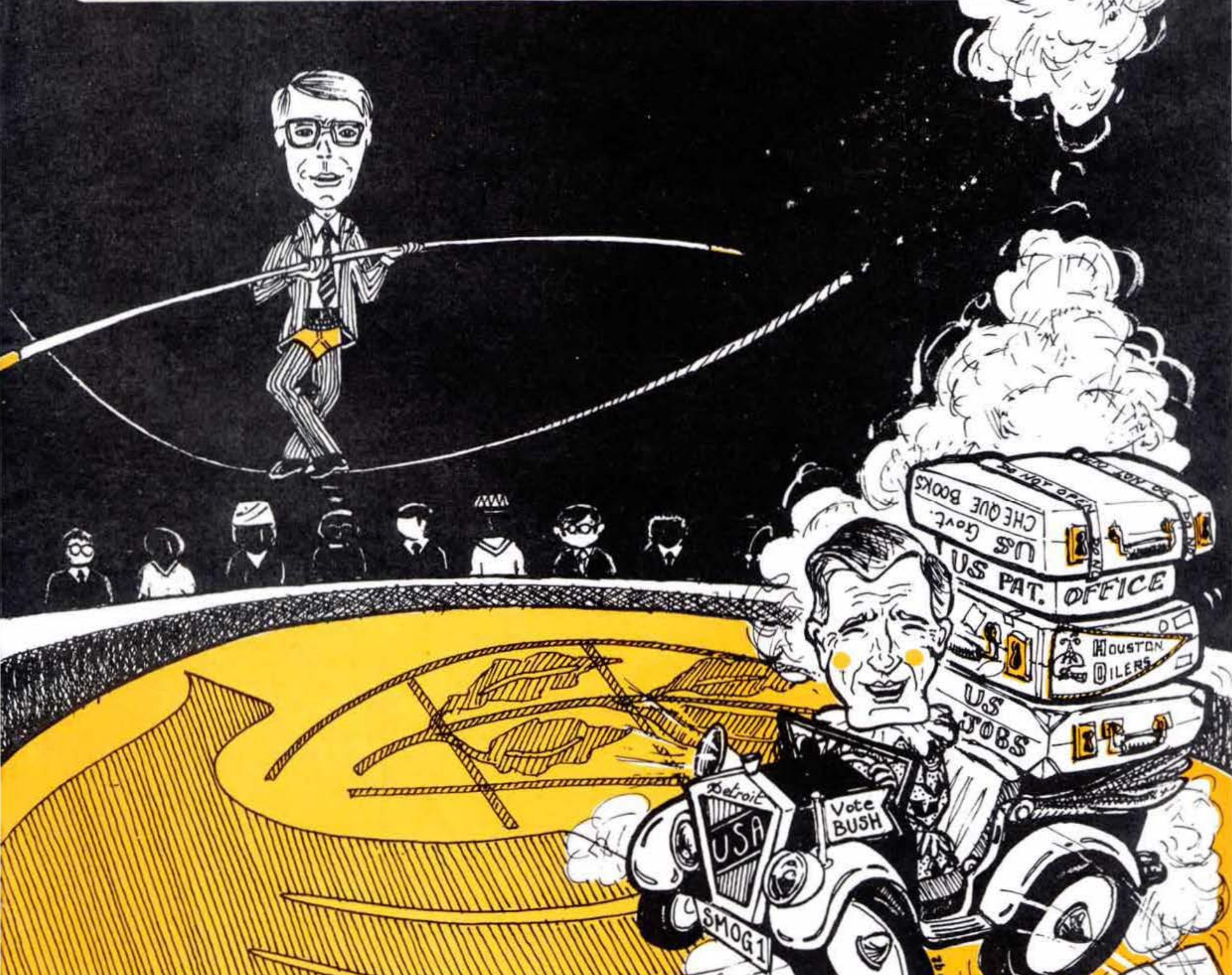
SAFE ENERGY

No.89 June/July 1992 £1.50



THORP: the krypton factor

UK radhealth directive criticised

The wind in Wales

Storing up trouble

Greening our buildings

Rössing roulette

When is a dose not a dose?

COMMENT

IS the 'mother of parliaments', the world's oldest democracy, turning into the newest dictatorship? A country where local authority office bearers are disbarred from holding office in political parties, thus being denied their democratic rights. A country where under the constraints of the new local authority finance legislation, Scottish authorities will be unable to take part in a public inquiry over the digging of a hole for nuclear waste at Sellafield.

There is a good chance that that inquiry will establish generic approval for the deep dump design; approval which will then be exported North, leaving a Scottish inquiry to argue about the colour of the outbuildings. A country in which the movements of nuclear materials are kept secret from the very people who would be expected to pick up the pieces in the event of an accident.

Now the Courts, those defenders of freedom and liberty, have been used to stifle protest over the opening of the Thermal Oxide Reprocessing Plant - Sellafield 2. A plant which will increase Sellafield's radioactive discharges to land and sea by 1000% and 800% respectively, escalating environmental and health damage.

"We won't allow Sellafield to become a danger to the public," screamed the massive ads taken out in Britain's national newspapers. Yet they were not taken out by opponents of the plant, but by its operators, British Nuclear Fuels (BNFL).

Having previously agreed to a demonstration against their new plant, BNFL took fright when the event threatened to draw over 10,000 people to the site. They only agreed originally to the demo on "the basis that a few hundred would attend."

A High Court judge, Mr Justice May, granted injunctions against Greenpeace, Cumbrians Against a Radioactive Environment (CORE) and the Irish 'super group' U2, banning them from setting foot on any of BNFL's 3,225 acres, which contains the 646-acre reprocessing plant, on the weekend of June 20.

"This is not a free speech issue, it is a public safety issue," claimed BNFL: "What was planned was not an anti-nuclear demonstration but an impromptu pop concert." Greenpeace had been granted a music licence for the day to allow U2 to play. BNFL's real concern was that once the rock fans knew the full horror of THORP's environmental and health implications they would add their voice to the growing protest.

If the company are really concerned about "safety, public order and public health," they should cancel THORP.

Reprocessing is without purpose; it increases the volume of radioactive waste for final disposal by 160 times and lays the foundations for the plutonium economy. It must, as it already has been in the USA and many other countries, be stopped.

EARTH SUMMIT

EVEN the longest journey starts with a single step. However, with the future of the planet at stake, it is alarming that the 150 world leaders who gathered in Rio for the Earth Summit have taken us such a short a distance along the road to sustainable development.

George Bush was the hate figure in Rio - and rightly so!

The Earth Summit demanded statesmanship from the leader of the most powerful nation; instead it got 'the campaign to re-elect the President'. As one US environmentalist explained, the trouble with Bush is that he's a Marxist - his philosophy is "stuff posterity - what's it ever done for us?" [Groucho Marx]

His argument in Rio about protecting US jobs is the self-centred view of a Texan oil millionaire - a move away from fossil fuels will offer new job opportunities, and much more.

Rather than hoping that the 1,000 scientists of the Intergovernmental Panel on Climate Change are wrong, urgent action must be taken now to reduce carbon dioxide emissions. The precautionary principle is the only sane approach.

Energy efficiency and renewable energy systems are a clean and viable alternative to fossil fuels and nuclear power. They are also appropriate to both North and South, offering the chance for convergent paths to sustainable development and the saving of this Earth.

SCRAM's *Safe Energy* journal is produced bi-monthly for the British Anti-nuclear and Safe Energy movements by the Scottish Campaign to Resist the Atomic Menace. Views expressed in articles appearing in this journal are not necessarily those of SCRAM.

scram, *skram*, *v.*
to shut-down a nuclear reactor in an emergency.

CONTRIBUTIONS
We welcome contributions of articles, news, letters, graphics and photographs; which should be sent to SCRAM at the address below.

LETTERS
SCRAM reserves the right to edit letters to fit the available space. All letters for publication should be submitted by the news deadline below.

COPY DEADLINES
The Copy Deadline for feature articles for the next issue (August/September '92) is 21 July. (Feature articles are approximately 900 words per page.) News copy should normally be submitted within a week of the features deadline.

ADVERTISING
Advertising rates are shown on page 26. Inserts can be mailed out with the journal – details on request.

BACK ISSUES
Back copies of the journal are available for most issues. Copies from the previous year cost £1.20 (inc. p&p) or £6 for the set of six. Issues more than a year old are 75p (inc. p&p).

SUBSCRIPTIONS
For details of subscription rates see the form on the back page.

FOR THE BLIND
The text of Safe Energy is now available on disk for people who are registered blind. This service is available at a charge of £3 above the appropriate subscription rate – this covers the cost of the disks and administration. Further information available on request.

PRODUCTION
Editors:
Mike Townsley
Graham Stein

Front Cover Illustration:
David Shaw.

Published by SCRAM, 11 Forth Street, Edinburgh EH1 3LE.

☎ 031-557 4283/4
Fax : 031-557 4284 (no junk faxes)

ISSN 0140 7340 Bi-monthly

SAFE ENERGY

FEATURES

CONTENTS

Nirex's deep trouble

IT'S the beginning of the end for Nirex's plan for a deep dump at Sellafield. The company have announced that they no longer intend to file for planning permission this year, instead they don't expect to lodge a planning application before August 1993.

In letters to local authorities, Nirex's Managing Director, Michael Folger, says that a review of geological studies carried out so far confirms that Sellafield potentially offers a safe site for the repository. This is despite revelations earlier this year, made in their own two-volume analysis of "The Geology and Hydrogeology of Sellafield" that water flow rates and the potential for upward migration are far in excess of that demanded by the original site selection criteria (*Safe Energy 88*).

Folger continues, "However, from the information currently available, knowledge of the hydrogeology is not sufficiently firm to allow a decision on a repository planning application."

The extra time is required to conduct further analysis on the data they already have, and to drill further exploratory bores, explain Nirex.

By Autumn of 1993, they expect to have completed 11 boreholes, including 2 in the Lake District National Park. Planning permission for the National Park bores has already been refused by the Lake District Special Planning Board. "Delays in obtaining borehole planning permission, including 2 key boreholes in the Lake District National Park, are now becoming a significant obstacle," say Nirex. The 2 boreholes would involve the erection of two 150ft high floodlit drilling rigs operating for 30 months on Bleng Fell and Whin Garth. BNFL, acting on behalf of Nirex, would then carry out tests lasting 4 years, but want the site to remain available for up to 50 years. The plan will also involve some 200 lorries travelling to the site daily during construction. Ancient looning and standing stones would be destroyed to make way for access roads. An appeal against the Planning Board's decision will be lodged and is likely to result in a public inquiry.

Since the planning inquiry into the Sellafield deep dump is expected to last a year, this means that no 'solution' to the problem of nuclear waste will be available for the Government's 1994 nuclear review. Without a 'solution' to the waste problem it is difficult to see how the Government could justify lifting its moratorium on building new nuclear power stations.

Government policy dictates deep disposal as early as possible, but according to Nirex: "Safety of disposal is the over-riding priority, not the 1994 review. It is important to go to a planning inquiry with a well-founded safety case for the repository, not something driven by the timetable." Folger adds: "We've never said we are convinced that this is the right site."

Cumbria County Council, who are also not convinced it's the right site, have welcomed the announcement. They are pressing for a planning inquiry commission which allows public debate over Government policy.

Their call is fuelled by a report they commissioned from the consultancy Environmental Resources Ltd*, which shows there is no need for early deep disposal. The report says "The capacity of the Drigg disposal site for Low Level Waste, and the stores planned for Intermediate Level Waste at Sellafield demonstrate a potential capacity to take the waste until 2055, the planned date for closure of the repository. The option is therefore available to delay the construction of the repository for further geological research at Sellafield, or even re-examination of the geology at other potential sites."

It also rejects the belief that the current design would allow retrievability: "beyond the 50-year operational life of the repository, corrosion of waste containers would mean retrievability was no longer safe."

■ Meanwhile, in a letter to Friends of the Earth (FoE) Nirex said they now plan to perforate the nuclear waste containers due to be placed in their repository.

According to FoE, Nirex have admitted that this change is the result of research which highlighted the danger posed by gas generation within the steel containers. A 150mm hole in the 500 litre containers would vent the gas, thus preventing pressure building up and causing the containers to explode, claim Nirex.

Previously Nirex has argued that the waste containers should remain watertight for several hundred years to allow relatively short lived and highly soluble radionuclides to decay before ground water entered the containers when they eventually corrode. Even if vents as small as 1mm are made in the containers, according to earlier statements made by Nirex scientists, "significant radionuclide concentrations" will escape.

Given that recent Nirex research (see above) has shown that groundwater movement in the Sellafield area is faster than predicted and, contrary to the site selection specification, are towards the immediate surface, the repository must fall back on physical and chemical containment. "This latest plan to deliberately breach the drums suggests that Nirex can also not rely on physical containment."

Harry Hudson of Nirex has rejected FoE's claims as "a scare story of an all too familiar kind." He claims, "Nirex has for many years planned for vents in the waste containers." The vents would be carefully designed to "allow fluids to pass and so help prevent deformation of the containers by inside or outside pressures, while retaining particulate matter." □

*** Waste Arising, Packaging and Transport Safety. Environmental Resources Ltd, April 1992.**

Sellafield triffids

MYSTERY surrounds the appearance of radioactive seaweed - or Hydroids - on the beaches at Sellafield, but not to worry, British Nuclear Fuels (BNFL) says it is perfectly safe, even if they don't know where it has come from.

BNFL said they found 65 fragments of grass-like material at the tide-line over a 2 mile stretch of beach during routine monitoring in March and April. However, by May the company said only 2 or 3 pieces were being found each day, and most were not contaminated. Most of the seaweed is being found near the plant's discharge pipe, and while radioactive levels on some pieces is significant, others show contamination levels of only 1.5mSv, say BNFL.

"Hydroids are unusual and we don't know how this developed," added the company: "We don't know if they have any connection with Sellafield at all really. All we do know is that some of the hydroids are contaminated with radioactivity associated with Sellafield discharges. There has been no incident or plant malfunction that would account for these findings."

Analysis of the weed by the Ministry of Agriculture Fisheries and Food and HM Inspectorate of Pollution (HMIP) indicates that the contamination happened within the last 12 months. HMIP said: "It's safe to go on the beach, it's safe to go in the sea. You'd have to press the seaweed or whatever it is against your skin for 33 hours non-stop before you came anywhere near a danger level." □

Nuclear squeeze

NUCLEAR power is being squeezed out of the global energy marketplace according to a new report* produced jointly by the Worldwatch Institute, Greenpeace and WISE.

The "World Nuclear Industry Status Report: 1992" shows that by the year 2000 the industry will be in terminal decline. The 49 nuclear power stations under construction worldwide at the beginning of 1992 will only bring nuclear capacity to 360,000MW, less than one-tenth of the forecast made by the International Atomic Energy Agency (IAEA) during the 1974 oil crisis.

Between 1991 and 1992, total installed nuclear generating capacity declined for the first time since the industry began in the 1950s. At the end of January this year there were 421 nuclear plants in operation, 10 fewer than the peak in January 1989.

"While nuclear proponents frequently refer to the expansionist plans of France and Japan," observes the report, "these two countries are minor exceptions to the global trend, and even their nuclear programmes are in jeopardy due to public opposition in Japan and the poor financial health of the State utility in France."

Construction has stopped completely in Belgium, Italy, Spain, Sweden, Switzerland, and Germany. Britain and the USA have just one reactor each still under construction, while Canada has just two.

In the Third World, there are only 18,394MW of nuclear plants in operation; 6% of the world total. Many are seriously over budget, behind schedule, or plagued by technical problems. As a consequence there have only been a handful of Third World orders in the past decade.

In Eastern Europe, the industry is faring no better. As some "300,000 people undergo treatment for radiation-related illnesses that stem from Chernobyl and other mishaps," argues the report: "... political changes have unleashed a torrent of public criticism, which in Eastern Europe has focused on the fact that their nuclear plants do not meet western safety standards." Plant shut-downs have proceeded rapidly as declining economic conditions lower worker moral, "jeopardise the supply of critical spare parts, and reduce electricity supply."

In addition to these factors, nuclear costs have risen to the point where it is no longer competitive with other new power sources. New nuclear plants in the USA, for example, produce electricity at a cost of over 12c/kWh, while natural gas plants come in at 6c/kWh and wind and geothermal cost 6c to 8c/kWh. Efficiency improvements cost even less, from 2c to 6c/kWh saved, the report says.

Any effort to revive the industry's fortunes on the back of fears about global warming are doomed to failure, says the report: "There has been little response so far ... as most governments with new climate policies are focusing instead on energy efficiency and renewable energy sources." The groups calculate that current nuclear capacity would have to be doubled at a cost of more than a trillion dollars to offset even 5% of current global carbon emissions; a goal they called "inconceivable given the current state of public opinion and economics."

Reports of the industry's demise are greatly exaggerated according to the US Council for Energy Awareness (USCEA) and the European Nuclear Society (ENS).

The two pro-nuclear bodies have denounced the figures used in the report claiming the number of units being built around the world is 76, and not 49. They also think, "It is ironic that the Worldwatch Institute, which claims to care about the global environment, should be going out of its way to discourage the growth of the one large, proven, and reliable source of electricity that doesn't produce greenhouse gases - nuclear power." □

* **"The World Nuclear Industry Status Report: 1992", by Greenpeace, Wise-Paris & the Worldwatch Institute.**

US Energy Bill

US public opinion was snubbed at the end of May when Congress, like the Senate before them, passed a Bill which establishes "one-step" reactor licensing and deprives individual States of the right to veto a nuclear waste dump within their boundaries.

Recent opinion polls showed that four out of five Americans oppose both developments. Congress, however, voted 381 to 37 in favour of the Bush Administration's National Energy Strategy which contains about 100 proposals (*SCRAM 82*).

The most fiercely contested of the two proposals was "one-step" reactor licensing. This will overturn a 1990 US Appeal Court decision requiring a hearing after a reactor is built but before it starts up if "significant new material" becomes available. The case against retaining the proposal was highlighted by Californian Congressman George Miller, who pointed to an example in his State where a reactor vessel was installed backwards: "Don't you think the American people deserve a hearing on that." Obviously not: the clause was retained by a vote of 254 to 160.

The second proposal was aimed at the State of Nevada where Bush wants to build a high-level nuclear waste dump, but the State Government keeps throwing up legislative obstacles to prevent the Yucca Mountain site from opening. The Government will now be able to ride roughshod over the Nevadans' fears. □

Hunterston fire

WORKERS using a plasma torch accidentally set fire to temporary rubber seals around the floor of the pressure vessel at Hunterston B, on 22 June.

At the time of the accident the plant was shut down for several weeks for routine maintenance. Scottish Nuclear (SN), the plants operator, dismissed the accident as resulting from "an operational anomaly," saying it posed no radiological risk. "There was no danger to the reactor core at any time."

However, the eighteen men trapped by the blaze hit out at the company's complacency. One of them told the ***Daily Record*** newspaper: "The fire should not have happened, but it showed how inadequate procedures are.

"It took a full half hour to clear the reactor. Access and escape hatches are so small that only one person at a time can squeeze through them."

SN said the fire is being investigated by the plant management and experts from the Nuclear Installations Inspectorate, adding: "If the men have fears we will listen. But sometimes people exaggerate." □

Dounreay dumbfounded

TWICE as many children born in the Dounreay area, between 1969 and 1988, had leukaemia than would be expected according to national statistics. Those who moved to the area show an even greater excess, according to a Scottish Health Service report.

After examining the records of 4,144 children born in the area, and those of a further 1,641 children who attended local schools over the same 20 year period, the study team found 5 cancer registrations in the birth group, which would have been on a par with overall national statistics. However, all 5 were leukaemia cases, more than double that which would be expected.

The incoming group registered 3 cancers, again all leukaemias. No cases were found in children who were born in the area but later moved away, when a total of 4.2 would be average.

In the report, published in May's British Medical Journal, the baffled team said: "The most remarkable features remain the concentration in a relatively short period of time and the common diagnosis of leukaemia with a complete absence of all other types of childhood cancer."

Commenting on the continuing mystery of the leukaemia excesses around the Dounreay plant, Scottish Health Minister, Lord Fraser admitted that after 2 very detailed studies at Dounreay "there was still cause for concern," adding: "No specific local factor has been identified which can provide an explanation for the increased incidence of leukaemia."

The Government have now accepted the advice of the Committee on Medical Aspects of Radiation in the Environment (COMARE), and ordered two new investigations.

The first, ***A Scottish Case Control Study***, will involve interviews with parents of children registered with cancer in the period 1991-1995 and with parents of healthy children chosen as controls for comparison. It aims to discover whether childhood cancer could be the result of exposure of the child or parent to ionising radiation, certain chemicals or infections in the child's early life.

The second concerns childhood cancer near nuclear installations in Scotland; all cases in the period 1975-1990 are being reviewed by a team of pathologists.

Roger James, Dounreay's site manager, welcomed the new studies and promised to support the initiative, but said: "This latest study weakens the claim that is often made by anti-nuclear campaigners that there is a link between working at Dounreay and Childhood luekaemia." He acknowledge that there is still cause for concern, but sought solace in the fact that no non-leukaemia cancers had been found in the area. □

AEA to go private?

AEA Technology should be privatised after the Government's 1994 review of the nuclear industry, if a way can be found to hive off the companies £3 to £4 billion liabilities for disposing of nuclear waste and cleaning up sites, according to a Monopolies and Mergers Commission (MMC) investigation*.

Although much of the liability has been incurred through work undertaken for the public sector, generally prior to 1986 - and these organisations have agreed in principle to cover the costs - "the fact that most of the liabilities are associated with AEA's sites limits AEA's freedom of action to develop such sites in the most commercially effective way," observe the MMC.

The Authority told the Commission that they believed their Decommissioning & Radioactive Waste Management Operations programme should be fenced off and not allowed to distort its commercial position.

While the MMC considered the option of the Authority remaining in its present state, it concluded: "We see little prospect of the AEA meeting its ambitious financial objectives of funding the cost of its restructuring and making a return to the Exchequer while its business expansion is constrained.

Generally impressed with the results of the company's restructuring programme, begun in 1990, the Commission was highly critical of its financial weaknesses and said it must cut jobs.

Last year the AEA lost £40 million. □

*** "UKAEA: a report on the services provided by the company", Monopolies and Mergers Commission; HMSO, May 1992.**

Proliferation problems

DOUNREAY has denied allegations that they are undermining an American programme to stem the world-wide flow of weapons-grade uranium-235.

AEA Technology, the plant's operators, have entered into a contract with the German company NUKEM, for the recovery and storage of uranium from 362,000 unused fuel elements. The elements come from the ill-fated prototype high temperature gas cooled reactor at Hann, known as the THTR-300, which was closed down in 1988.

They are described by Dounreay as being no bigger than billiard balls. The company has already begun the process of burning off the elements' graphite coating in order to recover some 348kg of U-235.

The refabrication work, turning the U-235 into highly-enriched uranium (HEU) fuel elements for research reactors, could be carried out by Dounreay or by CERCA in France, no agreement has yet been reached. Once refabricated the fuel is destined for four European reactors which previously received their fuel from the USA: two in France (HFR in Grenoble and Orphee in Paris), one in Belgium (BR2, near Antwerp) and one in the Netherlands (HFR Petten, north of Amsterdam).

The THTR fuel was originally supplied to Germany by the USA who are now concerned about the quantities of weapons-grade uranium in circulation worldwide, and the proliferation risk it represents. To address this problem the US Department of Energy established the Reduced Enrichment Research and Test Programme, designed to allow research reactors to switch to low-enriched uranium fuel (LEU), which is not weapons-grade.

The Petten reactor is believed to be first in line for receipt of the HEU. Petten had applied to the USA for a new batch of fuel, but the application was challenged by the influential US pressure group the Nuclear Control Institute, who believe there is no bar to Petten using LEU. Faced with a public hearing, delays and a possible cancellation, it now appears that the THTR fuel offers a way round Petten being forced to accept LEU by the USA.

Dounreay have denied that any of the four European reactors could use LEU: "If the customer had wanted LEU we could have supplied it." There is no question, say Dounreay, of undermining US attempts to control the movement of U-235. They are simply fulfilling an order from Nukem to strip the unused fuel, argue the company.

The unused fuel was flown into Dounreay via Wick airport and it is likely that either the recovered U-235 or fresh fuel elements will be returned to Germany the same way. □

Plutonium piles

PLUTONIUM stockpiles pose a "major political and security problem worldwide," according to the deputy director of the International Atomic Energy Agency (IAEA), William Dricks.

Dricks warned delegates attending a recent meeting of the Japanese Atomic Industrial Forum that "there is an urgent need to review again our policies regarding plutonium and its use." As a result of "nuclear fuel reprocessing, and potentially as a result of nuclear weapons dismantling, in the foreseeable future the supply of plutonium will far exceed the industrial capacity to absorb plutonium into peaceful commercial nuclear industrial activities."

The uncertainty surrounding the future size and shape of nuclear power makes it "imperative that decisions be taken now regarding plutonium storage that meets rigorous safety and security requirements."

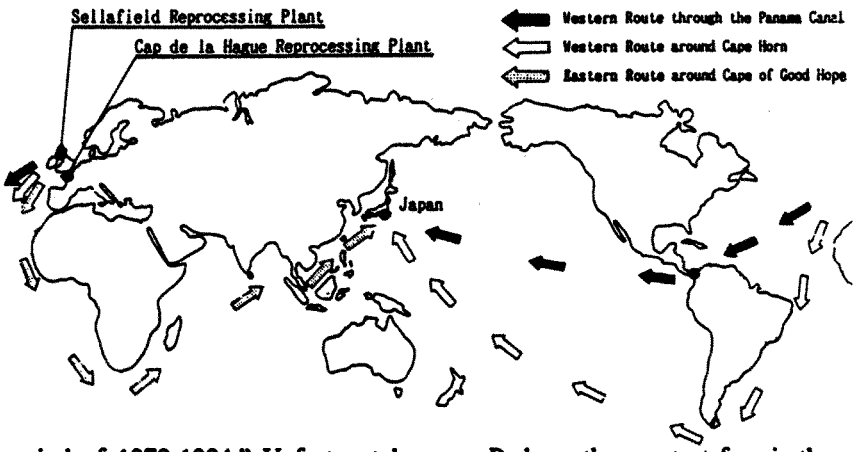
In 1990, the delegates heard, less than 30% of fissile plutonium isolated by reprocessing was incorporated into reactor fuel. Dricks said: "It is expected that this imbalance ... will during the period 1990-2000, result in the stockpiling of 110 tons of fissile plutonium." The dismantling of nuclear weapons will yield another 110 tons from the US and 100 tons from the former USSR. In addition the two states will produce about 500 tons of highly enriched uranium each.

While plutonium from power reactors tends to be impure - containing a significant amount of non-fissile isotopes - and not ideal for weapons fabrication, Dricks comments "it can nevertheless be used for this purpose. Accordingly it will have to be stored under conditions of strict security and safeguards accountability."

While using mixed oxide fuels (MOX) - a combination of plutonium and uranium oxides - in civil reactors is a popular notion for ridding the world of excess plutonium, the high cost of this fuel, about 13 times that of using fresh uranium, is a major drawback.

"There is no doubt that the process of finding ways to deal with the growing stockpile of plutonium and to achieve safe and secure use in power generation will be a long one ... major breakthroughs are not expected before the first decade of the next century. We must accordingly face up to the question of the long-term plutonium storage," opines Dricks.

It just so happens that the IAEA conducted "an intensive International Plutonium Storage (IPS) study during the period of 1978-1984." Unfortunately, he says, it "did not lead to a consensus among the participating member states." Perhaps "the time has come to revisit this concept," suggests Dricks.



He concluded, "The IAEA is ready to: offer an international forum for the exchange of information on this important subject; and participate in organising the international disposition of plutonium at the request of Member States - including Member States wishing to place their plutonium under 'international supervision'."

It is worth noting that the venue Dricks chose to unburden himself of these fears was in Japan, where the powerful Ministry International Trade and Industry (MITI) is deeply committed to the plutonium economy.

Controversy

Japan is currently at the centre of a world wide controversy over shipments of plutonium from both France and the UK. They plan to transport the first batch, around 1 ton of plutonium - enough for about 120 bombs - from Cherbourg sometime later this year. It will be carried by the re-flagged Pacific Crane - formerly British registered and Pacific Nuclear Transport Ltd owned - purpose built nuclear ship. It will be accompanied by a specially built 6,500 ton escort vessel, the Shikishima, which is armed with 2 pairs of 35mm cannon, two 20mm machine-guns and carries 2 unarmed helicopters. The trip will be non-stop, say the Japanese; it will also pass through some of the roughest seas in the world.

The transports pose three specific dangers: the risk of a straightforward maritime disaster; the possibility of attack by terrorists or unscrupulous governments; that the amassing of plutonium in Japan sends the wrong message to its neighbours in a politically unstable region - North Korea has already warned the world that it has produced plutonium for 'experimental use'.

Perhaps the greatest fear is the maritime disaster. A report produced by ECO Engineering Inc, of Annapolis in the US, shows that the flasks being used would be incapable of withstanding a realistic shipboard accident. ECO note that the flasks are certified to standards established by the IAEA. The IAEA insists that the flasks must be able to withstand an 800°C fire for 30 minutes; however if anything in excess of this occurs - the average temperature and duration of seaboard fire are 1,000°C and 24 hours - then up to 15 times the radioactivity of Chernobyl could be released. Such a prospect is causing considerable alarm along the potential routes.

The ECO report notes that although the IAEA standard requires that a cask survive immersion to a depth of 200m, 75% to 90% of the ship's route will be over water with a depth in excess of this.

Following the publication of the ECO report, US Congressman Neil Abercrombie of Hawaii proposed that measures be adopted to bar such shipments from US waters and ports until the US Nuclear Regulatory Commission certified that the casks were tested to withstand a maximum credible accident. Such a measure has a precedent in the Murkowski Amendment which put a stop to Japan's earlier plans to fly the plutonium.

Japan wants the plutonium for the operation of its prototype Fast Breeder Reactor Monju, which is due to go critical next March. It is the Government's ambition, in the absence of any indigenous fuel sources, to use breeder reactors to become energy self-sufficient. However, in a remarkable statement the head of the Power Reactor & Nuclear Fuel Development Corp told the Foreign Correspondents Club of Japan, at the end of April, that "there is no urgent need to further breed, or increase, the volume of plutonium," he even suggested that the country "should shift the direction of its technology from 'fast breeders' to 'fast reactors'." □

British Nuclear Fuels are planning to increase their emissions of radioactive krypton-85 gas, by a factor of ten. This will result from operating the new THORP reprocessing facility at Sellafield without any specialised filtering equipment. PETE ROCHE of Greenpeace highlights the risks that BNFL are prepared to run on our behalf.

THORP: the krypton factor

BRITISH Nuclear Fuels (BNFL) have submitted their applications to Her Majesty's Inspectorate of Pollution (HMIP) for authorisation to discharge liquid and gaseous radioactive wastes from Sellafield, to allow them to bring on stream the new Thermal Oxide Reprocessing Plant (THORP)[1]. For one particular radioactive gas, Krypton-85 (Kr-85), BNFL have applied for permission to increase their current discharge limit from 100,000 terabecquerels (TBq) to 1,000,000TBq per year (100PBq to 1,000PBq).

It is a radioactive inert gas and a major fission product present in spent nuclear fuel. There are traces of natural Kr-85 in the atmosphere, but of the present day atmospheric inventory, 99% has been produced in reactors and reprocessing plants. Most of the Kr-85 inventory is retained in nuclear fuel until it is released into the off-gas stream during reprocessing. This is "by far the most abundant of the gaseous radionuclides discharged from fuel reprocessing plant"[2].

With a half life of 10.76 years, Kr-85 is an inert gas and, therefore, does not readily form chemical bonds in the atmosphere, where it remains active until it has decayed. In the oceans it only dissolves slightly.

The UK's National Radiological Protection Board (NRPB) estimate that Kr-85 emissions from THORP at the Sellafield site in West Cumbria, will be of the order of 400PBq/yr (11 million curies) - a factor of more than ten higher than current releases from existing reprocessing activities carried out at the site.[3]

The 1977 Windscale (now Sellafield) Inquiry Report recommended that: "BNFL should devote effort to the development of plant for the safe removal and retention of Kr-85 and, if development proves successful, should incorporate it in the proposed plant"[4] (*Safe Energy 86*).

Subsequently, the Secretary of State, in accepting the Inquiry Inspector's recommendations, made certain conditional provisions, namely that BNFL should: "design THORP so that a krypton removal plant can be incorporated, when and if reasonably practicable [and] pursue vigorously the requisite research and development related to the provision of such a plant".

BNFL say they have "actively reviewed Kr-85 removal technologies since the late 1970s". They have looked at the suitability of several technologies mainly by monitoring developments elsewhere in the world. By 1982, BNFL say, it became clear that none of the available processes were "likely to result in a safe and technically viable option for THORP"[1]. From that date BNFL withdrew from active R&D in this field, but nevertheless maintained a watching brief. BNFL believe that "safe and commercially viable krypton removal technology does not yet exist which is capable of application to a full-scale reprocessing plant"[1]. So, at this stage, no Kr-85 removal facility is to be installed in THORP. They claim, therefore, that they have complied with the Windscale Inquiry recommendation[5].

A 1992 Department of Environment review of Kr-85 removal technology points out that "little R&D work in krypton separation has been performed within the last 5-6 years"[2] despite the recommendations of the Windscale Inquiry report. This raises the question of whether BNFL have carried out their responsibilities to "pursue vigorously the requisite research and development".

Krypton concentrations

Kr-85 levels have doubled between 1977 and 1989[6]. Atmospheric measurements of the gas in Europe are taken at laboratories in Freiburg, Germany; Ghent, Belgium; Cracow, Poland; and Madrid, Spain - as well as France and the UK. Atmospheric levels began to rise in the late 1950s, due primarily to atmospheric nuclear testing. In the 1960s the main sources were military reprocessing plants in the USA and USSR - levels were rising at approximately 0.05Bq/m^3 per annum. In the late 1970s European sources became more evident, and in 1988 levels were rising at 0.04Bq/m^3 per annum. By 1989 atmospheric concentration was 1Bq/m^3.

Kr-85 may be distributed very unevenly in the atmosphere. Concentrations many times the background level can be found up to several thousand kilometres away from the reprocessing plants. For example at Ghent, 400 and 500km away from La Hague and Sellafield respectively, a concentration of 28Bq/m^3 was observed in May 1983[6]. THORP's discharges will add 15% to the global inventory of Kr-85 each year[7].

Because Kr-85 is chemically unreactive, it does not enter food chains. Therefore, the main exposure pathway is external irradiation from Kr-85 in the atmosphere. The NRPB estimate that 2 fatal cancers per year may arise from the calculated doses caused by Kr-85 discharges from THORP, as well as approximately 100 non-fatal skin cancers per year[8]. However, it should be noted that these estimates were produced at a time when data from Hiroshima and Nagasaki were undergoing a major reassessment. "Risk estimates for ionising radiation exposure" were subsequently revised upwards. In the light of this new information the NRPB's estimated number of cancers should also be higher.

The question must be whether any amount of projected 'harm' is acceptable, in particular for people from third party states, who can not be considered in any way beneficiaries of the activities at Sellafield.

Climate change

Giving evidence to the 1977 Windscale Planning Inquiry into the construction of THORP on the release of Kr, Professor William L. Boeck, professor of physics at Niagara University, New York, said that the normal practice of the nuclear industry is to avoid unnecessary radiation exposure by preventing all but a very small fraction of the radioactive materials from entering the environment. In contrast, BNFL plans to release all of the Kr-85 produced by THORP directly into the environment. "This method has been called disposal by dilution. A better name is pollution by export ... The result of this disposal by export will be the contamination of the global atmosphere".[9]

Atmospheric scientists predict that, within three years, the Kr-85 from any single release will have spread almost uniformly around the earth from pole-to-pole. Background ionisation in the lower levels of the atmosphere will be increased. This could lead to some form of global-scale climatic change which may, in the long term, have serious consequences.[9]

Increased ionisation of the air by radioactive Kr-85 might reduce the fair

weather electrical field, which probably controls the water vapour content of the atmosphere very sensitively. This could lead to a reduction in precipitation and an increase in the total water vapour in the atmosphere. Aside from the possible problems caused by reduced rainfall, since water vapour is a greenhouse gas, an increase in the levels of water vapour in the atmosphere could add to the problem of global warming. There could also be a global increase in the frequency and/or intensity of lightning storms, and possibly also forest fires.[6]

Researchers for BNFL at Liverpool University investigated the environmental effects of Kr-85 being discharged from THORP and concluded that "... on the best evidence available [the effects] are negligible."[10]

Other studies, however, such as those performed for the German Bundestag and for the Windscale Inquiry concluded that our present understanding of atmospheric processes is not sufficiently sophisticated to determine with any confidence exactly what the short and long term effects of atmospheric ionisation might be. Any harmful changes in weather patterns could last decades. Continuing to release Kr-85 into the atmosphere is, in effect, equivalent to continuing and even intensifying an uncontrolled experiment on the Earth's atmosphere with unknown and potentially harmful consequences.[6,11]

The recent DoE report concluded that "there is an urgent need for further investigation of the possible adverse effects of an increased electrical conductivity of the Earth's atmosphere ... the accumulation of any hazardous or potentially hazardous substances in the atmosphere is to be avoided if at all possible".[2]

Krypton removal

There is a major expansion of reprocessing capacity underway in Europe. Two new plants are scheduled to open soon: UP3 at La Hague in France and THORP. If these go ahead the projected total reprocessing capacity is expected to increase from about 3,600 tonnes in 1990 to a peak of about 7,500 tonnes in 1995.

According to a 1983 European Commission (CEC) Study, as reprocessing capacities grow, krypton releases from individual plants "might have to be restricted", not only to avoid increasing dose rates locally but also to reduce the global background levels.(12) The CEC study concluded that "only action at a world level to reduce the discharges of Kr-85 can lead to a real improvement in the radiological situation".[12]

Christopher Harding, Chairman of BNFL, said in February 1992 "that the absence of a krypton removal facility is not a case of financial stringency: it has been demonstrated that no process could, as yet, be justified either on grounds of cost effectiveness in terms of collective dose savings, or of a reduction in individual dose."[5] He argues that there are problems associated with krypton removal and storage, but he does not say that these problems are not insurmountable, nor does he claim that the technology for krypton removal does not exist.

In December 1991 James Coote of the Health and Safety Division at THORP claimed "it is not feasible to remove krypton at a commercial cost".[10] This suggests that economic considerations may have played a major part in BNFL's decision not to install krypton removal technology.

Existing technology

The 1992 DoE Review gives the state of development of various techniques for the separation of krypton-85.[1] At the Idaho Chemical Processing Plant (ICPP), USA, there is a large-scale plant which has been in operation since 1958, using a cryogenic distillation process, for recovering and purifying several thousand curies of Kr-85, operating at a gas flow of $50m^3/hr$.[1] More recently, a krypton recovery pilot plant, developed by the US company Airco and the Power Reactor and Nuclear Fuel Development Corporation (PNC) of Japan, has begun radioactive operation, attaining krypton removal efficiencies of 99% at off-gas flow rates of up to $110m^3/hr$.[1]

The DoE Review investigated "The principal separation methods [of] cryogenic rectification, absorption in an organic solvent, adsorption on a solid, and selective permeation through a membrane." It was noted that "Adsorption at low temperatures has all the advantages of the absorption process but involves no CFC".[1]

The study further investigated immobilisation methods: enclosure in pressure containers and encapsulation in a solid matrix. The report concluded that "the investment cost of a krypton management system for THORP based on cryogenic distillation followed by implantation in a metal matrix, prior to disposal in deep geological repositories, is estimated to be between £51m and £57m. The accompanying operating costs, including those incurred by disposal in geological formations, would be £2.2 – £3.3m per annum for a 20 year plant life".[1]

BNFL's application to increase their authorised discharge limit for Kr-85 by 1,000%, highlights the risks and dangers associated with the planned opening of THORP. Despite the recommendations of the Windscale Inquiry, BNFL are not even planning to apply an end-of-pipeline control method to this isotope, which could cause serious damage to our climate . Even if they were forced to incorporate krypton removal technology, it would merely transfer the environmental burden from one receiving environment to another. Given that even BNFL now admit that "reprocessing is not necessary"[13], the obvious solution is not to open THORP. □

References:

(1) "BNFL (1992) Application for an Authorisation for the Disposal of Gaseous Waste from the Sellafield Site."
[BNFL also made three other applications for authorisation to: a) dispose of low-level liquid waste from the marine pipeline b) dispose of radioactive waste oil and c) dispose of low level liquid waste from the factory sewer. Copies of all 4 are available from HMIP, Mitre House, Church Street, Lancaster, LA1 1BG.]

(2) Judd S.J. (1992) "A Review of the Separation and Immobilisation of Krypton Arising from Nuclear Fuel Reprocessing Plant." Department of Environment. DoE/HMIP/RR/92/019.

(3) Clark M.J. and Broomfield M (1983). "The Removal of Krypton-85 from Nuclear Facility Effluents." National Radiological Protection Board. NRPB-M86.

(4) Parker (1977) Windscale Inquiry Report. HMSO.

(5) Harding C. (1992) Letter to Dale Campbell-Savours MP dated 20 February 1992.

(6) Kollert R. and Butzin M (1989) "Climatic Aspects of Radioactive Trace Gases, in Particular Krypton-85." A study carried out on behalf of the German Bundestag. Kollert & Donderer.
[English translation available from Greenpeace, Canonbury Villas, London N1 2PN].

(7) Taylor P.J.(1990) "The projected environmental impact of THORP at Sellafield: aerial and liquid discharges of radioactivity" in "THORP: An In Depth Investigation." Cumbrians Opposed to a Radioactive Environment (CORE).

(8) Duncan K.P. (1988) Letter to P. Reed of CORE dated 15 March 1988.

(9) Boeck WL. Proof of Evidence to 1977 Windscale Inquiry.

(10) Granada TV Transcript (1991) World in Action 2 December 1991.

(11) Boeck WL (1976) "Meteorological Consequences of Atmospheric Krypton-85." 16 July 1976 Science Vol.193, Number 4249.

(12) Hebel W. and Cottone G (Eds) (1983). "Methods of Krypton-85 Management." Proceedings of a meeting organised by the Commission of the European Communities held in Brussels 29 June 1982. Harwood Academic Publishers.

(13) A. Johnson, BNFL Executive Director 1989.

What have the Scottish Office, Welsh Office, Association of County Councils and National Steering Committee of Nuclear Free Local Authorities got in common? As FRED BARKER reports, they are all critical of key aspects of the Health and Safety Commission's proposals for implementing EC Directive 89/618 EURATOM, dealing with public information about radiation emergencies.

UK radhealth proposals criticised

UNLESS the European Commission can be made to act, an EC Directive with a potentially significant impact on the public's understanding of radiation risks, and on preparedness for radiation emergencies, will be watered down in translation to British law.

Directive 89/618 EURATOM (*Safe Energy 86*) requires the Government to ensure that people likely to be affected in a radiation emergency are given advance information about health risks and emergency responses, and that when a radiation emergency actually occurs, people affected must be told without delay about the emergency and what they should do.

The Directive was issued on 27 November 1989, with a two year period for passing national laws and distributing advance information. In Britain, the task of formulating and implementing regulations was given to the Health and Safety Commission (HSC). The HSC did manage – by the skin of its teeth – to issue a consultative document by the deadline*, but this attracted criticism from a wide variety of sources, largely because of the highly restrictive view taken of the Directive's requirements.

At the end of April, the Health and Safety Executive (HSE) issued a summary of the 64 written comments on the consultative document, along with proposals for some limited changes to the draft regulations. As explained below, these proposals fall far short of meeting the main concerns of critics, particularly those of the Nuclear Free Local Authorities National Steering Committee (NSC).

Advance information

The most contentious issue is identifying which people are likely to be affected in a radiation emergency, and therefore who should receive the advance information. The pragmatic view taken in the Directive is that any population group for which Member States have drawn up an intervention plan for dealing with such an emergency should be provided with advance information.

Intervention plans in the UK include those for accidents at nuclear power stations, nuclear weapon bases and plants, nuclear powered submarine facilities; for the transport of military and civilian nuclear materials; and a National Response Plan for Overseas Nuclear Accidents. In the light of this, the European Commission's intention is that the entire UK population should be provided with basic advance information. It advises that more detailed information should be made available around fixed sites, and along transport corridors wherever possible.

In contrast, the HSC proposals are likely to confine the provision of advance information to small areas around licensed nuclear sites, and so have understandably attracted widespread criticism. In addition to the NSC and some of the local authority associations, this appears to include the Scottish Office, which is reported to have criticised the "restrictive view" of the proposals, and Scottish Nuclear's Chief Medical Officer, who considers that advance information should be distributed nationally.

Out of date

It should be noted that the HSE arrives at its position through two contentious steps: firstly, by defining a "radiation emergency" as an occurrence where members of the public are likely to be exposed to radiation in excess of the public dose limits in the 1985 Ionising Radiation Regulations (IRR); and secondly, in proposing that the radiation emergency must be "reasonably foreseeable".

The Directive itself defines a radiation emergency as any situation that gives rise to a "significant release of radioactive material" or to "abnormal levels of radioactivity which are likely to be detrimental to public health". It then states that these terms "... are to be understood as covering situations likely to result in members of the public being exposed to doses in excess of the dose limits". The intention of the use of the phrase "are to be understood as covering" is to ensure that releases likely to give rise to doses in excess of the dose limits are not viewed as insignificant by any EC states. In other words, the dose limits are not intended to be used as defining limits, but as indicating situations that must be included.

The HSE disagrees. It argues that the dose limits should be used as definitional limits, in order to give "precision to what are otherwise two extremely vague phrases in a definition which is central to the application of the Directive".

Regardless of this disagreement, there is undoubtedly a strong case for arguing that the current legal dose limits are out of date. The principal dose limit in the IRR – a radiation dose to the whole body of 5 millisieverts (mSv) per year – derives from a mistaken interpretation of the 1977 recommendations of the International Commission on Radiological Protection (ICRP), in which the recommended limit was actually 1mSv per year.

In 1987, the National Radiological Protection Board (NRPB) issued interim guidance recom- mending that a limit of 0.5mSv per year whole body dose for the public should be used with regard to discharges from single sites. In 1990, this guidance was endorsed by the Hinkley Point Public Inquiry Inspector, who described the 5mSv limit as out of date even by reference to the 1977 ICRP recommendations. And in December 1991, the NRPB proposed a maximum value of constraint on whole body dose from a single source of 0.3mSv per year, and that any exposure from a single source greater than this value is likely to be intolerable.

The proposed use of the 5mSv dose limit as a defining limit is seen to be even more inappropriate when one recalls that countermeasures could in principle be introduced in emergency situations to avert lower doses. Thus the lower Emergency Reference Level

whole body dose for sheltering is 3mSv, and that suggested for food restrictions is 1mSv.

Although the Welsh Office is amongst those who have expressed concern about the use of out of date dose limits, the HSE has brushed aside comments, arguing that its hands are tied until the Basic Standards Directive, which specifies dose limits, is amended. This, however, is just not true, as Directive 89/618 allows member states to provide information additional to that required by the Directive.

'Reasonable foreseeability'

The second limiting criterion proposed by the HSC – that the radiation emergency must be "reasonably foreseeable" – does not appear in the Directive. Instead, the Directive submerges the vexed issue of the likelihood of accidents in the question of whether relevant plans have been drawn up. This is how it should be because all accidents lie on a spectrum of probabilities, so the official distinction between "reasonably foreseeable" and "incredible" accidents is essentially arbitrary.

Furthermore, emergency planning increasingly includes steps to prepare for accidents of greater severity than the worst considered "reasonably foreseeable" by the industry. Indeed, for nuclear power station emergency planning, the Nuclear Installations Inspectorate issued guidance in 1990 to ensure that outline planning was undertaken for such accidents.

According to the HSE, transport "is undoubtedly the most difficult and contentious issue in the whole regulations." Having reluctantly acknowledged that the Directive applies to transport, the HSE then argues that the onus should be on the transport operator to answer the question: "is a radiation emergency reasonably foreseeable from this transport operation?" Only if the answer is yes, will the HSE determine an area within which prior information should be distributed.

This line of reasoning is subject to the criticisms of the HSE's definition of a radiation emergency, and to the use of the notion of "reasonable foreseeability". In addition, the proposal that the operator should determine whether a transport operation should be subject to public information requirements is clearly unsatisfactory, since the decision must be seen to be free of vested interest.

The HSC's proposals for implementing regulations would also enable the Secretary of State for Defence to decide that the provision of advance information for certain cases is "against the interests of national security". Critics argue that this is completely unacceptable as advance information about the potential health effects of radiation emergencies from military sources could not seriously be said to jeopardise national security.

Critics also point out that the proposal could be unlawful, because discretion should not be reserved to a Secretary of State whether to implement the Directive or not. In response the HSE asserts that the EURATOM Treaty is "only concerned with the peaceful uses of nuclear materials and thus any Directive made under the Treaty is not applicable to military activities." According to the HSE, by considering military activities at all, they are going beyond the strict requirements of the Directive!

This argument does not impress the critics, largely because the HSE appears to be wrong about the scope of the EURATOM Treaty, which *is* applicable to military activities.

The EC must act

As reported in *Safe Energy 86*, the NSC submitted a complaint to Carlo Ripa de Meana, the EC Commissioner for the Environment, Nuclear Safety and Civil Protection, calling on the EC to ensure full UK compliance with the Directive.

The response explains that the Commission – on the basis of information supplied by the UK Government – does not consider it "opportune to start infringement proceedings at this time", but that it will monitor the situation.

The current position is that the HSE's slightly amended proposals will probably be put to the HSC for approval in June. After this, the proposals will be formally submitted to the European Commission, which has three months to express a view. If the Commission is of the opinion that the proposals do not fulfil the requirements of the Directive, and the HSC does not agree to the necessary amendments, it is open to the Commission to initiate legal proceedings against the UK Government.

Given the nature of the HSE's response to its critics, it seems certain that the NSC, and a number of the local authority associations, will make further detailed representations to the European Commission. Other organisations are urged to follow suit. □

*** Health and Safety Commission (1991), Proposals for the Public Information for Radiation Emergencies Regulations 199-, Consultative Document 37.**

Acknowledgement:
The author has worked closely with Jamie Woolley, Legal Adviser to the NSC, in developing the arguments outlined in this article.

■ Further information from the Nuclear Policy and Information Unit, Town Hall, Manchester M60 2LA, Tel. 061 234 3379.

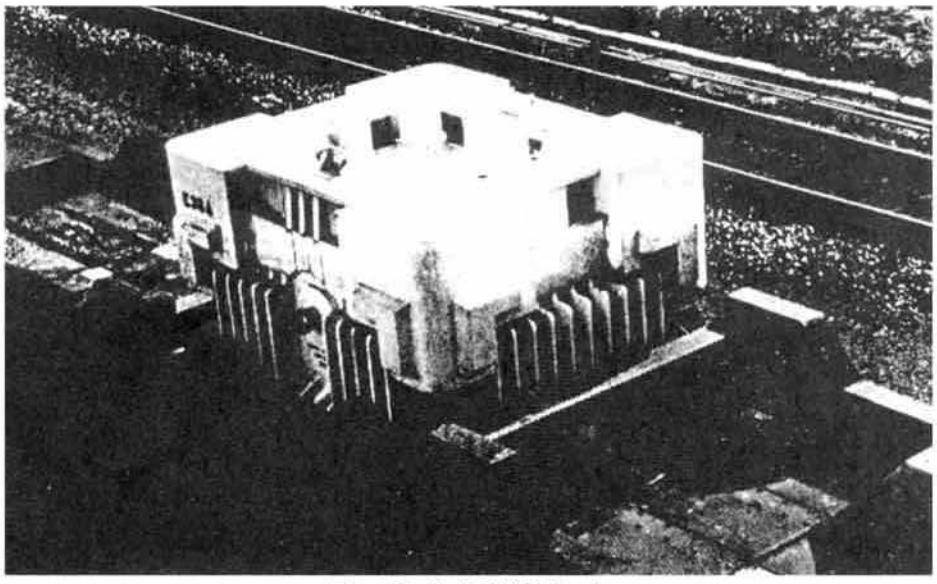


Photo: Martin Bond

The Mark 1 AGR flask

Some of the UK's prime sites for development of wind power are to be found in Wales. However, as ROBERT MINHINNICK of Friends of the Earth Cymru explains, progress is slow and uncertain, and several councillors and environmentalists have been 'tilting at windmills'.

The wind in Wales

ON the first day of June, a group of borough councillors from Rhondda, Mid Glamorgan, had an interesting day out. They were taken by coach to the wind-park at Delabole in Cornwall to hear for themselves the noise made by the development, and to judge whether the 100 foot high turbines constitute an alien intrusion into the landscape.

Delabole is the first commercial wind-farm in the UK (*Safe Energy 87*). It became operational last December and produces enough electricity to supply 3,000 homes for one year.

The councillors must to decide whether a small development of eleven turbines, identical to those at Delabole, for a mountainside in the Rhondda should go ahead. The scheme has already been rejected once, and the proposers, Renewable Energy Systems Ltd, have bowed to pressure and suggested the resiting of the park in a less prominent position.

Trips by Welsh councillors to Delabole are likely to increase in popularity, as Wales becomes one of the centres for the development of wind energy in the UK. At the time of writing, there are seven Welsh wind parks, totalling 208 turbines, with planning permission. A further five proposals are imminent, accounting for another 108 turbines, whilst two proposals (including the Rhondda) with 31 turbines, are being resubmitted.

Silver lining

For environmentalists like Friends of the Earth (FoE) Cymru, the burgeoning pressure for wind development in Wales is a silver lining to an ominously black cloud that currently hangs over energy issues.

Dyfed tempests appear to have permanently put out of action one of the turbines at the government's experimental wind-park at Carmarthen Bay. Opencast coalmining is due to increase by 50% in South Wales alone "in the next few years", taking annual production up to 3 million tonnes. Coal privatisation, linked to the lack of a ceiling on opencast production, suggests a coming free-for-all in Clwyd, east Dyfed and the Glamorgan and Gwent valleys.

Meanwhile, at the June public inquiry into the proposed enormous oil and gas terminal at Point of Ayr, Clwyd, FoE Cymru are the only organisation giving evidence in opposition, based on principles of energy efficiency and conservation. Bodies such as the RSPB have accepted the sweeteners offered by the developers relating to future protection for shoreland habitats. The Government's own environmental watchdog, the Countryside Council for Wales (CCW), due to publish its own energy policy very shortly, has not thought fit to attend the inquiry.

Add to this two other issues: the argument over the use of the sulphur-rich fuel orimulsion at Pembroke and Ince B (Chester) power stations and the saga of the clapped-out jalopy of Trawsfynydd's Magnox reactor, for which we are still awaiting the inevitable, but long-time-coming coup-de-grace. All in all, it is easy to see why wind development is seen as vital by Welsh environmentalists.

Scare tactics

Or should we say, by certain environmentalists. Despite the momentous decision to go ahead with the Mynydd y Cemaes development (*Safe Energy 85*) of 22 turbines on a ridge three miles outside the Snowdonia National Park – a decision greeted enthusiastically by FoE – the landscape conservationists who dominate. the CCW and other well-established countryside bodies, have been successful in using scare tactics about the 'intrusive' nature of wind-parks.

These arguments, linked to prejudices engendered by the alarming ignorance of some local councillors, have clouded the issue in Wales. For instance, the original decision to turn down the small Rhondda development was influenced by the views of the local MP, Allan Rogers, who reportedly said wind turbines have no place in a cleaned-up post-industrial valleys community.

Meanwhile in rural Montgomery, there is a greater concentration of wind-park proposals than anywhere else in Britain, including two that would see over one hundred turbines being erected along a seven mile ridge, near Llandinam. Here, one councillor claimed that wind-parks could have a greater impact on the area than the Industrial Revolution. (There are those who would argue that that is a revolution Montgomery has yet to experience.)

Regarding that seven mile 'ribbon development' of turbines, capable of supplying 31MW, even FoE Cymru sympathises with the argument that these proposals may have come too soon in the short history of commercial Welsh wind-power. It is the type of thing that can terminally scare off local authorities and send the congenitally-conservative Welsh environment movement into apoplexy.

National Park

Ironically, a recent proposal to site a small wind-farm at Angle, in the Pembrokeshire National Park, has led to the FoE Cymru policy of opposing such developments in designated areas on principle, being criticised from another side.

Citing such arguments as "a precedent for development", FoE Cymru was quick to oppose the scheme. The organisation was keen – and because of the at times acrimonious wind-park debate in Wales, perhaps too keen – to prove it was not in favour of development at any price.

It turned out that the location at Angle was a deserted and derelict airfield, that has been viewed as an eyesore for several years. Local press published the views of people that the wind-park would be far more "aesthetically-pleasing" than the existing blot on the landscape. Those who had opposed the scheme were accused of seeking to turn Wales into a rural museum, of interest only to tourists (20% of the country comprises National Parks).

However, industrial South Wales, with its precipitous valley sides, high wind speeds and general lack of designated areas such as SSSIs (the coal industry saw to that) is now increasingly viewed as a coming area for wind development.

Wind proposals for the valleys are even more pertinent when it is remembered that it is in this area that British Coal is seeking most vigorously to increase its opencast coal production. This is especially true of the Heads of the Valleys between Glynneath and Blaenavon, opencast mined since 1948, and undergoing programmes (however inadequate) of "restoration" work.

Thus there is at present a fascinating parallel development in this part of Wales between what has been described as "the ugly child of war-time emergency and post-war austerity" and new sources of benign energy - the Welsh tradition of "real jobs for real men" versus small, community-based, clean technology projects. How the struggle goes will say much about the valleys as a place to live in the next few decades.

Already a proposal by Perma Energy for 20 turbines generating 9MW in the borough of Taff Ely has been granted. Another valley station, this time in Ogwr, on land owned by the Duchy of Lancaster, is receiving the support of the local council. Estate surveyor Harold Parsons has described the project as "the most environmentally friendly development the Duchy has ever engaged in".

So important is the role that local councillors have in nurturing the new Welsh wind industry, that the planning committee members of Rhondda, Taff Ely and Ogwr, together with approximately fifteen other boroughs in Wales - all areas identified as being likely to interest developers - have been circulated with free copies of the FoE Cymru publication "A Case for Wind Energy", which illustrates the energy context for wind power.

Unintrusive

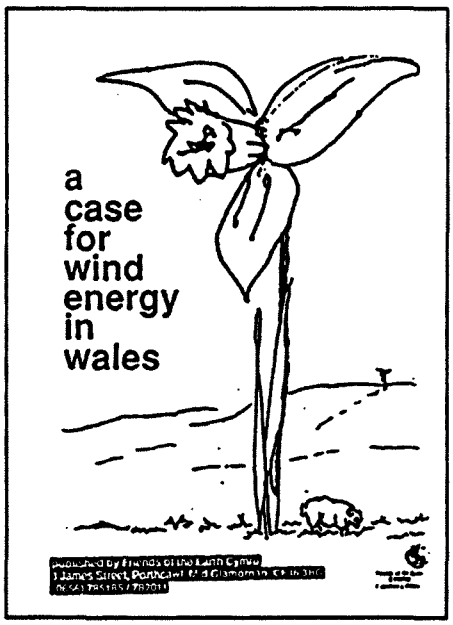
The document is also an attempt to "head off" the argument that wind parks are "intrusive" by plainly illustrating the intrusions that acid pollution, nuclear waste and other threats already create in Wales.

Prepared as a response to the proliferating arguments of Wales's "landscape guardians", and out of a frustration caused by the CCW's refusal to give more than lip service to renewable projects, it seeks to place Wales firmly at the centre of a world in which acidification and global warming are already damaging the environment.

However, it must be agreed that wind proposals for the valleys remain small and erratic. There is nothing yet to compare with the major scheme by EcoGen for Rhyd-y-Groes on Anglesey. The 24 turbines will supply enough electricity to meet 25% of the island's domestic needs. Once again, considering the proximity on Anglesey of the reactor at Wylfa, the location is symbolic of the struggle in Wales between the old polluting energies of the past, and the new adaptable technology.

Perhaps the greatest chance of rapid development in Wales lies with the farming industry. Already farmers in Ceredigion (the large, rural district around Aberystwyth) have proved themselves enthusiastic about the proposals in this area. (Ceredigion is helping lead the way at present in acceptances of suitable schemes.)

Upland Wales, where the greatest harvest of wind is to be found, is now, in general terms, a massively



overgrazed, often acidified area that has lost many of the small farms of the past. With a general ratio of four sheep to every Welsh man, woman and child, any encouragement to diversify into different agricultural practices is welcome.

The problem, however, is that the Welsh upland farmer, because of the inhospitable nature of the terrain, has few real options, apart from the desultory bed-and-breakfast trade of a few short months per year. Powys County Council recognised this in backing the 100-plus turbines for the seven mile ridge near Llandinam. It described the development area as merely "low-grade sheep-walk".

Opening up the sheep pastures to wind farms is one of the very few areas of diversification a Welsh farmer can embrace. In April this year, Aberystwyth was the location for the major conference, "Wind Farming in Wales: the Promise and the Perils", sponsored by the NFU.

As Bill Thomas, Compensation Advisor to the NFU, put it - "in providing access to the wind that flows over his land, the farmer provides the fundamental factor in the production of saleable power ... The special potential contained in the wind that flows over the land is as much an indivisible part of land as are minerals or any other physical feature needing specialist application in order to develop."

This type of pronouncement might at first not draw much support from environmentalists or Georgists. The philosophies behind modern farming have rarely elicited much encouragement from these sources. However, it gives an excellent insight into the ways that the farming community will treat the issue of wind development, and frankly, it illustrates clearly the conditions within which Welsh wind development must exist.

Anti-nuclear

It is therefore appropriate that we remember that the major percentage shareholding of the commercial wind farm at Delabole is held by the landowners, the Edwards family, and that this has only been achieved after years of hard work. The capital cost of the project has been £3.5 million, which is expected to be paid back in 5 years.

However, it would be nonsensical for the farming community to suggest that this development was originally simply a financial consideration.

As Martin Edwards himself described at the Aberystwyth Conference, one of the reasons for setting up the wind farm was that the proposal in 1980 for a nuclear power station in Cornwall concentrated wonderfully the minds of local people on the consequences of energy generation. Thus it is now Edwards' boast that the Delabole turbines annually replace 12,000 tonnes of CO_2 and 120 tonnes of SO_2 and NO_x.

It is hoped that the Rhondda councillors are impressed with what they discover in north Cornwall, and that the fears and superstitions implicit in their rejection of the original wind park for the mountainside above their valley are laid to rest. Who knows? Rhondda, once the world's most famous coalmining area, might one day receive delegations from elsewhere in the UK, come to see its wind farms. Unlikely? I'm not holding my breath. □

■ **"A case for wind energy in Wales"; Friends of the Earth Cymru, 3 James Street, Porthcawl, Mid Glamorgan CF36 3BG; £5.**

Scottish Nuclear have applied for permission to build a temporary ground-level dry store for spent fuel at Torness. However, as MIKE TOWNSLEY reports, Nirex's failure to find a suitable site for a long-term repository could mean that the Torness store will be less temporary than planned.

Storing up trouble

COMPROMISE is the name of the nuclear waste disposal game. Nuclear waste, or its radioactive content, cannot be destroyed – only nature with the assistance of time, a very long time, can deal with the nuclear legacy being left by the operation of nuclear power stations.

Scottish Nuclear (SN) have taken the first tentative steps towards the environmentalists' preferred option for dealing with nuclear waste (*Safe Energy 84*). They have lodged an application with the Secretary of State for Scotland for planning permission to build a temporary on-site above-ground nuclear waste dry store at their Torness AGR station. If they are successful at Torness, the company plan another dry store at Hunterston.

Such a move inevitably raises difficult questions. Is the design acceptable? Will the local community accept such a proposal? Once permission is granted for a temporary store will it become permanent?

The current practice of sending spent fuel to Sellafield for "early" reprocessing "commits SN to a course which limits future commercial, technical and strategic options" argue the company in their Environmental Statement for a dry store. It also accounts for about one-third of SN's operating costs, a fact that was immediately apparent to their Chair, James Hann, when he took over the company after Government's abortive attempts at nuclear privatisation. Hann comments that: "I've had the interesting experience of asking some people why things are being done, and people have said that they don't know why – it's always been done that way." Well, not any more. "There is growing evidence of a case for storage and direct disposal in safety terms and cost terms," Hann told The Independent's Tom Wilkie in late 1990, in one of the most celebrated gaffs of this nuclear newcomer.

CONSTRUCTION
Phase 1 – Target completion 1995/6
Subsequent phases – 1997 to 2020

OPERATION
Loading fuel – 1995 to 2024
Storage – To 2074 at earliest, possibly 2114

DECOMMISSIONING
Unloading fuel – Possibly up to 2014
Dismantling – A further 10 to 20 years beyond unloading

SN's timetable for a Torness dry store

The new store would also provide "a strategic option to reprocessing and permit continued operation of Torness in the event of reprocessing facilities at Sellafield not being available."

Modular store

SN's chosen design is GEC Alsthom's Modular Vault Dry Store (MVDS). Alsthom's Group Engineer, Chris Carter, comments: "Over the past decade there have been significant changes in spent fuel management policies around the world as a result of changing environmental, financial and technical considerations ... Within this changing world, there has emerged a clear need for interim storage of spent fuel prior to either direct disposal or reprocessing." The MVDS provides "all the required features for the interim storage option" he concludes.

Dating back some 20 years the MVDS development began at the Wylfa Magnox station in North Wales, where a dry storage facility has been constructed in 3 parts: storage for 249 tonnes of magnox fuel followed by further capacity for 350 tonnes in 1978 and in 1980. After this, Alsthom turned its attention to the US, where spent fuel is not reprocessed. They gained their first US contract in August 1989 for a MVDS at Fort St. Vrain in Colorado, now completed, which forms the basis of the SN store.

Before deciding upon the MVDS a number of alternatives were considered by SN. They included the construction of an off-site scheme and wet facilities which would keep the fuel underwater for a period of about 100 years. They were "rejected for a combination of economic, practical and environmental reasons. Construction of a store remote from the site was rejected on the grounds that it could have increased the volume of traffic outwith the station, in addition to the costs associated with developing a greenfield site. Wet stores were rejected because they would be more expensive over the 100 years storage period."

"The proposed dry fuel store is simple, both in concept and operation. It is essentially a building housing a number of vaults in which spent fuel can be stored and cooled by the natural circulation of air," say SN. It will be built in a number of phases to ensure that sufficient capacity would be available to store fuel as it is taken from the cooling ponds; the final phase of construction would need to be completed by the year 2020.

After a few months in the cooling ponds, the spent fuel would be placed in an A2 AGR transport flask, but rather than be taken to Sellafield it would be put on a flat-bed truck and driven within the station boundaries to the store. Some shipments to Sellafield would be necessary for routine fuel performance monitoring, as long as the reactors continue to operate.

In the dry store reception area the spent fuel assemblies or elements would be placed in steel tubes 10m long with an outside diameter of 0.273m. The design is such that it would allow the tubes to be replaced at any time during the life of the store.

Radiation

During this loading stage SN calculate that "effluent and direct radiation would lead to radiation doses to members of the public which are at most 0.5% of the Government recommended restriction of 500μSv per year. Ambient radiation levels at the site boundary adjacent to the dry fuel store are estimated to increase by about 1% over natural background."

A high-purity inert gas – Argon – at a slightly above atmospheric pressure within the tubes will prevent the fuel assemblies from deteriorating.

A system has been designed to allow continuous monitoring of the Argon and the condition of the fuel assemblies. The method of loading the assemblies will also provide the opportunity to check their condition as they are received, or to remove them for periodic inspection.

Each vault will contain 180 steel tubes, with each of these containing 8 fuel elements. A fuel element contains 43.2kg of uranium, and the store will

have a capacity to hold about 1,200 tonnes of uranium.

"A particular feature of the proposed design" boasts SN, "is that the cooling of the storage tubes, and hence the irradiated fuel within them, would occur by natural circulation of air." Each steel tube will be coated with aluminium and silicon resin which, say SN, will prevent corrosion by the slightly damp sea air.

High efficiency particulate activity filters "would reduce greatly the discharges of any solid particulate radioactive material coming from the stores active ventilation system." Yet SN argue that the filters would not become contaminated "because the fuel is kept separate from the active ventilation system."

In accordance with the As Low As Reasonably Practicable (ALARP) principle, SN claim any accidental release of radioactivity would be less than "10% of that accepted as safe for modern nuclear power stations."

Decommissioning at the end of the 100 year maximum storage time, envisaged by SN, should not present any problems. They believe that no part of the dry store would be more radioactive than that which is presently classified as low-level waste. "Such waste could be transported to a repository such as ... Drigg in Cumbria."

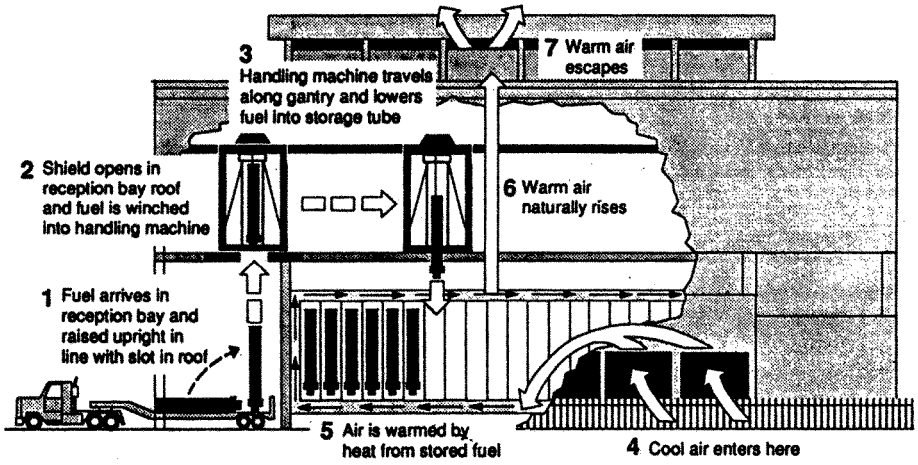
The cleaning of the storage tubes at the end of the store life may produce small quantities of intermediate-level waste which "would be dispatched to an appropriate repository, such as that currently being considered by UK Nirex Ltd."

Local response

Plans for the MVDS have met with a mixed local response. John Russell, chair of 'Nuclear Free' Lothian Region emergency planning sub-committee, welcomes the move saying: "It is highly encouraging news. If SN decides to store waste on-site it will be the best possible outcome for our campaign - short of decommissioning." Struan Stevenson, former Conservative prospective parliamentary candidate for Edinburgh South, wrote in *The Scotsman* that: "The political implications of storing spent fuel, containing plutonium, above ground at Torness for up to a century are awesome.

"Environmentalists who believe this to be a safer option than routine transportation by rail to Sellafield in ultra-safe 100 tonne flasks, need their heads examined!"

The East Lothian Labour MP, John Home Robertson, in whose constituency the



Fort St.Vrain Modular Vault Dry Store

store will be built, has not yet come out in open opposition to the plan. However, he is demanding a full investigation and public inquiry: "It would be outrageous if any decision were taken without the fullest public understanding and debate." His views are shared by Scottish Office Minister, Lord James Douglas Hamilton who said "a public inquiry may indeed be the best way of establishing" the safety of the SN proposal.

Home Robertson is also worried that the development may not be temporary: "This is something that could leave us with a nuclear waste store on the surface of Torness forever."

SN are keen to point out that: "THE PROPOSED DRY FUEL STORE IS FOR THE TEMPORARY STORAGE OF SPENT FUEL. IT IS NOT AND WILL NOT BE PROPOSED AS A PERMANENT REPOSITORY FOR SPENT FUEL." (Their emphasis)

However, the question must be asked, what if Nirex and the Government fail in their quest to establish a deep dump for the UK's low and intermediate level nuclear waste? Will some other 'solution' be found? Or, will the temporary store become a permanent mausoleum.

Just such a question is now being asked in the US, where a Minnesota administrative law judge (ALJ) has recommended against granting Northern States' Power Co (NSP) planning permission for an above-ground dry cask facility to store spent fuel assemblies from its two Prairie Island PWRs.

"If we knew that the dry cask storage would be temporary, then it is a reasonably safe and cost-effective way to deal with the storage problem, and would be eligible to receive a Certificate of Need," said ALJ Allan Klien in his April 10 decision. "Unfortunately, the past delays in federal siting efforts raise questions about whether the dry cask storage will be temporary or will end up being permanent."

He said the likelihood that the plant would become permanent "is so great" given the history of the DOE's (Department of Energy's) waste programme "that it is appropriate to require legislative authorization if the project must go forward immediately."

Neither the State Public Utilities Commission (PUC), which will make the final decision on planning permission, nor NSP "can control the timing or direction of the federal siting effort ... Once the casks are in place, the path of least resistance is to leave them indefinitely."

Klien rejects safety concerns expressed by opponents of the scheme but accepts arguments that a combination of conservation, energy efficiency and alternative power sources could replace all or part of Prairie Island's 1,060MW output. He suggests shutting down one of the 2 reactors in order to "stretch out" the available fuel storage space.

His conclusions have been seized upon by the Minnesota Department of Public Service (DPS) which is engaged in an ongoing battle with both the PUC and the DOE. The DPS believes that building enough storage to handle all of the stations' spent fuel sends the wrong message to the DOE, which is supposed to take possession of the fuel by 1998 under a DOE utility contract. DPS is also worried that the establishment of the store could put NSP in the position of being forced by the DOE to take spent fuel from other stations. They have recommended that only 14 casks be approved, allowing enough storage to meet the stations' needs until 2000.

Clearly on-site above ground dry storage does not solve the nuclear waste riddle, yet something must be done with existing nuclear waste. The bottom line is, its production must stop. □

A recent report[1] describes moves by our continental neighbours towards more energy-efficient buildings, and greater use of renewable energy. Here, DAVID OLIVIER* reviews some of the far-reaching projects undertaken on mainland Europe.

Greening our buildings

UK energy-efficiency lags far behind other European countries (*SCRAM 80*). Normal Swiss building practice, particularly, is much better than the UK's (see Table 1). In terms of energy efficiency, ordinary Swiss buildings match the low-energy buildings constructed in the UK in the last 10 to 15 years.

Since the 1970s, most Swiss buildings have a significant thickness of insulation: usually 150-200mm mineral fibre or expanded polystyrene in the roof, and 80-100mm in the walls (external insulation or cavity fill).

In Switzerland, Germany and the Netherlands, thousands of dwellings and small commercial buildings successfully incorporate:

1. Three to four times more insulation than required by the 1990 UK building regulations;
2. A higher standard of draughtproofing; and
3. Windows which are virtually draughtproof when closed, with the energy performance of triple or quadruple glazing.

Even in Switzerland, masonry walls with 125-175mm insulation, corresponding to 'low-energy' in the Table, are better than normal. In a small new house, this gives annual heating costs of about £40.

Still, in the view of many experienced Swiss architects, it is easy to improve construction to this point, and the economic value is proven. Experience in the Netherlands is similar, except that the highest levels of energy efficiency have been demonstrated in the public and social housing sectors, not in private owner-occupied housing.

The extra cost of such measures, if widely-applied, would almost certainly be less than 3% of construction costs. This is undetectable in the normal scatter of building costs. Indeed, as the energy savings alone pay for this premium, the cost of the environmental benefits is *negative*.

New building regulations

Because Switzerland has a devolved system of government, its building regulations have been a matter for cantons or city/town councils. However, some districts were widely felt to be lagging behind. Consequently, in a 1990 referendum, people voted to give the federal government the constitutional power to set *minimum energy efficiency standards* for new buildings. If voters choose, local government still has the right to require higher insulation levels.

Switzerland seems to have made more progress than the Netherlands, which still has 700 local building regulations(!), some of them non-energy-efficient. In Germany, by contrast, the obstacle is that building regulations are a federal responsibility. States that wish to go further may only undertake voluntary programmes.

'Zero energy' buildings

Sixteen ultra-energy-efficient terraced houses were built on a site in Darmstadt, Germany in 1991. They are expected to use one tenth of the total energy of an average existing dwelling; 75 times less energy for space heating. Over the worst day of a normal winter, a 180m^2 house should use 600 watts of low-temperature heat for space heating.

The Institute Wohnen und Umwelt (Housing and Environment, IWU), which designed it, terms it the Passive House Project. Rather than rely on elaborate mechanical services, or active solar heating equipment, little more is involved than lavish application of simple technology, especially thermal insulation. The external walls are built of calcium silicate blocks (a material which takes less energy to manufacture than fired clay blocks/bricks, and marginally less than concrete). From the footings to the eaves, they are externally-insulated with 350mm of glued-on mineral fibre, followed by render. The U-value is 0.11W/m^{2}K (the rate of heat loss is 20 times better than the walls of old UK houses, whose U-value is about 2.1W/m^{2}K).

The windows have krypton-filled triple glazing, with two selective coatings. A special insulating moulding covers the wooden frame, and the edge of the glazing, further reducing heat losses. The overall U-value is 0.8W/m^{2}K, with a solar transmittance of 50%. On a south-facing wall, such a combination just gives a positive heat balance in Darmstadt in January, when the mean outside temperature is 0°C.

The timber roof is built, not from solid rafters but, from Swedish deep mineral fibre-filled I-beams. With 400mm insulation between the beams, the U-value is about 0.09 W/m^{2}K.

To make the houses draught-free, the roof vapour barrier was tightly-sealed at the seams, as in Scandinavia, and sealed to the plaster on the walls. When tested under a pressure difference of 50

Table 1. Relative Energy Consumption for Space Heating, Different Energy Efficiency Standards.[1,2]

Energy Efficiency Standard	Annual Space Heat Consumption Per Unit Floor Area GJ/m^2
UK 1990 Building Regulations	0.41
Netherlands	0.32
Germany	0.31
Switzerland	0.21
Sweden SBN-80[3]	0.16
Dutch low-energy[4]	0.08
Swiss/German low-energy[5]	0.10
German/Swiss 'zero-energy'[6]	0.02

NOTES:

1 Figures are calculated for central England, and could differ in their home climates.
2 For a 90m^2 semi-detached house maintained at an internal temperature of 20°C, with typical internal heat gains.
3 Sweden's 1980 regulations were the world's first energy-efficient building code; they are therefore included for comparison.
4 Relevant projects include several thousand dwellings in Schiedam, elsewhere in the Netherlands and in Switzerland.
5 Relevant projects include the programmes of Hessen and Schleswig-Holstein states, Germany.
6 Relevant projects include Coppenbrugge, Darmstadt, Heidenheim, Sindelfingen and Wadenswil.

pascals (Pa), the first four houses gave respective air leakage rates of 0.4, 0.3, 0.3 and 0.2 air changes per hour (ac/h).

This is even better than the performance of new Swedish houses, which by law must have less than 3ac/h. The UK is still in the dark ages: UK dwellings often have an air leakage of over 10ac/h at 50 Pa; 4ac/h seems to be the lowest ever measured.

The German houses use a Danish mechanical ventilation system, with heat recovery. However, to lower the electricity consumption, IWU required the fans, motors and general design to be greatly modified.

Incoming air is supplied via a series of earth-buried tubes. Given the almost constant temperature of the deep earth, air enters the heat exchanger at 5°C and enters the living spaces at 16-17°C, even on the coldest days. This eliminates the risk of the heat exchanger freezing, and reduces demand for low- temperature heat.

Comfort

Indeed, as long as the ventilation system uses electricity efficiently, one can have generous supplies of fresh air in winter for a low energy cost. Such a system uses about 10% as much low-temperature heat as the same level of ventilation provided by opening windows, and is more comfortable.

There are some rather simple solar collectors on the south walls, with 'transparent insulation' (a promising, but 'over-hyped' material). Their output is mainly used to heat the tap water.

Rather than give each house an individual boiler, it proved cheaper in capital and running cost to build a district heating system. There are heat mains through and between the houses, and one heat meter per house.

The electrical appliances are the most energy-efficient on the German market. The houses have gas, not electric, cooking, in order to reduce the level of CO_2 emissions.

Until very recently, Germany was in a building boom, and contractors were not inclined to undertake unusual work. Partly as a result of this, the extra cost of building these dwellings was 15% (excluding land and external works). However, if the technology was very widely-applied, the premium might fall to 5%.

Over the next few years, further results from monitoring this project will become available. However, it should be emphasised that it was limited to techniques which are practical, robust, and low-risk. They could be applied now, if we wish to reduce fossil fuel consumption and CO_2 emissions.

Glazing which has a lower thermal transmittance than 95% of UK walls has been available since the mid-1980s from a Swiss firm, Geilinger AG, which have an overall U-value of about 0.75W/m^{2}K, excluding edge and frame losses. A prime application of such windows is office buildings.

Ventilation systems in office buildings tend to use large amounts of electricity. However, the Swiss have shown that if this glazing system is combined with a type of ventilation developed in Scandinavia (displacement ventilation), the total energy consumption, including the fuel needed to generate the electricity, is far less than when occupants have to open windows in winter for fresh air.

Basically, by spending money on a superior glazing system, heating and air conditioning in new offices become superfluous. A small ventilation system can supply all the necessary space conditioning. Some old office buildings have been renovated with the same glazing, and improved wall insulation, leading to 85% reductions in oil consumption for space heating.

So far, the use of such glazing is apparently confined to countries with an outstanding record on energy-efficient buildings. Switzerland itself has the most projects, but it has also been applied in the Netherlands, Germany, Scandinavia and North America.

Existing buildings

The council in Schiedam, in the Netherlands has 'superinsulated' a large estate of 448 four-storey flats, dating from 1956. The work was done at the same time as basic renovation and upgrading of the dwellings, which was needed anyway.

The largest single improvement was external insulation. Each block of flats was given an external skin of 150mm expanded polystyrene, followed by mesh and render. The flat roof was given additional insulation of 70mm polyurethane foam. The floor between the ground level and the basement was also insulated with 100mm expanded polystyrene.

All the existing windows were replaced by double-glazed wooden windows, with argon fillings and with one selective coating. Another aspect of the work was glazing-over the existing balconies, thus bringing them inside the 'thermal envelope', which is much more appropriate in a cool, cloudy climate.

The flats were given new heating systems, but this is not unusual after 35 years. They were all fitted with mechanical ventilation and heat recovery. Gas consumption was reduced to the target value of 14GJ per year. However, the high electricity consumption of the ventilation systems is of concern. Although mechanical ventilation gives a better internal climate than natural ventilation, extra natural gas has to be burned to generate this electricity. Until better-engineered systems, which do exist, are put on the market, the net primary energy saving is very small.

It was emphasised to the author that none of Schiedam's projects are classed as experimental. They all have to fit into the council's normal operations, and must be viable without subsidy. If such measures are now commercially-viable in Schiedam, however, one wonders why they do not yet exist in the UK, even as prototypes.

Conclusions

In the German parliament, there is virtually an all-party consensus that the industrial countries of Europe must cut their CO_2 emissions by about 85% over the next 50 years. If strong action was also taken to improve energy efficiency in developing countries, this could reduce the cumulative extent of warming from 4 or 5°C, if present trends continue unabated, to 1°C.

To reduce the environmental impact of the building sector in this way, and reduce the threat of serious climate change, it is necessary for all countries to take similar steps to reduce CO_2 production. Unfortunately, while these three continental countries are making serious moves in this direction, there is distinct inaction in many countries.

When the need for action is recognised, we shall have to admit that the skill shown in the design of some of these building projects is one borne of years of experience. They are just a further extension of ordinary building practice, designed with great care and based on the last 15-20 years experience of what works best. □

***David Olivier, B.Sc., M.Inst.E., is Principal of Energy Advisory Associates, Hereford. He has travelled abroad to review building practice in other regions; for example, Scandinavia and North America.**

"Energy efficiency and renewables: recent experience on mainland europe." Energy Advisory Associates, 8 Meadow Drive, Credenhill, Hereford, HR4 7EF. Tel. (0432) 760787. £75 incl. UK postage/surface mail. (5% discount for pre-paid orders).

The hazards of the nuclear industry are not confined to power stations, missile targets and dumping sites. TIM ARCHER reports on the health record of the uranium mining industry in Namibia and Australia.

Rössing roulette

ONE of the many topics hardly dealt with at UNCED (United Nations Conference on Environment and Development) is whether mining can be made sustainable. Minewatch, a global organisation of 90 non governmental organisation and communities concerned about the impact of mining on the environment and indigenous peoples, succeeded in getting mining included in early drafts of UNEP-UK's submissions to Agenda 21[1].

According to Roger Moody, author of *The Gulliver File*, a new book on "mines, people and land"[2], the concept of "sustainable mining" is a chimera. It is as impossible to rebuild co-evolved ecosystems, as it is to invite back the spirits of ancestors driven from burial grounds and indigenous people's sacred places, once the mining companies have finally shed themselves of residual responsibility for environmental rehabilitation. "State of the art tailings containment systems run foul of human error (as in the Key Lake dam in Canada) or Mother Earth (as in the habitual releases of contaminated water from the Ranger mine into the Kakadu National Park in Australia's Northern Territory)"[2].

While this has been recognised by Minewatch some of its "Northern" groups blame poor mine management (in the "South") upon antiquated systems and lack of capital. However, the technologies, finance and markets for mining production come largely from the "North", where campaigns demanding stringent health and safety protection are pricing northern mines out of the market.

Polluter pays

In his introduction, Moody argues that the "Polluter pays" principle be applied globally and retrospectively, and in future "the primary role in deciding where, what, and how, to mine, must lie with those on whose land the minerals are to be found".

This point has been furiously resisted by mining companies, but none so enthusiastically and paternalistically as by Rio Tinto Zinc (RTZ). One illustration of the inherent racism and double standards of RTZ's approach is the stark contrast between their reaction to the theft of uranium oxide (yellowcake) from their two mines Mary Kathleen in Australia and Rössing in Namibia. In 1980 after theft of 6 drums of yellowcake, presumably by white workers from Mary Kathleen, RTZ's in-house magazine 'Spectrum' stated that "if taken by an employee, it is no different in principle from someone taking home office stationery for his personal use"[5]. Last year after 3 drums of yellowcake went missing from Rössing several employees were detained and tortured by police with the apparent complicity of the company[4].

The company has been challenged over their moral obligations to the people whose lands they exploit, by a highly articulate group of shareholders banding together as PARTiZANS (People Against Rio-Tinto Zinc ANd its Subsidiaries). Two recent Partizans' reports in association with other groups are *Plunder*[3] (with CAFCA - Campaign Against Foreign Control of Aotearoa) and *Past Exposure*[4] (with the Namibia Support Committee).

Plunder

Over 50% of *Plunder* is concerned with CRA (Conzinc Rio Tinto of Australia), which occupied 30% of RTZ's first unofficial biography[6]. This increase in attention partly reflects the interests of those who created the two biographies and draws attention to CRA's pre-eminence as the world's second most diversified mining company (after RTZ). Neither company shall collapse once the uranium market dries up. *Plunder* documents the fate of two RTZ uranium mines in Australia. From 1953-63 Mary Kathleen supplied the UK Atomic Energy Authority (UKAEA - ex BAEA). It was reopened for five years from 1977 to fulfil contracts before the Ranger mine started production, and became a trial ground for RTZ's cost cutting rehabilitation techniques. After arming UK & US nuclear weapons and causing massive environmental damage, the Rum Jungle mine was finally 'rehabilitated' at a cost of A$30 million to the Australian taxpayer when CRA and RTZ refused to contribute[7]. Both are still serious sources of pollution.

Past Exposure was published after Rossing cut production and dumped 30% of its workforce. Its timely publication was no doubt prompted by strong suspicions that some of the 800 retrenched Rössing workers worked in the most hazardous parts of the mine, when health, safety and environmental conditions were worse than now. The authors acknowledge that the mine has improved, but argue that the damage of past exposure persists despite attempts to reduce the problem.

Health risks

From company documents, the authors piece together a picture of dusty radioactive working conditions in the early 1980s, of lax environmental and health monitoring, misleading public relations, based on incorrect estimates of lifetime health risks, and continuous racism in employment practice.

In the Final Product Area, where mostly black workers are in direct and continuous contact with uranium dust, and "some workers have been transferred to prevent unacceptable yearly radiation doses"[8], the lifetime risk of fatal cancer is estimated to be between 1 in 9 and 1 in 25.

Because there is no effective way of measuring the alpha or beta radiation inhaled or swallowed by workers, internal contamination is supposed to be regulated under International Commission on Radiological Protection (ICRP) 'Derived Air Concentration' limits. The limit for insoluble natural uranium in air (dust particles) set by the ICRP in 1977 is 0.0255 milligrams per cubic metre.

However, RTZ are not using the ICRP limits. Instead the Rössing industrial hygiene standard allows concentration of 0.15 milligrammes – nearly 6 times the ICRP limit. It is also worth noting that the ICRP's risk estimates have been shown to be over 6 times too high by the US National Academy of Sciences (*SCRAM 75*). "The Rossing standard for airborne uranium in dust is around 36 times too high," according to *Past Exposure*, adding: "In 1982, measured levels of airborne uranium frequently exceeded the inadequate Rossing standard, even reaching 88 times the limit implied by the National Academy of Sciences."

While RTZ do not dispute claims that levels have exceeded the safety standards they argue that "no employee is exposed to such conditions without the proper respiratory protection." Yet the company's chief medical officer, Jamie Pretorius, says maintenance workers and welders find respirators a nuisance and "tend not to wear them."

The National Union of Namibian Workers has demanded that Rossing pay for future treatment required as a result of exposure. Now, after 15-20 years of mining, silicosis, uranium poisoning and radiation induced cancer cases are likely to rise. It is not surprising that the RTZ claim a clean health and safety record (though *Past Exposure* reveals some suppressed accident statistics), and that departing workers are merely "requested to notify the Chief Medical Officer of any subsequent changes in health".

This is all the more odious when we learn that the same officer is failing to measure all internal contamination as required by ICRP for an estimation of Whole Body Doses (recommended by their own Chief Environmentalist in 1982). Individual exposure records are crucial for adequate health monitoring. In particular, extrapolation from Working Levels (i.e. environmental not body measurements) ignores insoluble uranium dust lodged in the lungs of the Final Product Area workers[9].

IAEA investigation

Against this background the International Atomic Energy. Agency (IAEA) has accepted a Namibian Government invitation to inspect health, safety and environmental conditions at the mine[10]. Since this never happened when critical damage to the environment and unacceptable exposure to health hazards may have occurred, it is imperative that all primary company documents, not just those seen by the Namibia Support Committee, are made available to the IAEA. However, an IAEA investigation is unlikely to denounce RTZ's 'state of the art' operation, and will reveal only part of the story.

In view of RTZ's history of abandoning uranium mines with no contribution to the cost of rehabilitation, it is understandable that SWAPO who opposed the operation of Rössing, have been unable to close the mine now that they form the Namibian Government; they need RTZ's expertise and funds to rehabilitate the mine site and compensate for future medical claims. There is no precedent of a Third World government taking over management responsibility of a uranium mine, especially one with economic, technological and contractual dependency so carefully built in as at Rossing[2].

Incensed by claims made by the Chair of RTZ at the May 9th AGM that "there are no problems at the mine", the Mineworkers Union of Namibia has written to RTZ demanding an independent investigation in which scientists of their choice are given the opportunity to appraise all relevant data.

This is not innovative, since in 1987 RTZ negotiated an agreement with the United Steel Workers of America, under which the union selects nine Health and Safety Inspectors and Environmental Monitors at the Rio Algom mine in Canada. These appointees have full access to company data, and are also paid by the company[4]. □

Rossing Mine, Namibia

References:

(1) "Agenda 21 'Building Blocks': Preliminary submission from UK NGO's for the 3rd Preparatory Committee of UNCED." Koy Thompson, UNEP-UK 5/8/91.

(2) "The Gulliver File" by Roger Moody. Minewatch 1992.

(3) "Plunder" by Roger Moody. Partizans/CAFCA, 1991.

(4) "Past Exposure: revealing the health and environmental risks of Rössing Uranium" by Greg Dropkin & David Clark. Namibia Support Committee/Partizans 1992.

(5) "Spectrum", RTZ September 1980.

(6) "Rivers of Blood" by Richard West, Earth Island 1972.

(7) "Rum through Jungle", Chain Reaction, FoE Australia Oct/Nov '84.

(8) "Rössing Radiation Report", RTZ (1982).

(9) "Rössing Radiation", New Scientist Letters 23/5/92.

(10) "UN Team to inspect uranium mine", New Scientist 18/4/92.

There is confusion over radiation dose limits between the International Commission on Radiological Protection, the National Radiological Protection Board and the Ministry of Agriculture, Fisheries and Food (MAFF), reports Dr PATRICK GREEN, Friends of the Earth's radiation campaigner. MAFF is suggesting the inadequate ICRP public dose limit does not apply to public exposures which arise from environmental contamination from past radioactive discharges.

When is a dose not a dose?

IN December last year the National Radiological Protection Board (NRPB) invited comments on its initial response to the new recommendations of the International Commission on Radiological Protection (ICRP). Since then the NRPB has written to a number of local authorities and individual members of the public arguing that its new public dose target will focus attention on the need to reduce radiation doses. However, the NRPB advice, which will not be legally binding, is already being ignored by the Ministry of Agriculture, Fisheries and Food (MAFF).

UK public dose limit

Regular readers of *Safe Energy* will remember that the ICRP has acknowledged that radiation is 4-5 times more hazardous than it previously believed. However, it has not recommended a proportional reduction in its dose limits for radiation workers or members of the public (*See Safe Energy 76, 80, 83, 84 & 87*). Instead, it reduced its worker dose limit by just over a factor of two, from 50 milli-sieverts (mSv) to an average of 20mSv per year and in doing so provided the dirtiest end of the nuclear industry with the flexibility it needed. Its public dose limit was not reduced at all and remains at 1mSv per year.

So far, the NRPB has refused to comment on the inadequacies of the ICRP's dose limits. Instead it has argued that dose limits are a matter for the European Community and that Member States cannot have limits which are more or less restrictive than the EC limit (*Safe Energy 87*).

The letter that the NRPB sent out in response to the correspondence it received from members of the public and local authorities did not address the failure of the Board to comment on the inadequacy of the ICRP's dose limits. Instead, the NRPB attempted to argue that the ICRP's 1mSv limit actually represents a five fold reduction in the UK's legal dose limit for members of the public. While technically correct, this argument is misleading.

The legal public dose limit in the UK is 5mSv per year. However, this limit was widely criticised when it was enacted in the 1985 Ionising Radiation Regulations (which became law on the 1st January 1986) because it was not based upon the then current ICRP advice.

The year before the Regulations became law the ICRP had stated that its "principal" public dose limit was 1mSv in a year. The ICRP also argued that it was "permissible" to use a higher "subsidiary" limit of 5mSv in a year, "for some years" provided that the average dose over a lifetime did not "exceed the principal limit of 1mSv in a year".

Consequently, the 1mSv limit should have been included in the Ionising Radiation Regulations. It wasn't, because the Ionising Radiation Regulations were formulated to comply with the 1980 EURATOM Directive. This Directive was based upon the ICRP's 1977 recommendations.

The ICRP's 1985 statement had aimed to clarify these earlier recommendations as they had argued that a public dose limit of 5mSv should be applied, provided that over a lifetime a member of the public did not receive more than 1mSv per year on average.

In view of its present arguments, it is worth noting that the NRPB considered that the ICRP's 1985 advice was unnecessarily complicated. It argued that "difficulties could arise in demonstrating compliance" with a limit that was averaged over a lifetime. It therefore recommended that "the simplest way to ensure compliance" with the ICRP 1985 recommendation was to apply a "single annual limit" of 1mSv.

Status of NRPB target

This advice was accepted by the Government and since then the 1mSv has been the principal public limit used by the regulators in the UK even though the legal limit is actually 5mSv. Consequently, and despite the comments of the NRPB, the ICRP's 1mSv does not represent a reduction in the public dose limit that is actually applied in the UK.

The NRPB letter also failed to address public criticism of the unenforceable nature of its 0.3mSv public dose target (*Safe Energy 87*). Instead, the NRPB's letter presents this as a more restrictive maximum than the ICRP limit. It argued; "Our emphasis, however, is on a maximum dose for members of the public of 0.3mSv per year from a single source". The purpose of this target is to "focus attention on the need to reduce radiation doses to as low as practicable".

This may be how the NRPB hopes its 0.3mSv will be received. However, this desire is unlikely to be realised as it already seems that UK regulatory authorities have decided to ignore the NRPB advice.

MAFF ignore NRPB advice

In April, the Ministry of Agriculture, Fisheries and Food (MAFF) press released its latest report on public exposure around UK nuclear installations. (This report was actually about public exposure during 1990.)

MAFF's press release boldly claimed: "A MAFF report published today shows radiation levels resulting from liquid discharges from nuclear installations continue to be within internationally recommended limits, set for the protection of human health".

All MAFF's estimates of public exposures were compared with the "principal international dose limit for the public of 1mSv per year, recommended by the International Committee for Radiological Protection". No mention was made in the press release, or in the full report, of either the NRPB 1987 0.5mSv target or the more recent 0.3mSv target. Clearly implying that MAFF considers these to be irrelevant as they are not legally binding.

MAFF went on to explain that its results were actually being compared with the ICRP 1977 recommendations which formed the basis of "Current UK practice relevant to the general public". A statement which does tend to contradict the NRPB's claim that the new ICRP recommendations will result in a reduction of the dose limit used for members of the public in the UK.

Nevertheless, MAFF also stated that the ICRP's new recommendations "have

not yet been adopted by the UK Government, but are being considered, with advice from the NRPB".

The most worrying aspect of the MAFF's report was its argument that when the new ICRP recommendations are adopted it will mean that public radiation exposures should not be compared with the 1mSv limit if the calculated doses, particularly those due to Sellafield discharges, include a significant dose contribution from past discharges which has resulted in contamination of the environment.

This claim was justified by reference to the new ICRP practice of recommending a separate system of protection for "practices", ie activities which increase the overall exposure of the population, and "interventions", ie activities which reduce existing radiation exposures which might otherwise occur, such as radon mitigation measures. Under this new system dose limits do not apply to interventions.

MAFF calculations

For instance, MAFF argued that consumers in the local fishing community near Sellafield received a dose of 0.16 mSv during 1990. MAFF also calculated the dose using the new ICRP system (which assumes amongst other things that the dose per unit intake of plutonium and americium is significantly less than previously assumed). This came to 0.11mSv. MAFF argued that this "dose should not strictly be compared directly with the dose limit for a practice of 1mSv per year, because a significant contribution is due to the effects of radioactivity already in the environment, which can only be subject to intervention".

This argument, however, is only one interpretation of the new ICRP system. Nevertheless, it does clearly demonstrate where MAFF's sympathies lie and if adopted would absolve the nuclear industry of any responsibility for the contamination it had caused.

However, MAFF did acknowledge that they are considering whether "it would be appropriate to compare the combined effects of current and past discharges calculated using ICRP-60 dose coefficients with a level of 1mSv in a year. If this level is exceeded then intervention might also need to be considered".

In other words, MAFF is arguing that radiation exposure caused by past discharges cannot be controlled at source. These exposures can only be controlled by intervention and not by applying dose limits. Consequently, exceeding the dose limit would cease to be an offence for which BNFL could be prosecuted. Instead it would become a level at which some kind of action might be contemplated.

What MAFF did not mention is that intervention, such as advising people not to eat fish, would be subject to a cost-benefit analysis. If at some stage in the future doses around Sellafield did rise above the 1mSv limit (which is unlikely and probably why the limit was retained), then this would not lead to prosecution of BNFL. Instead the regulators could decide that the financial cost to the Irish Sea fishing industry outweighed the benefits gained by cutting down peoples exposure. This would mean that nothing would be done to reduce the exposures, even though the risk would be clearly intolerable.

A bankrupt system

The question of what to do with pre-existing environmental contamination is something that the NRPB is still considering. When it published its 1987 advice, recommending that members of the public should receive no more than 0.5mSv from a single source in a year, it also stated that the overriding limit was still 1mSv. This meant that people could receive up to 0.5mSv from pre-existing environmental contamination.

It seems that its new 0.3mSv target is intended to be applied in a similar manner. The NRPB's public consultation document states that this target "applies to the dose from a single source". This is ambiguous. A single source could mean all exposure routes from Sellafield. This could include exposures from existing environmental contamination. However, the following NRPB statements suggests this is not the case: "Where there are multiple sources and pre-existing levels of radionuclides in the environment, these must be taken into account in settling an authorisation for discharge from each source". No guidance was given on just how this should be taken into account.

If this interpretation is correct it would mean that the NRPB target only applied to the proportion of a persons dose that was due to current discharges. In the example quoted above, only 0.03mSv of the 0.11mSv is due to current discharges.

These arguments clearly demonstrate just how morally bankrupt the ICRP's system of radiological protection has become. It is supposed to be concerned with the protection of human health and not about letting the nuclear industry off the hook over its legacy of radioactive contamination.

The basis of radiation dose limits is that they are supposed to represent exposures above which the risk is intolerable. Until 1990, the ICRP refused to accept that radiation is more dangerous than it previous claimed. When it finally conceded this point it responded by issuing new recommendations which oversee a massive moving of the goal posts.

Not only are the ICRP's and MAFF's arguments completely unacceptable; they also defy logic. As far as the human body is concerned a dose of radiation is a dose of radiation. If the NRPB considers that a dose of more than 0.3 mSv is not tolerable, it should make no difference whether this dose is due to contamination caused by old discharges, a dose arising from current discharges or a mixture of the two.

Using its influence

The NRPB is unwilling or unable to challenge the ICRP. It appears to accept that environmental contamination does not count. However, it is telling the public that it was trying to use its "influence to try to ensure that European legislation complies with good radiological protection objectives". The ICRP's new recommendations can hardly be considered to represent good radiological protection practice.

If you wrote to the NRPB and have received a reply write back and tell them that their inaction and their condoning of the ICRP's absurd plan is not acceptable. □

One small step?

BILLED as nothing less than "our last chance to save the world" by its secretary-general Maurice Strong, the Earth Summit in Rio has been and gone. Whether this landmark conference, which attracted nearly 150 world leaders, was the first step or the missed opportunity to save the planet, will only become clear in time, *writes Graham Stein.*

Enough good emerged from Rio to offer genuine hope, enough bad to justify despair.

The road to Rio began with ***Our Common Future***, published in 1987 by the United Nations (UN) World Commission on Environment and Development chaired by Norwegian Prime Minister Gro Harlem Brundtland. The 'Brundtland Report' argued for sustainable development in both rich and poor countries. In December '89 the UN General Assembly voted to hold a conference on environment and development based on the work of the Commission.

Concern about global warming and possible climatic changes had led in November '88 to the establishment of the Intergovernmental Panel on Climate Change (IPCC) by the World Meteorological Organisation and the UN Environment Programme. The findings of three IPCC working groups, involving over 1,000 scientists from around the world, were published in June and July '90. The risks of global warming and rising sea levels, confirmed by these IPCC reports, moved the whole issue of climate change up the international agenda.

Green aid

The Earth Summit (UN Conference on Environment and Development) was preceded by over two years of preparatory work and meetings by politicians and Non-Governmental Organisations. The key issues to emerge were: population growth; climate change; pollution and waste management; protection of forests; and conservation of plant and animal species. Underlying all these issues was the question of 'green aid', the level of support the developed countries, the North, would be prepared to give to the South to fund environmentally sustainable development.

However, differences were not always simply along North/South lines. The large industrialising countries of Brazil, India, China and Pakistan were reluctant to accept stringent agreements on the environment, and the oil producing countries of the Middle East, Venezuela and the USA jointly opposed agreements to ameliorate global warming.

It was on climate change, and carbon dioxide (CO_2) emissions in particular, that the European Community (EC) Environment Commissioner Carlo Ripa di Meana sought to take a lead in the North, with plans for a carbon/energy tax and other measures to reduce CO_2 emissions.

Prior to the Summit, the intransigence of the USA (which produces 25% of world CO_2 emissions) brought George Bush to the fore. Less than a month before the conference, he was still threatening to stay away. Only with a watering down of a treaty on climate change, removing CO_2 reduction commitments - brokered by the UK Government - did Bush agree to grace the occasion with his presence.

In a bizarre turnaround it was EC Environment Commissioner Ripa di Meana who decided to stay away. His plans for the EC to take a leading role had been undermined by the weakening of the climate change treaty, and as he put it "everything has been fixed in advance".

When the delegates from 180 countries arrived for their 12 days in Rio, accompanied by a 9,000 strong press corps, there was still some manoeuvring to be done before the final wording of agreements would be decided and signatures appended.

Surprisingly, overpopulation which was expected to be a crucial area for discussion was not up for debate; the whole matter had been quietly dropped from proceedings. This, despite the fact that the conference was taking place in a country where half the population is under nine years of age, and in a world where 260,000 children are born every day.

Bush was undoubtedly the least popular person in town. His approach, of putting the US economy before saving the planet, and absurd comments like "the day of the open check-book are over" - as if they had ever existed - and his description of the conference as a circus, were not well received.

Agenda 21, which ran to 800 pages, a non-binding yardstick for government measures on all aspects of the environment for the next century, was sufficiently vague to meet with approval from the countries of both North and South. None of the three treaties - on climate change, bio-diversity and forests - was completely successful. The climate change treaty was signed by more than 150 countries, but the price of receiving Bush's monicker was the removal of both timetables and targets for cuts in pollution.

Proposals for the conservation of animal and plant species (being depleted at the rate of 100 to 300 per day) were also supported by over 150 countries, but the bio-diversity treaty was not signed by the USA which wishes to preserve its drug companies' right to make money out of nature through bio-technology patents.

The treaty on forests proved unacceptable to many countries in the South, who saw it as a threat to their development, and it had to be dropped completely to be hurriedly replaced with a non-binding statement of principles on forest conservation. The Earth Charter, with simple precepts on the economic and environmental behaviour of peoples and nations, fell by the wayside.

The Earth Summit did not live up to the expectations of its organisers. The vital commitment of new money from the North was not forthcoming. The $2.5 billion pledged (the largest contribution from Japan) did not come close to the $70 billion the UN said was needed. And, much to the South's disappointment, such money as is available will continue to be channelled through the World Bank's Global Environmental Facility.

What next?

But if the historic conference, which placed 103 world leaders round a 77 metre diameter table on the final Saturday, is a first step, what happens next?

The treaties on climate change and bio-diversity will have secretariats to organise periodic reviews. In addition, a new UN body, the Sustainable Development Commission, has been established to monitor countries' records on environmental protection, and apply "peer group pressure" on dawdlers. It must be hoped that this toothless watchdog does have a bark that's worse than its bite.

There have been several calls for a follow-up conference: John Major has suggested 'Rio 2' be held in the UK next year; Bush has challenged other industrialised countries to organise a conference to produce concrete plans to curb pollution; German Chancellor Helmut Kohl wants to host a conference on climate change; Brian Mulroney, the Canadian premier, a meeting in '95 to propose a binding Earth Charter; and French President Francois Mitterrand proposed another 'rendezvous' in three to five years' time.

Rio was so all-embracing - as it had to be - that it will take time to assess what progress has been made. It is clear, however, that much more remains to be done. The two treaties which were signed are too weak, the monies pledged too little, the bridge between North and South too narrow. □

Scottish renewables order

OPTIONS for establishing a Scottish Renewables Order (SRO), promised by Scottish Office (SO) Minister Allan Stewart in January, have been set out in a consultation document* published in May.

The SO initially opposed calls for a scheme to match the English and Welsh renewables order, but in May 1991 the Scottish Secretary Ian Lang announced a deal for existing independent renewables generators (*SCRAM 83*). Eventually, acceptance of the need to include new renewables was announced to the Commons Energy Committee on 29 January.

The consultation document is a welcome development. However, the suggested size of the Order - an initial 10-20MW rising to 100MW by 2000 - is less encouraging. It compares with the cumulative Order for the first 2 years in England and Wales of about 600MW and a 2000 target of at least 1,000MW. Despite the vast Scottish renewables resource, the document claims the 100MW target "would ensure that Scotland made an appropriate and equitable contribution towards the [UK] target".

More positively, it recognises the boost which an SRO could make to "developing a viable industry which might be ready to take full advantage of rising demand for renewable generation as it develops in this country and abroad." Offering the possibility of "Scottish business opportunities and employment in the renewables sector, across manufacture, installation and servicing".

Three funding options are proposed: absorption of costs by ScottishPower and Scottish Hydro-Electric; pass-through of costs to consumers; and a renewables levy similar to England and Wales.

The SO document cites two objectives of the NFFO in the rest of Britain (which depends on coal for 75% of its electricity): to "increase the amount of non-fossil generating capacity"; and "to improve the diversity of generating sources available" - hence the 'Fossil Fuel Levy'.

About 50% of electricity in Scotland comes from nuclear power with another 10% from hydro. The main objective in Scotland must therefore be, using the SO's reasoning, diversification. Thus any Scottish levy should, as in England and Wales, fall on the major generating source - in this case nuclear power. □

*** "Outline proposals for a Scottish Renewables Obligation"; Energy Division, Scottish Office Industry Department, May 1992. (Copies from Lynne Rodgers on 031-244 4335; submission deadline 10 July.)**

UK renewables

VIGOROUS interest in "the Potential for Renewable Energy in the UK" was shown by 150 people crowding into the London seminar organised by the Climate Action Network (CAN UK) at the end of May, *writes Max Wallis.*

A new econometric energy-futures study was unveiled by Stewart Boyle, of Greenpeace International, showing that fossil fuels can be phased out in the next century, quickly enough to limit global greenhouse impacts, even with continuing growth in population and GDP.

Among the renewables, it puts emphasis on biofuels (to overcome intermittency) and adopts hydrogen as a motor fuel. Technology is not a constraint; nor is cost, because of high savings through lower energy use. Such a scenario could be achieved in a number of ways - taxes/credits, targets, fair prices, etc - creating a 'level playing field' rather than naively relying on market forces, said Boyle.

The whole technology bias in current thinking was attacked by CPRE's Ben Plowden. The bias towards renewables avoids tackling the real problem: energy overuse and wastage. He sees great risks in the current "spurt for renewables", arguing that rushed decisions could undermine public support and help government to dodge the real issues.

That renewables are just a PR exercise for the government is a popular belief. Their contribution to the 50-60GW UK peak demand is minuscule, said FoE's Mike Harper, and has no effect on energy policy.

Michael Flood, author of *Energy Without End*, gave a rapid survey of the large total resource of renewables. We should pursue the multiple benefits of total systems, he argued, like biogas from abattoir waste, or building tidal power into estuarial crossings. He also proposed a surcharge of 10% on all fossil fuel power stations, pending closer examination of their environmental disadvantages.

The British Wind Energy Association's past chairman, Andrew Garrad, suggested a higher surcharge of 1.5-3p/kWh as "reasonable". Though 11p/kWh is the current NFFO price for wind power, this is forced by the impossibly short cut-off date of 1998; the latest systems could reach 3.5 - 4p/kWh, given a 7% interest rate and 20-year payback. Because of the Government's lack of interest, there is only one UK producer of wind turbines, and 70% of the initial NFFO wind projects will buy Danish.

Justin Ford-Robertson of Aberdeen University gave an interesting and upbeat presentation on biofuels, which could economically meet 2.5% of the UK's total energy needs by the year 2000 (and 10% in the EC), he said.

Several concerns were raised over the future of the Non Fossil Fuel Obligation : can the new Minister, Tim Eggar, be persuaded to give it early consideration? The 10-20MW Obligation proposed for Scotland is pathetically small. There needs to be a thermal or CHP element in the future NFFO, and also an easier, cheap planning process to allow small individual renewable projects. However, it seems that no-one has yet worked out a practical proposal for which the renewable energy community can lobby. □

Wonderlamp?

THE "14-year wonderlamp", launched in a blaze of publicity as representing "an entirely new generation of lighting technology" by Intersource Technologies of California, may not be quite as revolutionary as they would have us believe. In fact, it uses the same principle as induction lamps already sold by Philips (who are examining their patents for possible infringements) and Matsushita.

The so-called 'E-Lamp', due to appear on the market next year, is said to have a useful life of 20,000 hours, by which time its light output will fall by 30%. An average tungsten filament has a 1,000-hour life. In addition, a 25-Watt E-lamp produces a similar light output to a 100-Watt conventional bulb.

The main difference between Intersource's product and the other induction lamps appears to be its lower price, and its domestic target market: whereas the Philips QL induction lamp costs £300-plus including a special fitting, the E-lamp should be priced at under £12 and contains all its circuitry in the base of the bulb, which fits into a standard socket. This puts it in direct competition with the compact fluorescent lamps (CFLs) which have been on the market since 1980: these consume a similar amount of power, but have a shorter lifespan of around 8,000 hours, at a similar unit cost.

Under the least-cost planning policy (*SCRAM 74*), utilities in the United States have actively encouraged the use of CFLs to replace the wasteful tungsten bulbs, and one has provided financial backing to Intersource. In the UK, however, CFLs have suffered from a singular lack of marketing. It will be interesting to observe the relative fate of the E-lamp. □

Barrage studies

THE results of a Department of Energy (DoEn) co-sponsored study into the proposed 64MW Wyre Barrage in Lancashire have been released.

The preliminary feasibility study, headed by Trafalgar House Technology Ltd, put the cost of the barrage at £90 million and estimated the scheme would provide 131GWh/y of electricity at 6.5p/kWh (based on an 8% discount rate). Inclusion of a road crossing was also considered, which would add £7 million to the cost, but the report concluded that a separate road bridge would provide better net present value - a short-term saving.

Consideration was given to the environmental impact of the barrage, but further "more detailed work, for example to clarify the impact on the water table ... [and] the Pandoro ro-ro ferry terminal," was recommended. The report pointed out that the scheme "could reduce UK carbon dioxide emissions by up to 136,000 tonnes per year".

The study concluded that the Wyre Estuary is well-suited for a tidal scheme, and subject to results of further studies, a barrage is unlikely to have serious adverse effects on present developments or current users.

Lancashire County Council, in association with Norweb, Lancashire County Enterprises Ltd and the National Rivers Authority, proposed the study, and two-thirds of the £200,000 costs came from the DoEn.

Since 1979, the Government has spent £14.1 million (1992 prices) on tidal energy research and feasibility studies. This included a theoretical study of over 100 estuaries in the UK, published in 1987, which concluded that the potential from small barrages is about 2% of electricity consumption.

As well as the Wyre Estuary, detailed studies have been made of the River Loughor near Llanelli and the River Conwy, Gwynedd.

A fourth preliminary study is to be undertaken, at the River Duddon near Askam, Furness, it was announced shortly before the General Election. Two-thirds of the expected £155,000 costs have been allocated by the DoEn.

Sir Robert McAlpine & Sons Ltd and Balfour Beatty Projects & Engineering Ltd proposed the work, which is also supported by Norweb, Shawater Ltd and several local Councils.

The DoEn 1987 UK study estimated a generation capacity of over 100MW and an output of about 180GWh/y for the Duddon.

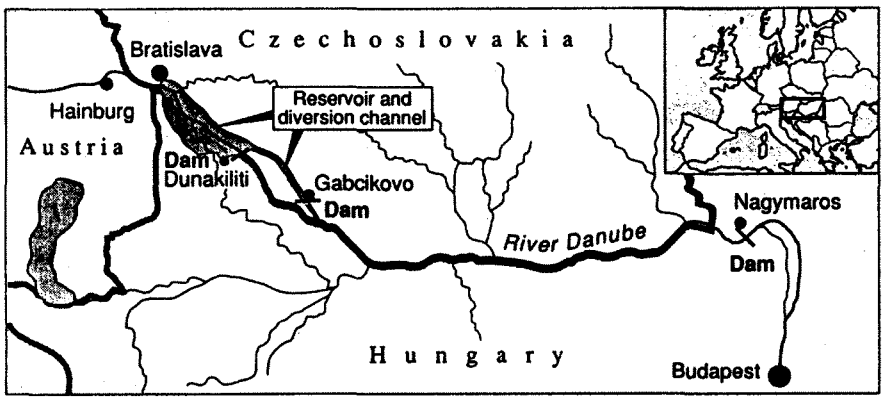
The year long investigation, to be undertaken by McAlpine and Balfour Beatty, will look at possible locations, engineering and design figures, economic feasibility and environmental effects. A

Dam argument

IN the long-running controversy over the Gabcikovo/Nagymaros Danube hydro-electric scheme, Hungary has carried out its threat to revoke the 1977 treaty with Czecho-Slovakia which had authorised the joint project (*Safe Energy 88*).

What effect the Hungarian action will have is not clear - even to the Hungarians - and the political uncertainty in Czecho-Slovakia adds further confusion. Two days after the revocation was announced, on 25 May, the Hungarian Minister with responsibility for the dam, Ferenc Madl, was still speaking of the possibility of further talks. The Slovaks are determined to complete their part of the hydro project, and their Premier Jan Carnogursky declared the Hungarian move as "legally invalid". However, he later wrote to Madl saying that further talks would be "useful and necessary".

The Hungarians, who pulled out of their part of the scheme 2½ years ago because of environmental concerns, have filed



protests with the Austrian government over funding of the Slovak scheme. The Slovaks, who reportedly first approached the mainly state-controlled Austrian banks for finance but were turned down, have struck a $345 million credit deal with a private firm Androsch International Consulting of Vienna. The Austrian government has unofficially advised banks not to provide funding to Androsch for the scheme.

Given the political turmoil in the Czech and Slovak republics future funding must be in doubt. □

Waste not

TWO plans for waste-fuelled power stations have collapsed, according to a survey conducted by industry magazine ***Inside Energy***, and several more are in severe danger of falling by the wayside.

Of the ten proposals included in the 1991 Non-Fossil Fuel Obligation (NFFO) a 4.1MW scheme planned for St Leonards, East Sussex has been abandoned due to difficulty in obtaining planning permission; another scheme destined for Derby has been dropped because its proposers, Derbyshire County Council, say it could not compete on cost terms with landfill sites as a method of disposing of municipal waste. Both schemes were judged to be viable by the Office of Electricity Regulation when they were included in the NFFO.

Of the remaining eight schemes, four have yet to secure a supply of municipal waste as fuel, and seven are still without planning permission. National Power's 44MW project at Northfleet, Kent, and Yorkshire Renewable Energy's 21MW scheme in Leeds have neither planning permission nor a fuel source. According to ***Inside Energy***, all of the projects look dubious: "Until a project has got waste and planning permission, it's just pie in the sky." □

UN renewables

RENEWABLE energy could account for more than 60% of the world's electricity needs by the middle of next century, concludes a report produced by the United Nations for the Earth Summit.

The report - ***Renewable Energy Sources for Fuels and Electricity*** - argues that this could be achieved competitively, at prices lower than in conventional energy price forecasts, using technology already available on the market or undergoing advanced engineering tests. It allows for an eight-fold growth in the global economy and estimates that CO_2 levels could be cut by 25% of their 1985 levels.

Such an energy future would be characterised by diversity of energy sources and suppliers, and by concomitant stabilisation of long-term world energy prices, because of fewer rapid price fluctuations and supply disruptions.

Intermittent renewables could provide up to 35% of electricity in most areas by 2050 without using new storage technologies, argues the report, but conventional supply mixes must be adjusted to accommodate them. Government policies must also change, if this future is to be achieved: subsidies that artificially reduce the costs of conventional fuels, by ignoring the full cost of energy, including environmental impacts, must be removed. □

UK wind developments

A new wind company for wind farm development in the UK, Wind Resources Ltd, has been established by two Regional Electricity Companies (RECs) in England and Wales, together with an existing wind developer, Renewable Energy Systems Ltd (RES) a member of the McAlpine Group.

South Western Electricity (SWEB) and Manweb each have a 45% stake in the new company whose first project will be the 6MW wind farm at Carland Cross, Cornwall, for which RES already have planning permission.

Finance for Carland Cross will be provided by Westpac Banking Corporation of Australia, which has previous experience of the industry having financed several Californian wind farms. "I think we understand wind power possibly better than other banks", commented John Norton of Westpac.

SWEB, which was an investor in Britain's first commercial wind farm at Delabole, Cornwall (*Safe Energy 87*), explained this further involvement on a belief that "there will be future NFFOs".

■ PowerGen have pulled out of their planned wind farm in Capel Cynon, Dyfed, which failed to be included in the 1991 renewables order of the Non-Fossil Fuel Obligation. PowerGen inherited the scheme from the CEGB who had earmarked the site as one of their two original Government backed wind farm projects in 1986. The site is now the subject of a planning application from Wind Power Systems who plan a 35 turbine 17.5MW wind farm.

The second CEGB site at Cold Northcott, Cornwall, which was bequeathed to National Power, is being developed by National Wind Power along with two sites in Wales at Cemaes (*Safe Energy 85*) and Llangwyrfon. The three projects, which will all use British turbines (300kW Wind Energy Group MS-3), are to receive a £7 million 'demonstration grant' which was allocated by the now defunct Department of Energy (*Safe Energy 88*).

■ Of the 38 new wind farms accepted under the 1991 NFFO, 14 now have planning permission, Mike Anderson of Renewable Energy Systems told a British Wind Energy Association (BWEA) conference in Nottingham. These 14 wind farms represent almost half the wind capacity under the 1991 obligation, and include what will be Europe's largest wind farm, Ecogen's 103 turbine, 31MW project at Llandian near Rhyddhywel, Powys. Ecogen, the country's most prolific wind developers in the 1991 NFFO, now have the go-ahead for 38MW of capacity. A total of around 80MW of capacity has been given planning permission, and the BWEA expected installed capacity in the UK to have reached 130MW by the end of the year. □

Biomass

AS interest in producing crops for power grows amongst British farmers (*Safe Energy 88*), the Government have announced a £45,000 6 year trial of a giant reed which may offer the ideal substitute to burning fossil fuels.

The reed - Miscanthus sinesis - has been dubbed as "elephant grass" in Germany because it grows to a height of over 3 metres in one season. German researchers claim it can yield 30 tonnes of dry matter per hectare annually. "We are having to answer inquiries from farmers every day of the week," says Manfred Dambroth of the Federal Research Institute for Plant Breeding and Crop Husbandry in Brunswick.

German research into the crop is much further advanced than in the UK; they have planted over 130 hectares of trial plots this year. Indeed, some German farmers are so convinced of the crop's viability they are pressing ahead with commercial projects. In Bavaria a group of farmers have signed a deal with a local crop drying cooperative, where the plan is to replace 80% of fuel oil with home grown power by 1995.

The reed is also suitable for making paper and chipboard, and in Dresden a paper company is using it as a cellulose source instead of timber. Veba, an oil and chemicals company in the Ruhr, has planted 30 hectares. The crop is used to produce hydrogen which in turn will be used in oil refining.

The most obvious use for the crop would be in power stations, says Dambroth: "Systems must be created: with farmers supplying the Miscanthus on contract to small community central heating systems and power stations, for instance."

British investigations will be run by ADAS, a government-owned agriculture research agency near Ely in Cambridgeshire. Colin Speller of ADAS, believes the crop could compete with short-rotation coppicing of trees such as willow and poplar, which gives typical yields of 16 tonnes per hectare.

Speller, however, is cautious of claiming to much for the reed. ADAS have just completed a review of studies around the world on the crop, for the Energy Technology Support Unit. They have found that estimates of the plant's yield vary widely, from below 20 tonnes up to 35 tonnes per hectare. If it can achieve yields of over 20 tonnes "it moves into a new league" according to Speller.

One complication for British use is that the plant is more suited to sub-tropical climates. It thrives on high light levels and high temperatures. Speller is uncertain of how it will fare in Britain, where most crops are suited to temperatures below 25°C.

The plant offers high production on minimal chemical inputs. Dambroth explains, "No pesticide sprays are required and the plant's rhizomatous root system has proved to absorb fertilisers efficiently, so helping to prevent seepage of nitrates into ground water."

Speller believes the crop will be attractive to British farmers because it is dry when harvested, burns cleanly and can be harvested annually. Unlike coppicing, where harvests are available every three years, it does not require special machinery.

Solar Village

For those who want to know more about the mysteries of solar energy, and how it can heat your home, a new series of courses will be of interest.

Tir Gaia Solar Village in Rhayader, Mid Wales, have been running workshops and seminars for two years, during the earlier design stages of their project. Construction work is now nearing completion on the first of their new passive solar heated, timber frame houses.

This month sees the launch of their new Training Department, which will be offering information and support to anyone who is interested in 'green building', or who wishes to include energy- saving features in their own home.

'The courses examine many of the ideas which have gone into the present solar house,' explained the training organiser, Mick Brown. 'We are evolving a new building technology,' he added, 'and are teaching how many of these new features can be applied to other house designs.'

The new courses also cover a wide range of topics including heat and sound insulation, triple glazing, ventilation and condensation controls, conventional and alternative heating systems, and the design of sun spaces.

Fees for a weekend course are £85, including half-board. These are now taking place at the new solar house, giving people the chance to explore and discuss its construction with the self- build team.

Dates for the next courses are: July 18/19, August 1/2, and September 5/6. Longer 5-day courses are on August 19 to 23, and September 16 to 20. For further details, phone 0597 810929.

LETTERS

Dear Safe Energy

The dash-to-gas issue achieved prominence on the political agenda back in January, when the Coalfield Communities Campaign launched Fothergill and Witt's "The case against gas". This excellent Special Report[1] showed that on the basis of present proposals for CCGT gas-fired stations in England and Wales, gas will soon account for more electricity generation than the combined total from oil and nuclear – and virtually all at the expense of coal.

Why the dash-to-gas? It's not "primarily economic considerations" as stated by Michael Harper of FoE in "It's a gas"[2] (*Safe Energy 88*). Fuel and operating costs of existing coal-fired stations (eg 2.2p/kWh) are less than CCGT generating costs of 2.45–2.95p/kWh (depending on present and future gas prices), a point picked up by the House of Commons Energy Committee[3] (*Safe Energy 88*, p18). However, the cost of retrofitting FGD, at about 0.6p/kWh, would be crucial[1]. It follows that the building of CCGT plant by PowerGen and National Power – who would have to close coal-fired stations – is 'economic' only if they can wriggle out of obligations to retrofit FGD.

Orimulsion fuel gives another twist. National Power and PowerGen have been granted company-wide quotas for sulphur emissions. They can burn the sulphur-rich orimulsion in redundant oil-fired stations (Ince; Pembroke; Isle of Grain) if they can counterbalance it with extra sulphur-free gas-fired generation.

The costs depend on assumed discount rates. The private sector uses high rates exceeding 10% and pay-back times of 15 years. Since power plant is designed to last twice as long or more, one would expect FoE to be critical of these short-term economics.

In April 1990, Stephen Witt and I met with FoE's Energy Campaigner to alert them to the dash-to-gas issue. Nothing resulted. A few months later, FoE were asked to oppose the ICI-Enron CCGT power station on Teesside (1725 MW, with small use of heat-steam for ICI), but showed no interest. Then the European Commission proposed to rescind the EC Directive forbidding the use of gas in electricity generation. *Safe Energy* contributor David Ross asked FoE to lobby MEPs to get the European Parliament to insist on maintaining the Directive; FoE declined. That potential battle was so easily lost.

By mid-1991, however, FoE got the message. They agreed to oppose NP's Didcot CCGT application (1300 MW). It's pleasing that FoE have "targeted resources on fighting the large power station proposals".[2] But why not acknowledge that others did the groundwork, that the Energy Committee's criticism[3] used the CCC analysis, and that the strength and influence of FoE has come into the battle almost too late?

The regulation structure of privatised electricity is working against general objectives of energy efficiency and CO_2 reduction. Efficiency of 50% in power generation (42% delivered power) is unacceptable compared with 80% or so for CHP[2]. High penalties or even a ban on gas for non-CHP generation are needed. Also, the scam whereby RECs (regional electricity companies) tie themselves into gas-fired generation projects, contract to buy power long-term for themselves, and expect to pass through the costs under the regulator formula, is also unacceptable. Ways to stop this, while still encouraging RECs to invest in local renewable sources and CHP schemes, need to be devised. Can FoE come up with practical proposals, while they fight the CCGT inquiries?

Max Wallis

1. "The case against gas: why gas is the wrong fuel for Britain's power stations", Stephen Fothergill & Stephen Witt, Coalfield Communities Campaign, Barnsley, 6 Jan 1992. (£7.50)

2. "It's a gas", Michael Harper, Safe Energy 88, April 1992.

3. "Consequences of Electricity Privatisation", House of Commons Energy Committee, HMSO, 26 Feb 1992.

4. "Orimulsion", Miri Zlatner, FT Business Info, London 1989.

Dear Safe Energy

As always I am indebted to Max Wallis for his contribution to this debate, though I disagree with his economic analysis which looks to the operating costs of existing stations as opposed to the capital and operating costs of new stations.

I both fully recognise and value the work of the Coalfield Communities Campaign in fighting the CCGT proposals and indeed the work of the individuals who have contributed to this end. I did not mean to cast any disparagement on their work by my article and I find it remarkable that Max found such innuendo in the piece.

I agree with Max's argument that only by imposing a ban on non-CHP generation can this madness be ended. This is exactly what Friends of the Earth requested of Mr Timothy Eggar, the Minister for Energy, as he considers the backlog of CCGT applications awaiting his consent under Section 36 of the Electricity Act.

We are helping FoE local groups to fight proposals at Greenwich, Brighton, Bristol, Connah's Quay, Trafford, and Colchester, in addition to the two proposals Max mentioned. I agree that it is unfortunate that we are not able to fight other developments but there are other pressing energy-related issues, from resisting the lobbying efforts of oil companies fighting climate change agreements to pressing for the restructuring of the NFFO and the end to NIREX proposals for a nuclear dump.

I hope that this helps to address some of Max's varied concerns.

Best Wishes

Michael Harper
Assistant Energy Campaigner
Friends of the Earth

Nuclear Juggernaut: The Transport of Radioactive Materials; by Martin Bond.

Earthscan; 1992, 239pp, £11.95.

Every day throughout Britain, by road, by rail and by sea, there are large numbers of routine movements of radioactive cargo. Materials at all stages of the nuclear cycle, from Uranium ore to nuclear waste, from nuclear warheads to radioactive isotopes used in medicine, are constantly on the move.

The International Atomic Energy Agency believes such transports are perfectly safe, arguing: "In more than 40 years of experience, there have been no known deaths or injuries due to the radioactive nature of the material being transported." But, here Martin Bond provides a damming list of accidents small and large which point to the inevitability of human life being lost because of these transports.

If a serious accident does happen, its consequences could well be made much worse by the secrecy surrounding the nuclear juggernaut.

Local authorities "have scant information and no authority over the variety of ways in which the cargo is routinely moved." Yet it is those authorities which would be expected to take action in the event of an accident.

Public concern over nuclear transports is often decried by the industry as being Luddite and without foundation. Bond lists the different materials being transported and catalogues the accidents they have been involved in. He places the transports in the framework of international legislation and finds it wanting.

This well-researched and well-written book puts meat on the bones of the public's radiophobia.

It also provides a series of original photographs so that we all know what to look out for.

MIKE TOWNSLEY

Energy policies & the greenhouse effect Volume Two: Country studies & technical options; by Michael Grubb et al.

The Royal Institute of International Affairs/Dartmouth Publishing; 1991, 450pp, £35 hb, £12.50 pb.

Not just another book about the greenhouse effect, this excellent work considers in detail energy resources and systems, energy efficiency, and modelling and analysis. It also provides six country case studies looking at the economic and political context for emissions reduction in the UK and European Community, the United States of America, Japan, the former Soviet Union, China and India.

This second volume "represents the intellectual underpinning" of Grubb's earlier book on Policy Appraisal (*Safe Energy 84*). It is thorough in its consideration of the technical options and realistic in its assessments of what can be achieved.

Grubb states that "identified and cost-effective technologies in OECD countries could in principle increase the efficiency of electricity use by up to 50%". The problem is not primarily technical but political, as Grubb points out in the case study of the UK and the European Community: "the role of the UK government in energy supply has declined, and there is great reluctance to intervene ... [which] precludes many significant abatement options".

Anyone planning to look in detail at the technical and policy aspects of reducing greenhouse gas emissions would be well advised to read this book.

GRAHAM STEIN

LITTLE BLACK RABBIT

Fax or fiction?

More trouble with facsimile messages in the corridors of (non-Federal) European power: the Socialist Group in Strasbourg carelessly let one of these dangerous beasts escape in the direction of the British press. The document claimed that a couple of our beloved Falkland Islands had been earmarked for nuclear dumping, and seduced hapless hacks into printing the 'scoop'.

Unfortunately, nobody thought of checking up on the source of the story until the islanders themselves started to kick up a fuss. It was eventually traced back to an article in 'Extra', the Argentine equivalent of our own highly-respected investigative journal 'The Sunday Sport'. Next time, before rushing into print, the humbled reporters would be well advised to make sure of their fax.

More malvinas

More news of interest to Britain's proud possessions in the South Atlantic concerns the Royal Navy's current embarrassment over its superannuated Polaris submarines. What do they do with the irradiated hulks? It has been suggested that at least one of them could be spruced up as a tourist attraction. The most likely candidate for this distinction is none other than HMS Conqueror. (In case the name doesn't ring any bells, prospective visitors are advised not to approach the sub in anything resembling a South American naval vessel.)

Gull cull

The feathers have been flying at sunny Sellafield, since BNFL called in the exterminators to deal with an unfortunate plague of seagulls. Happily, a spokesperson informed the local press, the hapless birds were trapped in cages and shot "in a humane way". The same impeccable source reassured us that there was "certainly no radiological reason for culling the birds".

Not that we would dream of suggesting otherwise: for what Cumbrian herring gull with an ounce of sense would be silly enough to become contaminated by perching on top of those warm, inviting radioactive filters? And what self-respecting gull would then proceed to deposit radioactive calling-cards on all and sundry, setting off alarms and disrupting the good work of the reprocessing plant; especially when a little bird might be watching? No, that would be well beyond the bounds of reasonable foreseeability ...

In safe hands

It's good to know that those filling the top posts in the Environment Department have a sound grasp of the issues. Lord Strathclyde, a new Junior Minister and previously would-be scourge of Scottish anti-nuclear campaigners (LBR, *Safe Energy 84*), last month gave the Upper House the benefit of his extensive knowledge of pollution control. On Government measures to limit emissions of carbon dioxide, he announced:. "We have encouraged the use of unleaded petrol; we are introducing catalytic converters on new cars ... and we have also introduced the use of sulphur scrubbers at power stations."

Forward planning?

Scottish Nuclear is currently running a £1.9 million publicity campaign, which includes a TV advert featuring a veritable ark-load of cuddly woodland creatures, all setting off in wide-eyed enthusiasm for the fascinations of the visitor centres at Hunterston and Torness. (Euro Disney? Who needs it!)

Our furry friends are sure of a big surprise, though, when they arrive at this particular picnic, for demonstrations of renewable energy (yes indeed!) are being installed as part of the educational displays. Could the more forward-thinking engineers at SN want hands-on experience before facing radical enforced career changes? LBR thinks we should be told - and has asked those cuddly little moles to see if they can find out for us, when they get there.

Sponsorship update

Buxton Opera House is to play host to the world's first Festival of Musicals; featuring ten musicals chosen from 491 entries. One of the winners "New things to feel bad about" is a performance about genetic engineering. Event sponsors? British Nuclear Fuels!

Three ways to promote safe energy

Three ways to help SCRAM: fill in the appropriate section(s) together with your name and address and return the form to the address below.

1 I would like to **subscribe** to the **SCRAM Safe Energy Journal**, and I enclose an annual subscription fee of:

- ☐ £15 (ordinary)
- ☐ £7 (concession)
- ☐ £25 (supporting)
- ☐ £100 (life)
- ☐ £35 (institutional)

Overseas (£ sterling please):
Europe add £2.50;
Outwith europe add £4.50.

2 I would like to make a **donation** to **SCRAM** and enclose a cheque for:

- ☐ £10
- ☐ £25
- ☐ £50
- ☐ £100
- other £_____

3 I would like to help SCRAM with a regular monthly donation of:

☐ £1 ☐ £5 ☐ £10 other £_____

To the Manager _____

_____ (your Bank)

Address (your Bank) _____

_____

_____

Please pay on _____ (date) the sum of _____ (amount) from my account number _____ to the Royal Bank of Scotland, 142/144 Princes Street, Edinburgh (63-51-00) for the credit of SCRAM No.2 Account 25859[illegible] and make similar payments monthly until further notice.

Signed _____ Date _____

Name _____

Address _____

_____

Post code _____ Phone No. _____

To: **SCRAM, 11 Forth Street, Edinburgh EH1 3LE**