 1984 and received a limited amount of grant aid from the government (along with Leicester and Belfast) to carry out a feasibility study of creating a CHP scheme within the city. Its members include Edinburgh and Lothian Councils; the South of Scotland Electricity Board; Northern Engineering Industries and a number of other private sector construction and energy interests along with support from the Scottish Development Agency.

By now, we are all aware that there is nothing particularly technically exciting about CHP. It is a very efficient way of utilising the waste heat lost by any electricity only generating power station and it is a particularly sensible way of ensuring that scarce fossil fuels are used to their most effective capacity.

From the early stages of the initial Atkins Study which looked at a number of cities in Britain, it was clear that a major opportunity for Edinburgh/Lothian was presented by the proximity of Cockenzie Power Station and the opportunity to link that into a CHP/District Heating scheme for the city.

The work of the study has confirmed the practicality of using Cockenzie, following turbine conversion and that this provides a more cost effective solution to providing hot water into the system than would be the case for a purpose built plant. Even though it requires the installation of a trunk main that is nearly 18 kilometres long, it still makes better financial and economic sense and will be particularly good news both for Cockenzie and the surrounding coalfield. The idea behind the scheme is that reliance on Cockenzie would be supported by a heat only boiler within the city itself for stand by and peak demand; the possibility remains in the longer term of using refuse disposal for heat generation.

CONSUMER COSTS IMPORTANT

A major weakness of earlier district heating schemes in Britain, and a source of much criticism from the consumers of that heating, has been the quality of pipe work and the basis on which it has been installed - for example in Midlothian where tenants and the local authority are discussing at present the future of a large district heating scheme in Penicuik. The Edinburgh team have worked with Danish consultants in developing a computer modelled system for defining the best arrangement for heat distribution pipe work round the city.

The market survey studies which have been carried out look encouraging. The kind of target set was to try and aim at an effective heat price 10% or so below the equivalent of gas as fuel, and to do so taking account of connection costs; maintenance and other related customer costs. Experience in most countries that have well established CHP schemes makes it abundantly clear that the cost to the customer is a fundamental factor in determining whether it is popular and whether its penetration into households is at a high enough level to justify a scheme. Of course, in many Scandinavian and other North European countries, combined heat and power supported district heating is commonplace reaching into residential areas with densities of housing much the same as some of the villages and small towns which surround Edinburgh. However, the general perception is that in and around the city it will be the central area that will be most suitable for the initial launch of any such scheme, though the local authorities will certainly be pressing for the extension of a scheme into other areas particularly those where residential levels are high and fuel costs present a problem.

GOVERNMENT SUPPORT NEEDED

We shouldn't, of course, have any doubts about the technical feasibility of a CHP scheme. After all, such projects were developed in Clydebank and Manchester at the turn of the century! What has always been a problem - and may continue to be so with this present government - is that the establishment of a CHP scheme may well present a classic opportunity for public investment and, at least in this country, a not very appealing one for private investment. The financial culture that governs the decision making of major investment institutions in the UK looks for a relatively short term return at a relative high yield. That is why the smart money from Japan - as opposed to Britain - is in a majority in, say, the Channel Tunnel investment where yield is low; steady and long term. A project which requires a great deal of up front investment and a good few years before any income starts to come through, represents a classic public spending commitment, but doesn't provide the kind of rate of return that will be sought by a private investor - at least not from this country.

The Government, therefore, has a major part to play in supporting the establishment of a CHP scheme, not just in Edinburgh but probably elsewhere in the UK where similar financial calculations are producing similar results.

What we'll be looking for in Edinburgh and Lothian when the report is publicly launched is some recognition by the Government of the part it must play in this exercise and some commitment from it to discuss with us what can be done and how it can be done in order to implement the kind of major energy beneficial investment which a CHP scheme for Edinburgh/Lothian represents.

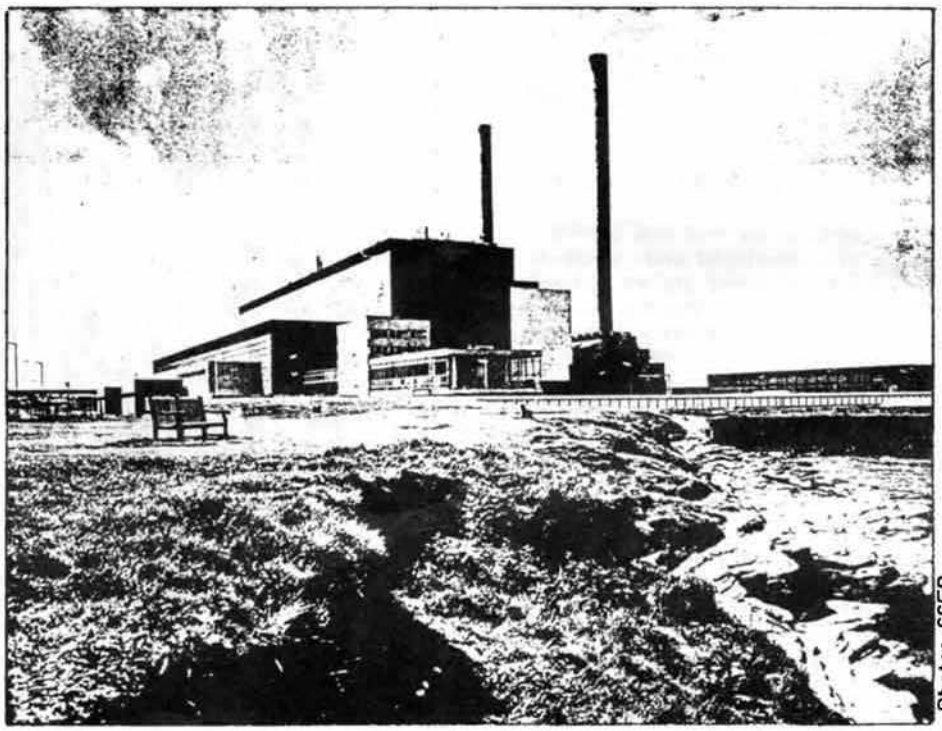


Photo: SSEB

Cockenzie power station: the main source of the heat

Britain's Acid Exports

The CEGB have finally agreed to do something about acid rain. However, many environmentalists think that it is too little, too late. There are worries about which method should be used, and whether they could adversely effect other environmental factors. MIKE TOWNSLEY describes the history of the problem, and how the CEGB intend to solve it.

The problem of air pollution from the combustion of coal is not a new one - in Britain awareness stems from 1306 and Edward I's royal decree "...compelling all but smiths to eschew the obnoxious material (coal) and return to the fuel they used of old."

However in more recent times the London Power Company (LPC) were the first to incorporate Flue Gas Desulphurisation (FGD) into a power station in 1933, "at least 20 years before anyone else." This was instigated by a 1924 court action brought by a farmer who claimed that his crops were damaged by pollutants emitted from nearby Barton power station. The farmer lost the case in 1929, after a House of Lords judgement, but there was no going back to the days of polluting power stations - the public were now aware of the dangers. The proposed Battersea power station became the focus of this concern.

When the Electricity Commission granted consent for Battersea it was provisional on the London Power Company (LPC) using the best available technology for the elimination of smoke and decreasing as far as practicable the production of oxides of sulphur from the plant's flue gases. The LPC had either to find a new site or develop a sulphur removal process - economics precluded the first option and hence FGD was born.

Battersea A was commissioned in 1933 - the first power station with FGD. The Electricity Commission's conditions were interpreted as 90% sulphur removal - a target the plant came close to throughout most of its life.

DILUTE AND DISPERSE

Several other methods of FGD were also developed and installed in coal-fired power staions between 1935 and 1962. During this time the CEGB were also actively investigating "alternative avenues" of solving the emissions problem - or rather how to cheat the local ground level sensors. They came up with a very simple solution - that stalwart of pollution control, dilute and disperse. Their research led to "design methods which gave the dimensions of chimneys to achieve acceptably low ground level concentrations of SO_2 and other components of the flue gases." These stacks are up to 300m high.

No other FGD units have been incorporated into CEGB power stations since this amazing discovery - "The proven effectiveness of high-level dispersion in achieving safe level concentration of pollutants is the main reason why the CEGB have not installed any FGD plants since the one at Bankside." (Bankside B was commissioned in 1962). Yet, as a condition of planning permission for power stations since the late 1940's, land should be set aside to build FGD if necessary.

INTERNATIONAL PRESSURE

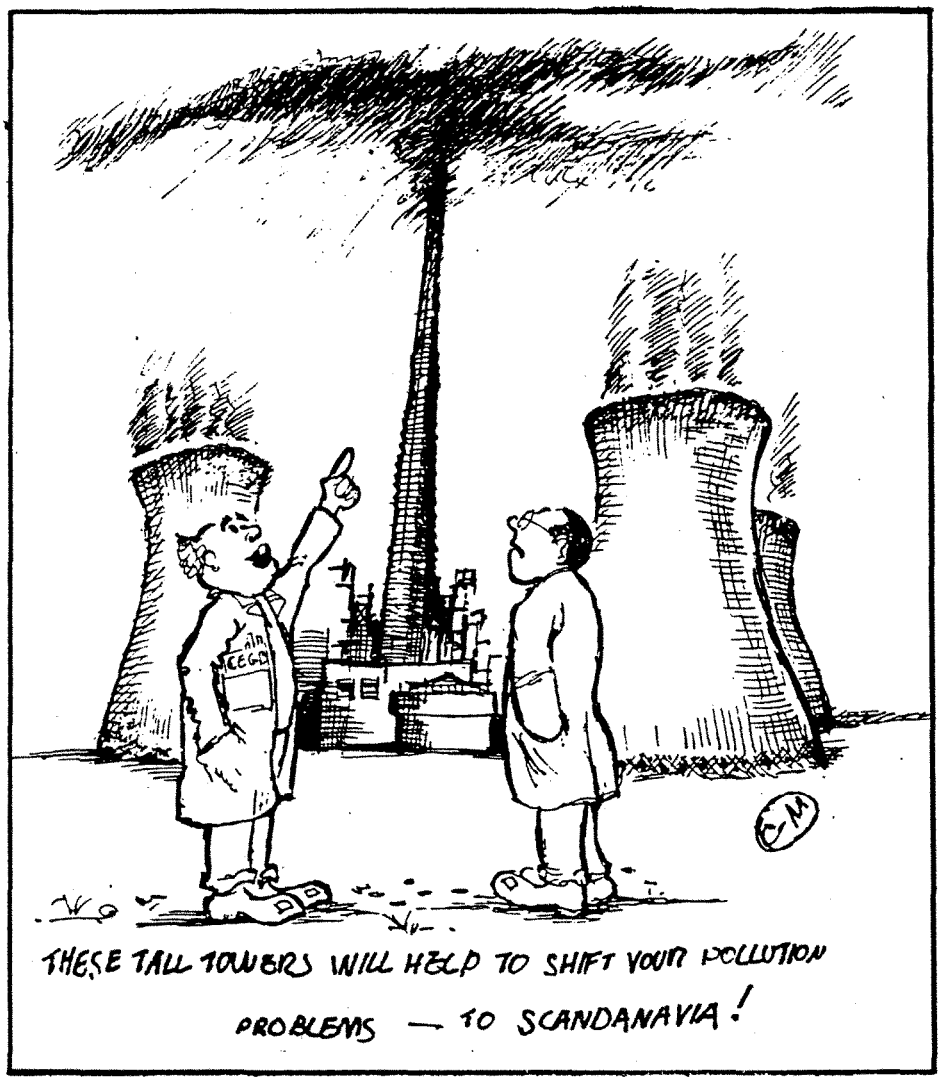
Now, after more than ten years of international protest the CEGB have conceded some responsibility for the acid rain over Europe. Previously they had claimed that scientific evidence linking their power stations to the problem was not strong enough to justify expenditure on the clean up programme, estimated at £2.5bn, which could mean a 6% increase in the Area Board's electricity bills. In reality, now the money is going to be spent, their estimate has fallen to £1.5bn with a knock-on of only 1.5% for the boards.

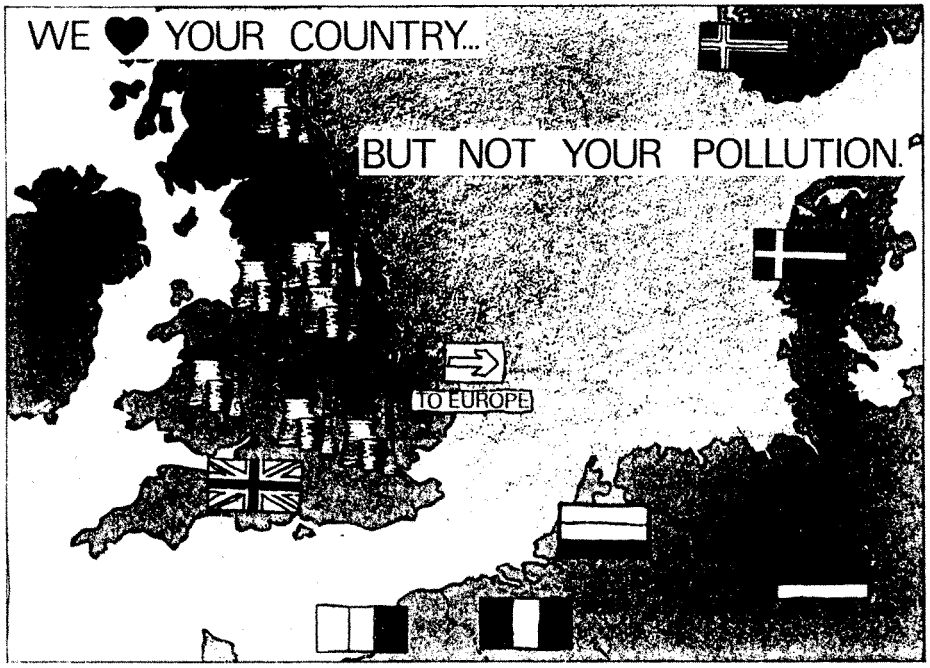
The Government announced last September that they had authorized the CEGB to "retrofit" 6000MW of coal-fired capacity with FGD units, at a cost of £600m. The plan is for 3 of the Board's 12 largest coal-fired power stations. The CEGB say "It will help to halt the build up of sulphur in the soils of Scandanavia which research has shown to be a contributing factor in the increased acidity of the lakes and rivers."

The programme is intended to cut the level of SO_2 emmissions to 70% of their 1980 level over a 10 year period. The CEGB are currently emitting around 75% of their 1980 level. So despite their grandiose statements, it's not a very ambitious programme. They also intend to install FGD in all new coal-fired power stations.

A great deal of scepticism has surrounded the announcement, which environmentalists consider as "too little too late". The decision coincided with Mrs Thatcher's visit to Norway, who are vehement objectors to Britain's acid exports. Many people feel it was a political decision rather than a genuine environmental concern.

The first plant scheduled for retro-fit is Drax B in Yorkshire's Aire





valley; an ironic selection! The construction of Drax B, completed last summer, began at a time when Scandinavians first complained about British sulphur exports. The cost of retro-fitting FGD in Drax B is estimated at a minimum of £40m: planning permission application is expected later this year. Fiddlers Ferry, on Merseyside, looks likely to be the next candidate. It already has an experimental process to reduce NOx emissions, another main ingredient in the acid rain cocktail.

GYPSUM MOUNTAINS

The CEGB seem to favour the "throwaway" Limestone/Gypsum (L/G) method. Unfortunately this is the most environmentally unacceptable! Drax B is almost certainly going to incorporate this method, subject to planning permission.

The limestone requirements for the L/G process are huge, and pose a very serious threat to Britain's national parks and many other beauty spots. This threat prompted the Council for National Parks (CNP) to enter the debate in defence of two potential limestone sources for Drax: Ribblehead, in the Yorkshire Dales National Park, and Tunstead/Old Moor, which is partly in the Peak Distrct National Park. The battle was fought, and won by the CNP, in the Press, using public opinion as a weapon against the CEGB's already battered public image. The CEGB raised a white flag in the form of a press release: "FGD Limestone not to be taken from national parks." (5.8.87)

The other main disadvantage of this process is the amount of Gypsum it produces. Drax B will require 340,000 tonnes of limestone a year and produce 500,000 tonnes of gypsum; the current annual UK requirement for gypsum is only 3 million tonnes. Gypsum is used in plaster-board for the building industry, bag plaster, and cement. Large scale incorporation of the L/G method into the CEGB's coal-fired plant will flood the UK gypsum market and put a great strain on the jobs of the people working in the gypsum mining industry.

The world market is currently flooded with gypsum produced by the German FGD programme - 27 German coal-fired power stations have L/G FGD installed. Environmentalists there are worried about the growing number of gypsum tips and its subsequent leaching into the water supplies. The CEGB, who assure us the gypsum from Drax B can be sold, have been making enquiries into possible landfill sites, such as land exploited for open cast coal mining, and have spoken with the Yorkshire Water Authority about the dangers of gypsum leaching.

The CEGB see the Wellman-Lord (W/L) process as the main alternative to the L/G method. It is far less environmentally damaging. Their expert in the field of emission control, Dr Bill Kyte of the Central Electricity Research Laboratories, has this to say: "Due to environmental considerations, such as space limitations and waste disposal, an FGD plant on a CEGB inland power station would probably have to be of the regenerative type."

SULPHUR BY-PRODUCTS

W/L is regenerative and uses 12 times less limestone than the L/G process. The limestone is only used to clean the waste stream rather than in the main process of sulphur removal. The predominant by-products of the process are SO_2 and sulphur. There is a ready market for these by-products: fertilisers, paints, detergents, fibre, film plastics, dyestuffs, steel, oil, and petrol.

A small amount of the UK's need for sulphur is supplied as a by-product of smelting ferrous metals, but 90% of our requirements, at a cost of £57m a year, are imported. The benefit to Britain's balance of payments from adopting sulphur-generating FGD technologies could be considerable. Dr Kyte argues "the much reduced level of imports and exports from a regenerative system may outweigh the increased processing and energy costs." Even if sulphur from this process did need to be dumped/stockpiled the problem would be much less severe than with gypsum stockpiling.

It is hard to believe the CEGB are seriously considering the Spray/Dry process as a third possibility. This is the most crude of the three methods being considered. It requires 250,000 tonnes of lime per annum with a by-product of 400,000 tonnes of a "mixed product" solid - recovered with the fly-ash. The by-product is totally useless, and landfill sites will be required for its disposal.

The conventional approach to FGD is to buy one system for SO_2 emissions and another for NOx (nitrogen oxides). In West Germany, however, a technique known as the Walther process is being developed to remove both using one system. The by-products of the Walther system are ammonium sulphate and ammonium nitrate, both of which can be used to make fertiliser. The first plant to incorporate this process, a 440MW unit, is now being constructed in Mannheim.

In Bavaria a plant now coming on stream incorporates a new technique called BF/Uhde which also tackles the problems of SO_2 and NOx in the same unit. The by-products here are sulphur and sulphuric acid. After dealing with the sulphur, the flue gases pass on up the stack to where ammonia is added which eliminates NOx turning them into nitrogen and water vapour which pass harmlessly out through the chimney stacks.

If the CEGB decided instead to fit Fiddlers Ferry first, which they admit would incorporate the W/L system, there would be no time lost in reaching their 1997 emissions target, and it would allow time for more suitable techniques to be found for Drax B and other stations.

The CEGB have pioneered a revolutionary concept in pollution. They first incorporated Flue Gas Desulphurisation into a coal-fired power station in the late 1920's, and then abandoned it in the early 1960s. They now propose to go back to the same tired techniques, proven unsatisfactory in other countries far more advanced in their clean up programmes. Perhaps it's time they used some of that great British resource - the "pioneering spirit". There exists today a huge world market for FGD, which, had they pursued the technology past the mere research stage, could have provided Britain with a very lucrative export market.

Wave Power

It is estimated that the wave power station currently under construction on the island of Islay (LBR, SCRAM 60) in the Inner Hebrides, will produce electricity at 4-5p/kWh.

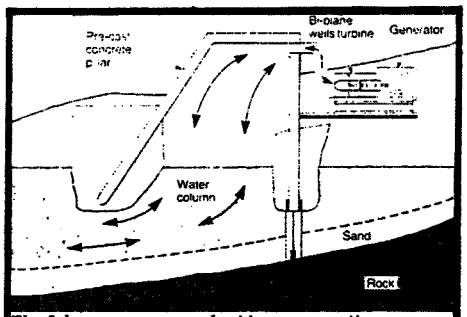
The Department of Energy have contributed £230,000 towards the first 2 phases of the project, run by a team from Queen's University, Belfast - the feasibility study, and the building and testing of the 200kW demonstration plant - representing around 90% of the project's costs. The third and final phase - installation of the turbine - is expected to take place in the spring of next year. Queen's intend to apply to the Government for extra funding towards the £25,000 costs to complete their project.

In 1982, ACORD (Advisory Council on Research and Development) recommended the abandonment of Government wave energy funding, based on findings that current technologies would not permit generation at below 9p/kWh. The new estimates of generating costs, accepted by the Government, negate the ban, although some may say the Government have been embarrassed into action by the success of two Norwegian projects. The Norwegians have orders from Indonesia, Portugal and Puerto Rico for their OWC (Oscillating Water Coloumn) demonstrated near Tofestallen.

Only Japan and Norway have built and tested prototype wave power generators, during the last ten years.

The three phase Islay project, is now at the beginning of the second phase - building and testing the prototype in a small gully near the village of Portnahaven.

The site was chosen following an aerial survey of the north of Ireland and the Western Isles of Scotland. Islay alone contains over 50 potential sites for the demonstration project, with potential peak power ranging from 50kw to 2MW, giving a combined output potential of 30MW. The other criteria were: wave climate, sea bed topography, geology of the coast,



The Islay wavepower plant in cross-section:

access to the device site and proximity to the consumer.

The protoype is being tailor made for the site - extensive monitoring of the site has enabled the team to optimise the structure's shape and characteristics. It is intended that as much of the structure as possible shall incorporate local materials, and use local workers to minimise the civil engineering costs. Unfortunately, owing to the shortage of locally available materials, a great deal of the structure will have to be precast.

One of the beauties of this system is its simplicity. It is situated at the end of a naturally tapering gully which focuses the waves before they enter the column; the amplified wave is then reflected off the back wall to combine with the next incoming wave creating a large rush of air out through the turbine, mounted at the rear of the structure. The air is sucked back when the water level falls. The Wells "bi-plane" turbine has 2 tiers of blades which improves operating efficiency and was also developed at Queen's University.

The problem of noise pollution - a loud moaning was encounterd at the Norwegian plant - should not occur in the Islay project as the Belfast team have benefitted from the Norwegian experience.

Although not yet competitive with conventional generating plant, 4-5p/kWh makes it extremely attractive to island communities currently serviced by sub-sea cables, or very much more expensive diesel plant, at around 20p/kWh.

Tidal Barrage

The British Trust for Ornithology (BTO) have been awarded a major contract to conduct studies into the implications of a barrage on the 70,000 or so waders who winter on the Severn estuary.

The contract has been awarded by the Energy Technology Support Unit on behalf of the Department of Energy, and will be officially announced in September.

The BTO are specifically worried about 7 species of birds - 5 species of international importance and 2 of national importance.

There is concern about the effect of the barrage on the area of intertidal mudflats, vital to many waders. The mudflats are used by a diverse array of birds, from breeding areas as far apart as Greenland and Siberia. There are some possible benefits. For example, the twenty million tonnes of sediment currently suspended in the water would settle out leading to an increased density of invertebrate prey in the remaining intertidal areas.

It is against the backdrop of a highly complex estuarine system that the BTO will be carrying out their research programme, which involves both analysis of existing data and collection of information in the field.

It is in the collection of the new field data that the BTO becomes the obvious choice to carry out the research - over the years the BTO have taken the lead in the area of ornithological research.

Since 1970 they have been carrying out an ongoing survey, the Birds of the Estuaries Enquiry (BoEE). The BTO have built up extensive data banks since the inception of this project.

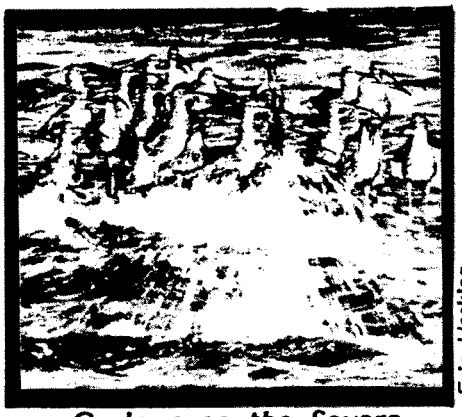
Both ringing and the BoEE counts will contribute to the Severn research programme. The two main ambitions of the research are to determine the importance of the estuary to breeding populations wintering there, and to explore the possibility that other estuaries may be able to accommodate birds displaced from the Severn.

This autumn and winter the BTO have ambitious plans for field work involving their members. They require complete high tide counts of each area within the estuary for comparison with existing BoEE counts.

Counts will also be made of waders on individual mud flats at low tide - it will then be possible to rank the mudflats in the order of preference for each species. Studies have shown it is the dominant birds which use the preferred feeding areas; so if the barrage destroys these areas the effect on the wintering waders could be catastrophic.

The BTO hope to submit an initial report to the DoEn in September of next year, for publication early the following year.

The Severn Tidal Power Group (STPG) are also conducting studies into the ecological effect of the barrage including studies on the correlation between intertidal sediments and invertebrates; the effect on tide and current patterns; the migration of shore-birds; and the balance between wild fowl and the wintering wader population.



Eric Hosking

Curlews on the Severn

The STPG hope to submit a draft report of their findings to the DoEn in September next year, leading to publication coincidently in early 1989.

The DoEn will also be issuing a series of information pamphlets about the proposed Severn Barrage over the next two years.

Mr Wardle of the STPG sees these studies as "the first stage" in the Severn project - leading to more precise analysis of specific factors outlined by the current programme. Even if all goes well they don't expect to begin construction of the barrage for at least another 5 or 6 years.

If you live within reach of the Severn and would like to help, please contact Nigel Clark at the BTO.
Tel: 044 282 3461

Energy Strategy

The Department of Energy have published a new report, researched and presented by the Energy Technology Support Unit (ETSU). It is a comprehensive assessment of energy technologies "considered relevent for the UK".

The £1 million research programme was conducted at the request of two Parliamentary groups: ACORD (the government's Advisory Council on Research and Development) and the Energy Select Committee.

ACORD are quick to point out "the document is neither a statement of strategy or policy. It is a technological review - a source book."

Central features of the study were the economic assesssment of:

- the prospects for deploying the various technologyies in the appropriate market in which they may be expected to compete;
- the cost-effectiveness of the associated R&D programmes.

Energy Paper 54 (the companion paper to the ETSU report) provides a very convincing argument for immediate exploitation, and increased R&D of renewable energy souces in the UK: "It is clear that some technologies are vulnerable to pressures on cost and availability of supply." And "Such considerations may greatly enhance the value of certain technologies in terms of the UK's security of supply."

Section 3.31 identifies the following possible pressures:

- a freeze on further nuclear fission power development resulting from public perceptions of the associated risks;
- extremely severe restrictions on SO_2 and NOx emissions, constraining the combustion of coal and oil;
- drastic reductions on fossil fuel burning, due to fears of carbon dioxide build-up in the atmosphere;
- cessation of Middle East oil supplies, with obvious consequences for world prices and availability;
- cessation of Soviet supplies of natural gas, with obvious consequences for European gas prices and availability;
- restriction on the production and/or export of uranium.

The report comes down very strongly in favour of increased investment in "end-use technologies" - energy management, industrial CHP, and energy efficient lighting and appliances are likely to be very "cost effective".

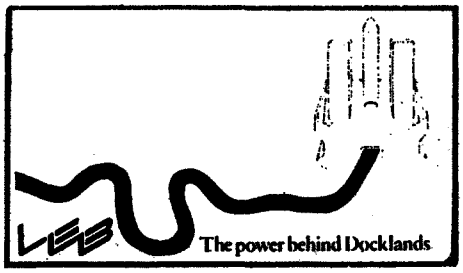
A package of passive solar energy and energy efficiency measures, incorporated during construction, can typically reduce heating bills by 40% compared to a conventional house. The report points out there are "no significant commercial incentives for the building industry to promote measures which do not significantly increase profits."

Wind power is the most favoured of the electricity producing renewables, closely followed by tidal power. Biofuels are also seen as a good investment, with energy crops becoming economically attractive in the near future as a result of increased oil prices.

Among the technologies now seen as "unpromising" are the once favoured off-shore wave power, active solar energy, and geothermal aquifers.

Publication of this volume seems to herald a major reappraisal of Government energy strategy; and could deter Cecil Parkinson from cutting back the energy efficiency programme set up by Peter Walker, his predecessor.

Heat Pumps



London Docklands is ideal for district heating schemes and other energy saving systems said John Wilson, the chairman of the London Electricity Board (LEB), at a reception - Dockland: seeing is Believing" - to promote development of the area.

LEB are working with the London Docklands Development Corporation (LDDC) to advance the benefits of using the vast expanse of dockwater for commercial sector heating.

John Wilson proposed the system as being "...pollution free, space saving and above all economic."

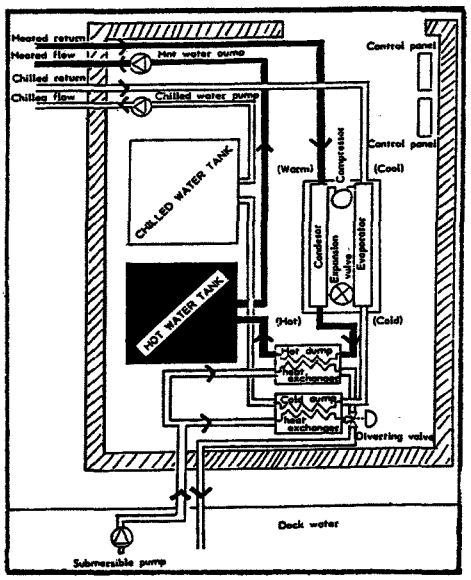
The large volume of water forms an inexhaustible supply of energy for heat pumps which could be used as the basis for air-conditioning systems in the commercial buildings scheduled for construction as the Docklands extensive development scheme gets underway.

Heat can either be "dumped" into the docks or retrieved using a series of heat exchangers and heat pumps - such as in the "test bed" trial system installed in the LDDC's Royal Docks Area Office. It is expected that the heating costs for the whole building will be only £1,400 a year, compared to the LEB's estimate of £2,350 for a conventional system.

The energy absorbed by the chilled water from the zones requiring cooling, is recovered within the heat pump and recycled for use in heating the other zones. During some periods of operation the system will become out of balance - when either the heating or cooling load is greater. For example, if the heating load is greater, the excess cooling water is rejected through the heat exchangers into the dockwater.

The costs of installation and maintainance of this system are no greater than those of a conventional system incorporating an electric chiller with a fossil fuel heating plant.

John Wilson highlights energy efficiency as being "crucially important in the Docklands." Electricity demand in the area is expected to exceed 450MW in the next ten years, but that figure could rise to 550MW if energy saving techniques are not employed.



LEB are also promoting high standard insulation - to Scandinavian and Canadian specifications - to help reduce the demand for electricity.

Rates

The Government are soon expected to make a statement about reducing the rates levelled on private power generators to bring them in line with the ESI (Electricity Supply Industry). The new rates are intended to come into operation in 1990.

A Government spokesman said that working parties will be set up before the end of this summmer to calculate new rates for industry, including the ESI. The working parties will consist of representatives from the Department of Energy, the Department of the Environment, industry and (possibly) local government.

The Government have also approached the recently-formed Association of Independent Electricity Producers (AIEP) asking them to declare their membership, "so the Government can assess how much the AIEP represents private generators." This is presumably so they can decide whether or not to include them in the working parties.

Although the formula for rates was altered in 1984 to allow private generators to be charged a comparable rate with the ESI, this did not occur. A Government spokesman said that the amendment has been in operation since 1984 but it is impossible to apply to the private producers.

He promoted the new rating formula as being applicable to post-privatisation of the ESI - "We don't want to go through the whole process again" - but was unable to explain how the new formula would work.

Wind Power

Rumour has it that the Government are about to announce the site of the first British Wind Farm. It is thought that the announcement will be made by Michael Spicer, the Government Minister responsible for renewable energy (and nuclear power!) in mid August - when he will connect Orkney's massive 3MW aerogenerator, LS1, to the National Grid.

It is thought that the Farm will consist of around 30 large machines; giving it a capacity of between 20MW and 30MW.

High on the list of potential sites are Cornwall and "Scotland" according to the *Financial Times* (24:7:87).

The Hydro Board told SCRAM, that they are interested in the proposal, but as yet have no details.

* * * *

The Wind Energy Group (WEG) have completed the installation of twenty 250kW wind turbines - based on the prototype at Illfracombe - in Alatmont Pass, California.

This is the second US wind farm to be built by a British company. WEG are a consortium involving several British companys including Taylor Woodrow and British Aerospace.

The farm is now contributing 5MW to the Californian grid, continuing the British wind industry's success story in the Californian wind rush.

* * * *

The Hydro Board have taken over ownership of the 50kW WEG wind turbine on Burgar Hill, in Orkney, and are negotiating for ownership of the 300kW Howden machine. A problem with the blades on the Howden machine is holding up negotiations.

The Hydro Board have taken over each of the wind turbines for operational purposes from their date of synchronisation with the grid.

They also expect to purchase the 3MW machine on Burgar Hill, although the actual details of the contract will not be discussed with the Department of Energy until the end of a 2 year monitoring period.

* * * *

The CEGB and two other major generating boards, in Spain and Denmark, have signed contracts with the European Commission for the development of 1-2MW wind turbines.

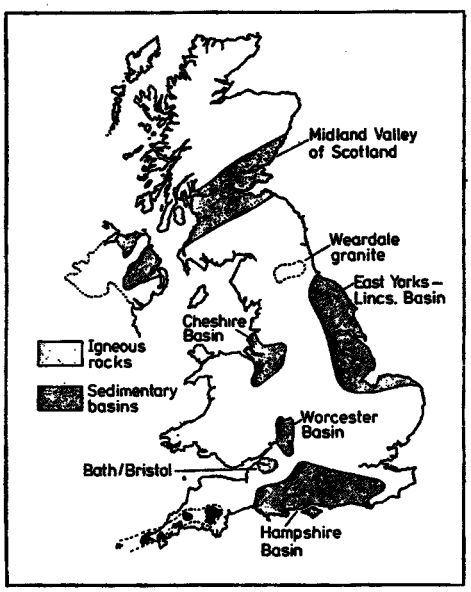
It is the Commission's intention that electricity should be generated for the European grid using the proven technology of aerogenerators in this range.

The 1MW plant at Richborough, which is due on line next year, will be the CEGB's contribution. The Spanish and Dutch contributions are also due on line next year.

Geothermal

Southampton City Council have signed a deal with Utilicom bringing back to life their plans for a geothermal group heating scheme in the city centre.

Utilicom, a wholly owned UK subsidiary of the French Idex Group, already run three such schemes in the Paris basin. Steve Forrest, Utilicom's general manager, told SCRAM, that their French experience is one of the main reasons for their interest in the project - a scheme that both the CEGB and the Department of Energy have previously abandoned. Low rent for the site and an EEC grant have provided the additional incentive.



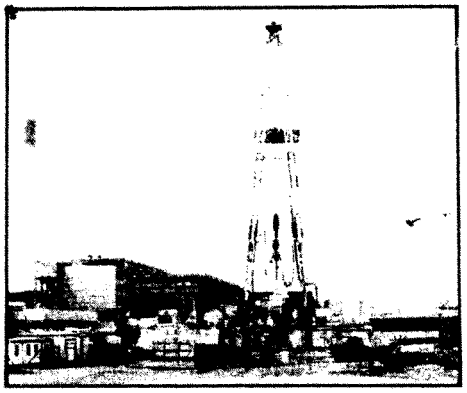
Areas of potential geothermal interest

Steve Forrest is also quick to point out that the contract for supplying the pumps for the scheme is going to the Weir Group of Scotland, designer's of the revolutionary hydraulic pump for geothermal extraction *(see SCRAM 44)* - showing not all the financial benefit from this project is going abroad.

Southampton is at the edge of a geothermal reservoir which deepens towards Bournemouth - the Wessex basin. The results from the first bore hole drilled in the basin, at Marchwood power station near Southampton revealed an estimated potential of 2.5MW and much enthusiasm. Dr John Garnish of the Energy Technology Support Unit estimated that 15% of British electricity could come from geothermal schemes "if the British nuclear programme failed to materialise."

The announcement of success in this project came in 1980, when the then junior Energy Minister said that the £1.8m well at Marchwood hit an aquifier at 5,500ft, giving rise to water with a surface temperature of 65-67°C, sufficient to heat homes and offices for several decades. Yet for some reason this potential has not been exploited and the £1.8m costs of that scheme have been literally poured into a hole in the ground.

Based on the "very successful" results at Marchwood, a second bore hole has been drilled in the city centre, with government backing.



Drilling for geothermal hot water at the Marchwood power station site

Unfortunately this one proved to be a disappointment, revealing an estimated potential of only 2MW capacity, at a flow rate of 10 litres/second of water at 74°C, and an expected life time of 15-20 years. Previously it was expected that the flow rate would be 20 litres/second, giving 4MW capacity, with a life span of 25 years.

Steve Forrest feels that their scheme has a potential of 9MW, promoting it into the league of a full scale district heating scheme.

Utilicom are currently putting the finishing touches to a report which is expected to be published soon.

CHP

The Government are funding a £728,000 project to demonstrate a micro CHP (Combined Heat and Power) system - developed by Combined Power Systems (CPS).

CPS are to choose 15 test sites in Manchester, the company's home, to demonstrate their system. Sam Almozaffar, the managing Director commments "we will choose sites which will give CHP high exposure and will show what can be saved - in some cases cuts of 50% are possible." He cites local government buildings, British Telecom offices and swimming pools as examples.

Manchester University's Institute of Science and Technology have shown that 300,000 buildings in the UK are compatable with this system, involving some 12GW of capacity.

The market for this device is said to be any building capable of using a 40kW generator. With only 2,500 to 3,500 hours use each year, Almozaffer expects a payback period of 2-3 years.

Dr Julian Packer, technical advisor to CPS, thinks that production costs could be halved if the level of production is geared to account for the systems potential.

Sub-sea Link

Iceland's National Power Council (NPC), have declared plans for transmitting power to the North of Scotland, via a £500m submarine cable.

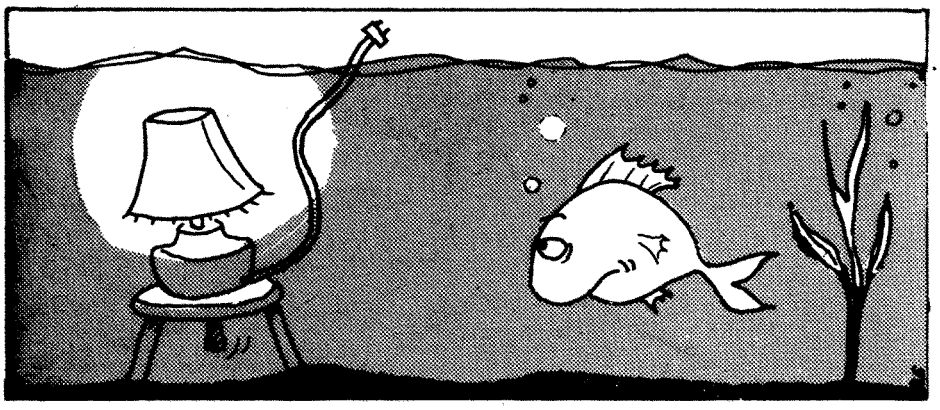
This is not the first time plans for the 600 mile link have been tabled by the NPC. Past studies - the most recent was in 1985 - have shown that the scheme is not economically attractive. Recent developments in power transmission, including super conductors, are thought to be the main reason for resurrecting the proposals.

The project would make use of Iceland's vast hydro-electric and geothermal potential. Currently they use only around 13% of their hydro-electric capacity and a tiny fraction of their geothermal potential.

If the scheme proves successful, it could pave the way for similar schemes delivering power to Norway and the rest of mainland Europe.

Although the benefits of this project for Iceland are obvious - the creation of a major new export industry - Halldor Jonatansson, NPC's general manager points out, not to use the resources available "... is a waste - especially at a time when there are so many worries about pollution from oil, coal and in particular nuclear."

But it is difficult to see how foreign governments will allow the lure of cheap and pollution-free electricity to overcome their paranoia to hand responsibility for their power generation over to Iceland.



Acid Rain, What is it, and what is it doing to us? Penguin, 1987, Fred Pearce, 162pp, £3.95.

Anyone with interests in atmospheric pollution and its effect on soil, trees, lakes and rivers, architecture and human health will welcome this book. In the rest of Europe, many more people, it seems to me, are aware of the ecological disaster which is happening all round us and feelings are running high. Yet there seems little to parallel this in Britain where the damage to the health of people, trees and lakes is as bad as in other countries. The British public has yet to realise what is going on. It has to be hoped that this book will make a big contribution to increased awareness of acid rain on this side of the Channel.

Starting with the, by now obligatory historical overview of British air pollution from 1273, black rain showers in Peterhead in 1862 and the devastating London smogs of 1948 and 1952, Pearce moves on quickly to describe the ecological disaster of our modern less smoky but more pollution laden air.

Pearce analyses the roles of sulphur dioxide, nitrogen oxides and ozone in the origins of acidification in the

environment. He describes the origins of these compounds from fossil fuel power stations and car exhaust and then relates the latest ideas about how they interact in the "complex cocktail of chemicals in the air over the continent" to cause the death of forests, lead and aluminium poisoning, corroding gases, the disappearance of fish from lakes and so on. The list is endless.

Little attempt is made in the book to be non-partisan, and often opinions are expressed for which as yet insufficient scientific "proof" is offered, for instance, the role of ozone in the death of trees, and the actual role of sulphur dioxide in the acidification of lakes. Sometimes as well, the quest for readability and simplicity leads to statements like "Concentrations of nitrogen in the air have increased fourfold in Britain since the 1880's." Nevertheless this should not put you off. Pearce is able to put sophisticated scientific argument into accessible prose to reveal a story which is both frightening and absorbing to read.

His views, shared by many scientists and others throughout Europe are gaining wider and wider currency. Even the CEGB who have sought to obscure the acid rain debate, finally admitted in September 1986 that the British sulphur dioxide (for which it is responsible for two thirds) are partly to blame for the apalling destruction of Scandinavian Ecosystems. Pehaps this book will help the rest of us to take an even more positive stance.

TIM PUNTIS

Forevermore: Nuclear Waste in America by Donald L Bartlett and James B Steele; Norton. 352pp, £15.10.

If you think the UK nuclear waste management programme is in tatters you have just got to read this book. The US have been producing nuclear waste for longer, and in much greater quantities, than we have; and if anything they have less idea of what to do with it than us!

The book has been written by two journalists on the *Philadelphia Inquirer* whose investigative work has won them 18 national journalism prizes. It grew out of a series of articles they wrote during November 1983. There was such a large response to the series - over 25,000 reprints were sent out to individuals and organisations from 40 states and several foreign countries - and many requests to expand the series into a book, that the authors continued their researches and produced what amounts to a powerful indictment of nuclear industry politics which can equally well be translated to any other country. It rivals the excellent "Nuclear Barons" book, published by Sphere books in 1982, in its exhaustive coverage of an issue.

Although this book was published in 1985, it is still useful today - the only omissions are further errors and political complications which have occurred in the past couple of years: the waste problem has not been solved in the meantime.

The foresight of the nuclear waste management programme can be

summed up in the following quote: "If the politicians and scientists in charge of nuclear waste had been running the space program, John Glenn (the first US astronaut) would still be orbiting the earth today."

The authors describe a catalogue of inter-state politics, federal mistakes and changing policies. State law makers have schemed and lobbied to introduce legislation which rules out their own state for earmarking as a dump site. The Federal agencies and government departments have allowed facilities to be constructed and operated without proper surveys or consideration of their consequences, often because of short term private profit making. And policy has changed from shallow dumps to deep dumps; reprocessing was abandoned by Carter in 1977 only to be revived by Reagan to augment the plutonium stocks for his planned military build-up; and a few national repositories became regional state "compacts" to take care of waste produced in those states.

What the book says, very clearly, is that forty years on we are no closer to finding a solution to the waste problem than we were when the first atom was split. And the politicians and scientists are still telling us, as they have for the past forty years, that the problems are solved - the solutions have only to be implemented.

STEVE MARTIN

Reviews

Pacific Women Speak. From Green Line, 34 Cowley Rd. Oxford. £2.15 incl. p&p.

Pacific Women Speak is definitely not cheerful bedtime reading, but it does have its lighter and more hopeful moments. The women visited Britain over the last few years to publicise the plight of Pacific bomb test victims around the Bikini and French test sites as well as those threatened by Japanese nuclear waste dumping and US and French Imperialism.

"We are the people of the land and the ocean and we are struggling for survival. Because our water is killing us slowly. After four months the Bravo fallout went all over Micronesia" said Chailany Palacios. Lijon Eknilang describes the day of the Bravo test: "Late in the afternoon I became very sick... our eyes itched terribly and towards the evening our skin began to burn." The Pacific Women speak as people who have lived through World War 3, while we sat secure. They ask "Why haven't you known?".

Perhaps we haven't known because most world maps divide the Pacific in two, because people in the West assume that the South Sea Islands are still a paradise to escape to. They are not.

Ebeye Island, for example, is the 'slum of the Pacific' where 8,000 people evacuated from other islands exist on 66 acres, suffering from leprosy.

The Australia section concentrates on the loss of Aboriginal land rights to uranium mining and as Titewhai Harawira from Aotearoa says "We don't see the white nations as our friends any more - you're going to have to earn our trust."

LINDA HENDRY

A guide to small wind energy conversion systems. C.U.P, 1987, Twidell (Ed), 155pp, £15

An invaluable volume to anyone with an interest in small wind energy conversion systems (SWEC's).

Written by the members of the British Wind Energy Group (BWEA) it provides vital insight to all aspect of SWEC's: choosing a machine; regulations and institutional support; installing and operating a system - just some of the chapter titles.

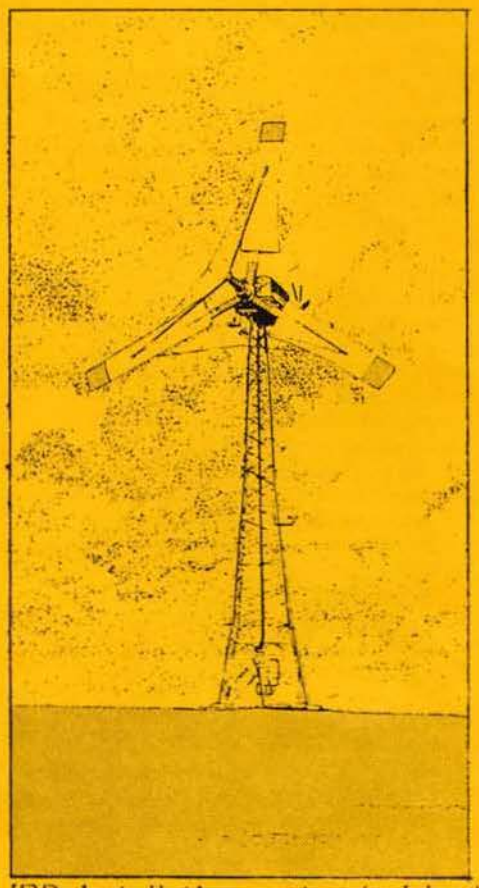
It was BWEA's intention to produce a small volume providing, in non-technical terms a reference text, in an attempt to "give straightforward answers to the questions commonly asked by potential users of these machines".

The emphasis here is on exploring all eventualities before going ahead and buying your SWEC. It gives information on Electricity Board's buy-back tariffs, possible interference and the effect of Inflation - to help you calculate the value of your investment relative to other possible investments.

It contains an interesting chapter on case studies, and "since this Guide Book is intended to encourage the application of wind energy in the UK, a chapter describing a selection of operational installations is important." The inclusion of these case studies will give potential purchasers a little added confidence, and knowledge when purchasing their SWEC, the chapter excludes any mention of machines greater than 100kW as they are too large to be considered as SWEC's.

This book is for everyone interested in wind energy, but specifically for potential users of SWEC's, the comprehensive index will ease the constant use this book will get. It also provides a wide list of valuable contact addresses including local electricity boards, and a list of UK Meteorological Wind Recording Stations

Judging by all the requests I receive from school children "doing projects on



IRD installation on Lundy Island

Wind Energy", I suggest this would be an excellent addition to the school library.

MIKE TOWNSLEY

Little Black Rabbit

American cousins of Little Black Rabbit are causing great problems for nuclear waste management authorities. The 26 June issue of *Science* this year carried four and a quarter page "news & comment" feature on the 44 year old US Hanford military nuclear facility.

According to the feature a badger broke through the security fence in 1959 and, ignoring all the warnings, dug a hole in one of the waste pits. Subsequently, rabbits which stopped to lick salt from the exposed material deposited 200 curies of caesium 137 and strontium 90 in their droppings over 2500 acres of the reserve.

Rabbits are not the only problem: ground squirrels, burrowing owls, mice and insects also spread radioactive material; as do some plants, such as tumbleweeds. A former employee at the site, now a state radiological safety officer, is concerned that a range fire "may produce airborne contamination."

As the article points out: "The task of chasing hot tumbleweeds does not fit with the image of a seamless engineered environment that Hanford folk aim to create."

Little Black Rabbit is wondering about Drigg and Sellafield?

● ● ● ● ● ● ● ●

SCRAM readers may remember the story about the exodus of nesting sea birds from the Ravenglass estuary over the past few years. Little Black Rabbit is understandably very concerned about the issue.

You can therefore imagine the surprise when LBR heard that, in an attempt to show that the estuary is not really radioactive at all, the powers that be are trying to encourage the birds to return. Wooden "decoys" have been placed in the area in the hope that the birds are daft enough to think that some other birds have been daft enough to take up residence there.

Rumour has it, and it must be stressed that it is only rumour, that BNFL and the local tourist industry are thinking about erecting strategically placed wooden tourists in Cumbria to attract tourists back to the area.

● ● ● ● ● ● ● ●

How independent is independent? It appears that Dr Berry of Middlesex Hospital Medical School will take up the post of Director of Health and Safety at Sellafield in December when Dr Mummery retires.

Nothing so odd about that you may think. But Dr Berry has other strings to his bow.

Dr Berry is a board member of ICRP, NRPB, RWMAC and COMARE. All of these organisations are described by government and the nuclear industry as "independent" bodies, and offer advice to government.

We naturally presume that Dr Berry will be resigning from all of these committees as soon as he takes up his new job at Sellafield. If he does then we may expect the introduction of a new broom into what must surely be one of the most important jobs in the UK nuclear industry, bringing with him the experience he has gained from his "independent" advisory roles.

If Dr Berry does not resign, then the whole "independence" of these bodies, criticised as it has been in the past, will go out of the window once and for all.

● ● ● ● ● ● ● ●

Little Black Rabbit has been wondering if the harmonic convergence is beginning to have a strange affect on some of the people who work for the electricity boards.

A senior executive who has worked for the CEGB for 40 years, was quoted recently as saying "Its a marvellous job. I just wish at times the public were more sodding grateful. We keep the lights on and all they do is moan about nuclear power and a few dead trees." It almost makes you feel sorry for him.

What he should do is take some inspiration from the SSEB's chairman, Donald Miller. He says that working for the SSEB "is a bit like being a doctor or a social worker. People tend to tell you all their problems and their worries." He talks about the need for all the Board's staff to be "kept informed about ... our involvement in nuclear power" and "Your friends' perceptions of the SSEB ... are influenced in part by what you say."

Little Black Rabbit is sure that if our CEGB executive friend were to take the trouble to explain the Board's policies to his staff and the public, then worries about nuclear power would disappear in a puff of logic and the trees would miraculously start to grow again.

● ● ● ● ● ● ● ●

As well as the interesting stuff about the fast reactor's future the leaked UKAEA documents also contain some funny bits.

Here's another acronym for your collection - MASSENET (Massive Assembly of Sodium, Steel and Enrichment for Novel Engineering Trends - an incredibly tortuous concept). It's something to do with the fast reactor programme.

The name was chosen, according to one of the documents, to continue the ZEBRA (sorry - Zero-Energy Breeder Reactor Assembly) tradition of using composer names for programmes. Both Mozart (1756-91) and Bizet (1838-75) "died at tragically early ages" whereas Massenet (1842-1912) lived to the ripe old age of 70. There is also the advantage that "his music is popular in the UK and Germany, [illegible] us who like simple melody and orchestral colour." He was apparently also an admirer of Wagner. So was Adolf Hitler. Now, there's an idea!

SUB FORM

I would like to subscribe to SCRAM. I enclose cheque/postal order, payable to SCRAM for:

Concessionary £5
Ordinary £10
Supporting £15
Institutional £25
Life sub. £50

Name . . . . . .
Address. . . . . .
. . . . . .
. . . . . Tel

WAGES FORM

Please fill out the standing order form below and send it to us.

To the Manager:
. . . . . Bank
Address . . . . . .
. . . . . .
. . . . . .

Please pay on . . . . (1st payment) the sum of . . . from my account number . . . . . to the Royal Bank of Scotland, 142 Princes Street, Edinburgh (83-51-00) for the credit of SCRAM number 2 account 258597 and make similar payments monthly/yearly until cancelled.

Signed . . . . . Date . . . . .

Return this form to:
SCRAM, 11 Forth Street, Edinburgh
EH1 3LE. Tel: 031 557 4283/4.