AN ORDINARY CITIZEN'S VIEW OF

"RADIOACTIVE WASTE MANAGEMENT"

Department of the Environment, Cmnd.8607.,
and of Cognate Proceedings at the Sizewell B Inquiry.

An Ordinary Citizen with a typical middle-class, suburban and small-business-management background, read the Department of the Environment's White 8607 Paper 8607 last winter, decided it was very unsatisfactory, and wrote a critique of it. Later a friend pointed out that it was relevant to the Sizewell B Inquiry. Transcripts were sent for, and this was found to be so; they also raised points which called for further comments, and these have now been incorporated in the original paper.

Para. 3iv. "The public must be kept fully informed about what is being done, and there must be proper scope for public discussion". Hear, hear.

The whole nuclear enterprise was started, and continued for years, in closely guarded secrecy, and hundreds of millions of pounds of Ordinary Citizens' money was spent on it without their knowledge or consent, or Parliament being involved at all. Only little by little has it been possible for them to realise the extent of this commitment and the seriousness of the issues raised by it. That such a thing could be done in a democratic country in a matter of such importance is highly disturbing. The Ordinary Citizen is entitled to complete frankness from now on.

Para. 7 and Graph on p.6. "One basic characteristic of radioactivity, which actually assists in waste management, is that it decays over time".

BUT - it is precisely the "decay" of unstable elements which is the radioactive event, and which therefore poses all the ensuing problems. To say that decay "actually assists with waste management" is to stand the whole situation on its head, and is unbelievably fatuous.

Most of these very dangerous elements would never have existed at all but for man's meddling with the very building-blocks of the universe. Nor do they disappear to nothingness, as the word "decay" might imply. They form decay-products, (not even mentioned here), which are also radioactive, and often work through a whole series of them before reaching a state of stability. Some of these them are more dangerous, or alternatively, longer-lived, than the elements from which they started. For the same reason, the graph is meaningless; no elements are named on it. A rough average must be represented, but a rough average is no way to present facts as serious and as complicated as these.

That bright and cheery thought is as pure an example of newspeak as could be found. Windscale into Sellafield is another. The deep mental dishonesty they betray is terrifying.

Para. 8. "An estimated 78 per cent of the radiation received by the population of the United Kingdom is from natural sources, and a further 21 per cent from medical uses. The amount received from all other uses is very small, about 1 per cent, and the amount caused by the discharge of radioactive wastes to the environment is only 0.1 per cent of the whole".

To express the nuclear industry's contribution to these ratios in terms of what it is considered safe to ~~let out~~ discharge is a gross distortion of the situation. If one year's total production of radioactivity from the industry were put in instead, the ~~ratios~~ proportions would be startlingly different. But this is the quota which

is the real ~~proportion~~ contribution (all on top of thirty years' accumulation of the more long-lasting and dangerous of the wastes) of the existing sources of radiation, and the fact that it has to be completely contained with scrupulous care and at increasing cost does not alter this. It is the worst form of industrial pollution ever created by man, unique in its concentration of intense and continuing heat with toxicity and radioactive penetration. It contains a whole range of transuranic actinides which do not occur in nature. The world's burden of radioactivity from this source is being steadily added to at an increasing rate every year. Once created it cannot be destroyed, and there is as yet no acceptable form of final disposal as opposed to mere management, in sight anywhere (see below). This country has the greatest concentration of nuclear installations for its size and crowded population of any in the world. A table showing last year's total arisings, including of course Windscale, in terms of radioactivity from the industry, would have been a more seemly contribution than this, from a body having responsibility for these wastes. The Ordinary Citizen would be glad to know exactly what emissions are included in this 0.1%.

The sources of background radiation usually mentioned are cosmic rays, and the granite rock of which the earth's crust is formed. Cosmic rays tend to concentrate at the magnetic pole. Granite in the British Isles is covered in most areas by varying thicknesses of other geological formations, which must surely have the same insulating effect as the concrete shields on nuclear reactors. The inhabitants of Aberdeen and Cornwall, where the granite does come to the surface, are not commonly seen chewing pieces of their native rock. It is the ingestion of radioactive elements that constitutes the danger. As man and his artifacts are not infallible, some of the very large and concentrated quantities of radioactive material accumulated in thirty-odd years by the industry do escape, both in constant small seepages, and occasionally in spite of all care, in accidents, and it is difficult, if not impossible, to prevent their entering the food-chain. There is a steady build-up continuing. Once it gets into the sea, for instance, Strontium 80 or 90, with its affinity to Calcium, lodges in the limy structure of minute Foraminifera, which are consumed by larger creatures and so on upwards to the fish which are eaten by men. At every step in this food-chain, the Strontium is concentrated 350,000 times.

Para. 10. The I.R.C.P. has twice already in its history lowered the prescribed limits for radiation-dose, so one is bound to keep a very open mind about the present ones. They are now under challenge once again.

Mr. Hookway says (DOE/P/W. Para. 3.1.): "The IRCP sets up limits of radiation exposure for workers and the public. Units for workers are set in comparison with the risks of other occupations having high standards of safety". In DOE/P/2 (ADD2), P.2, Para.3.1., he tells us that this means occupations where the death-rate per annum does not exceed 100 per million in that occupation, and follows this with a table setting out examples for one year in America, date not given.

A useful addition to the table would be the death-rate from lung-cancer among uranium-miners, resulting from radiation-carrying dust. They were very light-hearted about these hazards in the early days of uranium-mining in America, and the U.S. Public Health Service has estimated that between 600 and 1,100 out of 6,000 men who worked at it in those days would die of lung-cancer. Taking a ~~rather below mean~~ quarter figure of ~~600~~ 950 from this estimate gives a death-rate of 125,000 per million. Decreasing this by a factor of ten to allow for improvements in conditions (ventilation of mines, etc.) gives 12,500 per million, which is practically four times the whole list given by Mr. Hookway (3148 × 4 = 12,592). Divide this again by four and the result is still over three times the death-rate that he gives for mining (3125:1,000). Presumable he means coal-mining.

The figures suggested are hypothetical because a thick veil which even Professor Margaret Gowing could not penetrate is drawn over the whole subject, but such drastic reductions must bring them into some sort of credible relationship with the facts. The position could actually be worse.

The whole nuclear industry rests on this ghastly base. On top of this hazard are the thousands of tons of tailings resulting from the milling of the rock to extract the uranium, which is done near the mine. These tailings are in the form of fine dry sand containing radium and its deadly decay-products, which will be blown about the whole area for thousands of years. It would be refreshing never to be told again that nuclear power is so clean and safe compared with coal-mining.

With regard to Mr. Hookway's second table on the same page,(accident-liability), it should be emphasized heavily that an accident involving radioactivity is entirely different in kind from the ones listed, which are limited to the time, the place and the people concerned. A radio-active accident reaches, sometimes vastly, beyond all these. To compare it with an "ordinary" accident, however disastrous,is to compare things that are non-comparable, and is inadmissible.

Mr. Hookway says on P.2 of DOE/P/2 that the IRCP sets upper limits for the public "in the light of public acceptance of other risks in every-day life". What sort of standard is this? Not what is right, but what they will stand!

Here we have embodied almost as a principle, the shocking but frequently used non-argument (another which it would be a mercy to be spared henceforth) that because people put up with 6,000 road deaths a year, or other existing horror, why worry about a little more danger from nuclear power (especially as the deaths don't occur till 10, 15 or 20 years later and responsibilty can be evaded)? One evil does not justify another,and the opposite conclusion should be drawn, both evils should be abolished, or at the very least another should not be added.

When the case for nuclear power has to be propped up by such shoddy arguments as these, the Ordinary Citizen concludes that it can't be very good, and his mistrust of the people making them is increased accordingly, and the effect of their blandly assuring statements decreased.

Para. 13. The Royal Commission on Environmental Pollution in its 1976 Report on Nuclear Power, says (Para.338) "There should be no commitment to a large programme of nuclear power until it has been demonstrated beyond reasonable doubt that a method exists to ensure the safe containment of long-lived highly radioactive wastes for the indefinite future. These wastes already exist in considerable quantity". It repeats this in paras. 181 and 583, emphasizing that any other course would be "irresponsible and morally wrong". This thrice-repeated statement of principle is one of its most important conclusions. It is a minimum requirement.

In 1977, the Department of the Environment, having taken over responsibility for waste management and disposal, set out its aims in a White Paper, and quotes them here in Para. 13: "The main elements in the responsibilities of the Environment Secretaries of State for the management of the wastes from nuclear power are to (13ii) ensure that waste management problems are dealt with before any large nuclear programme is undertaken. And (13vi) secure the disposal of wastes in appropriate ways at appropriate times and in appropriate places".

Note how the Royal Commission's statement of aims has been completely emasculated in the DOE's version. In (13ii), "ensure that waste management problems are dealt with" is substituted for "safe containment of long-lived wastes for the indefinite future", which is not mentioned at all. In (13vi), the disposal of wastes (without specification) is left to whoever likes to think what is "appropriate", apparently. There is total laxity just at the point where the principle needs to be stressed most strongly.

Paras. 29 & 50. "For present power-stations the transport of spent fuel to Windscale for reprocessing is not undertaken until 90 days after it is removed from the reactor".

Isn't it? At end Sept. or early Oct. 1981, a flask of spent fuel-rods that had been in the cooling-pond at Oldbury for only 27 days was sent up the main railway-line ~~through Hereford, Shrewsbury~~, Crewe & Preston, etc. It must have been in a very dangerous condition. A letter to the local press asking a number of questions about disciplinary action, monitoring, advice to Health Authorities and local Councils etc., received no reply at all. Typical cover-up and contempt of the Ordinary Citizen. All Health Authorities, Police and local Councils should be advised beforehand of every consignment.

Paras. 27 & 34. THORP (Thermal Oxide Reprocessing Plant) was given Planning Permission early in 1978. In its Report for 1981-2, BNFL says: "Preparation of the site is at an advanced stage". Does it really take over three years to do only this? In the meantime we are having to provide storage for the spent oxide fuel, not only from this country, but also from several European countries and Japan, which arrive constantly. Para. 27 does not even suggest that there is anything to be dealt with apart from our own oxide fuel from the few AGR stations yet working. Imports are just barely mentioned in Para. 34, where it says that "reprocessing is currently undertaken on a commercial scale only by U.K. and France. BNFL have been able to acquire valuable additional business by reprocessing spent fuel from other countries".

The only reprocessing which U.K. is "currently" doing is Magnox, so it must therefore be assumed that BNFL is taking spent fuel from the only two Magnox stations ever sold abroad, one to Japan and one to Italy, thus adding to the quantity and very expensive custody of High ~~Activity~~ Level Wastes (HLW), and also increasing the pollution of the Irish Sea with Caesium 137.

Para. 28. The high ~~activity~~ level waste is the worst and potentially the most dangerous of all the stages of nuclear waste ~~treatment~~ management. The stainless steel tanks in which they are kept at Windscale cost £4 million each in 1976. The extremely hot ~~and~~ and violently radioactive wastes are dissolved in nitric acid solution. This is the most reactive of the common mineral acids, and also an oxidising agent, so that, if there were ever a leak from these tanks, there would be a danger of fire. If a fire got hold here, the ensuing catastrophe would be worse than a meltdown at a power-station. The twelve tanks are provided with separate cooling-systems, but there is no alternative general water-supply - no fail-safe for this, the most dangerous complex in these islands. Yet Para. 57 says that this question of HAW "is not an immediate issue". It is not one perforce, because the next stages of treatment are not ready, and nothing can be done about the HAW until they are. To have a system of power-production necessitating such a devil's brew as this, is just plain silly. The main ingredients are Strontium 90 and Caesium 137, both deadly.

HLW

HLW

What is it intended to do with the 800 cubic metres of FBR wastes at Dounreay which cannot be vitrified?

Para 28. "Work is going ahead on the design of a vitrification plant"...

The possibility of the vitrification of high ~~activity~~ level wastes was first mooted in the mid-fifties, and UKAEA just started on it, but did hardly anything all through the 60's although the work was known to be urgent. In the 70's the HARVEST vitrification project got going but when finally put to the test in 1980, it turned out to be a complete failure. Why is this not mentioned in this report of July 1982, nor in RWMAC's Third Report of May 1982, which says that on 30th Nov. 1981, the Secretary for the Environment told Parliament that BNFL's preference was to build the first Windscale Vitrification Plant on the basis of the French AVM process, which had already operated successfully for two years?

Preference implies choice, but the French process was, and is, the only one working in the world, so BNFL had no choice. The French are hard-headed people, and will no doubt make a heavy charge for their expertise, so the Ordinary Citizen will pay twice over for this facility. The money for R & D for the UKAEA comes from a Government fund for general industrial R & D, of which it has the lion's share.

A vitrification plant is even more expensive than THORP (BNFL evidence at the Windscale Inquiry). Seeing that the main ingredients of HAW, Strontium 90 and Caesium 137 remain very active for 5-600 years, can the assurance expressed in Para. 32 about the durability of ANY materials over several centuries really be justified? ~~When Cmnd. 8607 was written,~~ The French plant has been running for only ~~two~~ two years. Extreme heat and radiation combined are already seen to be causing embrittlement in materials, and we simply do not know.

HLW

If vitrification should not work we are faced with a dreadful prospect. Mr. Wedd says: (DOE/P/1 ADD2): "These wastes remain potentially harmful in proportion to their radiotoxicity, and unless disposed of would require to be safeguarded indefinitely if they were to remain in liquid form.... The wastes are, however, only actually harmful if the radioactivity is allowed to affect living things!" That of course is actually the whole point of what we are all discussing.

The steel tanks in which the high level wastes are contained are only reckoned to have a life of around thirty years. There are now twelve of them containing about 1,000 cu. m. of liquid. So 36 per century would be required to deal with present liabilities, or say 40 with spares, which are necessary. This would suppose posterity to have "indefinitely" the technical, financial and social capabilities to produce them. And does a safe method exist of transferring high level liquid wastes from one tank to another?

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Para. 31. Geological disposal. Evidence given by Dr. D.G.Arnott at the Cheviot Borehole Inquiry emphasized that 20-30 years' experience of the effects of intense heat and radioactivity combined on any containment-material was insufficient for irretrievable disposal to be justified, and that an engineered store would be safer for posterity although requiring supervision for 5-600 years. The cogency of this argument, and the reception accorded to the proponents of boreholes by the doughty Northumbrians, resulted in the borehole programme being called off. The DOE retreated to their desks and a review of progress of work abroad on this subject instead. Such work is not always relevant here, but in spite of this they have concluded in the light of it that: "The emplacement of high level wastes deep underground...is now established in principle... and that nothing has emerged to indicate that it would be unacceptable". (Third Annual Report of RWMAC, p.49).

The flaw in this "principle" (held with the greatest tenacity at the Inquiry) does not emerge, it's down there, namely, water. Continental evidence is not suitable as an example for the British Isles, which are constantly saturated with moisture driven in from the Atlantic. It is most unlikely that even the hardest rocks would be free of it. Ground-water contains mineral salts in solution. The corrosive effect of these would combine with and intensify the factors mentioned in the Cheviot evidence. Leakage of radioactivity into the ground-water is unthinkable.

The Institute of Geological Sciences has pronpunced on the present state of knowledge and is quoted in D.95,p59FG. "The type of information required to assess the geological barrier provided by various formations ia largely unavailable. For example, with respect to crystalline rocks, geologists have tended to be concerned more with their petrology and mode of formation than with their hydrogeological propeerties or the geochemistry of ground water systems within them. The hydrogeology of poorly permeable rocks in general is a subject which has been neglected by scientists because previously there was little application for such information". And on P.60D: "Site-specific feasibility at a level leading to an acceptable safety-analysis has not been demonstrated anywhere in the world".

They are quoted again on p.61D: "The basis of reliability for any assessment is the degree of confidence placed in predictions extended to very long periods in the future. Realistic groundwater flow and transport models have yet to be validated in the field in any country in the world".

And RWMAC's Fourth Report, Para 6.26., quoted on p.64D, says: "So far as geological disposal is concerned,, the main function of backfilling and sealing will be to prevent or retard vertical upwards movement of groundwater, which would be the shortest pathway back to man. This presents a technically very difficult task".

Can a project where the main question-mark has not been researched at all, anywhere, really be said to be "established in principle"?

Mr. Wedd says that the main effort is now directed to "bringing the state of knowledge of the sea and under-sea options to the same level as the land options." (p. 64 H). He admits that the feasibility of these has not been established in principle.

In D 100, p.10 G-H, in answer to objectors who say that we should not create substances which we do not know how to get rid of,, he says: "There are no such substances to our knowledge in the radioactive waste field. They can all be managed, held in storage and disposed of safely within the limits of present knowledge and present technology".

One can only suppose that Mr. Wedd has means of reconciling such statements with those of the geologists and his own RWMAC which are denied to the Ordinary Citizen. He has said himself that the sea options have not even been researched or "established in principle" at all.

When asked whether this state of the art satisfies the principle of ensuring that "waste management problems are dealt with before any large nuclear programme is undertaken", he is completely convinced that it does. He says (p.66DE "The phrase "dealt with" does not mean that one should have shown that one can now do something that will not be possible to be done for the period of 50 years. It should show either (sic) that the problems that arise now and can be dealt with now are within the compass of normal technology and administration and that there is good reason to suppose that the problems that will arise in 50 years' time will be within the scope of present technology". Perhaps the omissing alternative should be "OR NOT."

The Royal Commission asks for "demonstration beyond reasonable doubt that a method exists to ensure the safe containment of long-lived highly active radioactive wastes for the indefinite future". Neither THORP nor the vitrification plant yet exists, nor do the following steps, and neither is just what one would put under the heading of "normal technology".

Responsibility for radioactive waste management was taken from the nuclear industry and passed to the Department of the Environment so that the public could have confidence that it was under the control of a totally impartial body. It is a very heavy burden of responsibility. They have a backlog of thirty years' operations to deal with, plus the massive arisings from decommissioning that will start before long, plus continuing wastes from Magnox stations until they are decommissioned, plus wastes from 4 AGR stations now running. One would think that the prospect of the wastes from 12 PWRs by the end of the century, added to all this, would move them to caution, and a suggestion that it might be better to deal with what is unavoidable first. But Mr. Wedd positively stonewalls in the opposite sense over this. Sizewell B, or even all its successors will hardly make any difference - "the wastes are there now" (exactly), it's all established in principle, a few more repositories perhaps.....No doubt the thought that Sizewell B is planned to have a store for 18 years' spent fuel cheers him (so somebody sees that there is quite a problem), but the present commitments as listed above will spill over well into the next century. He seems determined that nothing he says should stand in the way of either Sizewell B or its successors. This does not inspire confidence in the DOE's impartiality in the Ordinary Citizen's mind.

On D 100 p.10B, Mr. Wedd, while admitting that the fact of their radioactivity sets such wastes apart from all others, tries to make out that the fact of their decay is a point in their favour, a "plus", in comparison with arsenic, mercury, cyanide, etc., a "time dimension" he calls it. Plutonium-239 with a half-life of 24,413 years hardly peters out in a "time-dimension" that can readily even be imagined. Far less can such slow decay provide any practical advantage in its management compared with the above "conventional" elements. Just one quarter of its first half-life alone puts it beyond any possibility of our being able to guarantee its isolation from all living things, which is essential. This watering down and minimising of extremely serious problems is precisely what promotes instead of allaying the uneasiness of the public, which is therefore rational, not emotional, as is so often made out.

Arsenic, mercury, etc. existed before man and will exist after him, he is not responsible for their being there. This is not to say that he should use them in such a way as to make them too easily accessible, which he does happen. Man, on the other hand, creates the radioactive pollutants which emerge from nuclear power-stations in unprecedented number, concentration and violence. He need not do it.

At the mention of final disposal of high-level wastes under the ocean-bed, the horse-sense of the Ordinary Citizen rebels completely. Our contribution to research into this method of disposal was £3 million in 1982-3 (DOE-P/4, Para 6.12.). What sort of system of energy-production is this, which on top of all the extraordinary, dangerous, exceedingly expensive and barely half-tried stratagems already mentioned, plus several more, has to resort to such a desperate measure as this - and all just to try and get rid of the rubbish? And all after the main job of electricity-generation itself? The difficulties and dangers met with in oil-drilling on the ocean-shelf would be compounded in the ocean-deeps, and also the cost. How can nuclear power possibly be anything but many times dearer than any other system of energy-production ever devised? Paras. 43 and 44 mention SIXEP, an ion-exchange plant to obviate as far as possible the discharge of Caesium 137 from the Magnox cooling-ponds to the Irish Sea. How much does this cost? And a number of other plants to do this and that mentioned in RWMAC's reports. Anyway the damage has been done. Caesium 137 gives off dangerous radioactivity for 500 years, and is water-soluble, thus passing up the food-chain through a vast number of organisms in its life-time. It is sheer madness to poison our life-support systems like this. Did the people responsible never have the simple thought that perhaps it might be better to close down the Magnox stations until the problem was solved, instead of leaking Caesium 137 for nearly thirty years, as they have done, before attempting to stop it? Not at all. Nuclear power is the crown of human achievement and sacrosanct.

What about the costs of waste-management up to 1971, an item totally repudiated by BNFL, which was incorporated in that year? They say they are "substantial". This item is mentioned every year in their Report and is then ignored completely by everybody, including the Government. Past and future costs are simply not being faced. Is the R & D mentioned in Para. 52, and the whole new set-up at the DOE to deal with wastes, being charged to nuclear power in any estimate of costs? And the very large grants made to BNFL? If not, comparisons with other methods of energy-production are inaccurate. And it is precisely after the next ten years (Para. 59) that the heaviest costs will fall - the decommissioning will start, and the second THORP will be needed, or some other means of dealing with spent oxide fuel if it fails, and so on. The £65 million mentioned is just trifling, and Mr. Wedd's statement (Day 100,p.200) that "the costs of waste disposal do not make a radical difference to the costs of nuclearpower" raises eyebrows to the limit*.

Paras. 35 & 58. Posterity will be left with large quantities of Plutonium and other very long-lived actinides. The disadvantages of destroying these in a fast non-breeding reactor are mentioned - very stringent ones. And surely this operation would also produce very awkward wastes to be dealt with in their turn? Plutonium 239 with its half-life of 24,400 years is forever mathematically, and as-near-as-makes-no-matter practically. In face of this fact, what hypocrisy to say in Para. 58 that "the regulatory bodies...will ensure...that the public are fully safeguarded, both now and for future generations". This is simply not possible. It is also an illegal statement, as no government in this country can bind a succeeding one.

Paras. 35-37 & 53. Disposal of intermediate wastes. For thirty years these have been allowed to accumulate without a thought being given apparently to any means of tackling them.

This was the subject of severe reproof by the Royal Commission. Mr. Wedd (D.100, p.33B) mentions the "inconvenience and expense" of looking after intermediate-level wastes, and in his own evidence (DOE/P/1, Para.6.4) says: "There is no technical advantage to be gained in delaying disposal of these wastes; furthermore, the availability of suitable disposal facilities will save the construction of additional stores.... The Government's stated intention of giving priority to making progress towards the early disposal of these wastes has been generally welcomed". A splendid exercise in making a virtue of necessity, and in transforming criticism into general approval. Meanwhile we have paid for thirty years' storage - vast radiation-proof structures.

The DOE witness agreed under cross-examination (Day 95, p.19B) that there will be 286,000 cu. m. of intermediate wastes by the year 2081, even if not a single station is built after Torness add Heysham II (stations now under construction). This figure excludes all wastes from Ministry of Defence operations, and those from foreign contracts. The extended period allows for continuing operations for decommissioning. This total is an

inescapable commitment. Agreed CEGB and BNFL estimate (in Document C1/44 Res)) for intermediate wastes from the whole life of Sizewell B, including decommissioning, is 4,000 c.m. In view of this, the suggestion that "the creation of wastes from nuclear activity might be minimised by building no more nuclear power-stations than are absolutely necessary", made by Mr. Blake during his cross-examination, seems eminently sensible.

Surely a "modified mine or purpose-built cavity" would be open to the same objections and dangers as were described at the borehole Inquiry?

Para. 26. "Those disposal-routes which already exist for radioactive wastes are acceptable and should be used, if necessary, on an increasing scale".

This is a statement of intention that the government really does mean to put into action. Their prompt rejection of a European vote for a two-year moratorium on ocean-dumping of low- and not-so-low-activity wastes, shows where their priorities lie: nuclear industry a very good first, environment nowhere. Para. 12 says: "The government has concluded that it is feasible to manage and dispose of all the wastes currently envisaged in the U.K., in acceptable ways". The international community does not appear to agree on the acceptableness of this one. Para. 24: "Waste management is not therefore a barrier to the further development of nuclear power as now foreseen". The "conclusion" seems clear, that the government is determined that it shall not be, and believes accordingly. Britain does 90% of the dumping in the deep Atlantic, and the next lot is to be double the quantity of any previous one. A special ship is being built to carry it (cost?). So the flouting of the moratorium raises the question of how far the government is serious about any good intentions expressed in this paper.

Para. 57. In this connection, the suggestion that handing the responsibility for waste-management policies to the Department of the Environment would make it "independent of the responsibilities for promoting nuclear power" sounds very hollow. It was this independence above all that the Royal Commission sought. The Nuclear Industry Radioactive Waste Executive (NIREX) recently set up, consisting entirely of "component parts of the industry" and based at Harwell, neither meets this desideratum nor inspires confidence.

On top of this, Mr. Hookway says in his evidence (DOE/P/2.Para.7.16): "Potential land-disposal facilities for intermediate-level wastes will be dealt with by NIREX in their evidence in support of CEGB". WHY should NIREX support CEGB? Their job is to get rid of the wastes, not to promote the creation of more. This is just a first sample of the results of handing back the executive part of waste management to the sole control of the industry itself; it strengthens the suspicion of the public, that the first concern of the nuclear industry is its own perpetuation.

It also has an inbuilt tendency to dictatorship, of which there was an unpleasant instance this summer.

Sir Peter Hirsch, the new director of UKAEA, said on Channel 4 early in June that local authorities must eventually agree to underground sites being used for the disposal of intermediate radioactive nuclear waste. He suspected that "there are ways of doing this by offering them something". At this the Ordinary Citizen's blood really does boil. Note the "must", and the pressure to be applied. By what right does Sir Peter Hirsch dictate to local councils elected by their own people? We have heard about freedom and democracy ad nauseam during the last twelve months, we don't need to be told, they are the British birthright, but it seems we shall have to start defending them in our own backyard.

Paras. 48 & 49. Decommissioning. This is bound to add very considerably to the 35,000 tons of intermediate solid wastes already existing and being added to all the time. Very little is yet known about it, and the "financial provision" being made seems very inadequate. What happens to the very large pressure vessels which will be extremely radioactive? Would there be any other course open than to encase them in massive concrete, and leave them for several hundred years? What an ornament to the English countryside. "Apart from the bulk of some items" is the only glancing reference to this problem.

It would surely be a good plan, before building any more power-stations, to decommission one of the earliest Magnox stations, which are not needed, and are all cracked anyway, and so discover in fact what are the real problems and costs. If the many people are right who have said that will cost as much to decommission as to build a nuclear power-station, the sooner we know the better.

Para. 58. The Nuclear Installations Inspectorate is seriously under strength and underpaid and has recruiting difficulties. The immense and vitally important task of assessing the safety of the proposed Sizewell B PWR has been added to their routine work, and over most of the eighties they will have three more (totally superfluous) AGR stations to inspect in every detail before they start up, and their routine inspections added to their regular work-load if and when they do. The state of overstrain and/or delay which must result is not tolerable in a task as important as this. Are the costs of the Inspectorate charged against nuclear power? (Almost certainly lost in the Health & Safety Executive, in which they were merged a few years ago, to their own great resentment. A move which it can be guessed was made for those financial reasons).

Paras. 35, 37, 62 & 68. The public has now very little faith in public inquiries, especially since the Energy Minister declared his intention of going ahead with the Sizewell B PWR station whatever the result of the Inquiry.

Para. 66. "Radioactive waste is the cause of much public concern. It is sometimes seen as dangerous and intractable material which poses almost insuperable management problems. This view is, in the Government's considered judgment, an exaggerated one. Closer study of the question shows that, although problems and dangers are certainly present, the problems are being resolved, and the dangers are being eliminated, by the systematic application of known technology, and sound commonsense. Policies to this end will not, however, be successful, unless there is public support based on a full and accurate assessment of the situation".

Para. 67. "The government proposes to take the appropriate measures to provide the necessary basis for public support....The machinery for achieving this will be published reports by the departments concerned....These will provide ample material for informed public debate".

The only possible comment on all this is, that if the proposed reports are like this one, their only effect will be to "exaggerate" public concern still further. Para. 12 says: "The main task is to identify the most appropriate of the methods available to us for each category of waste and then ensure that this method is implemented". It is now thirty years since Calder Hall was built, and the weapons reactor was working at Windscale and producing wastes for some years before that. It is absolutely staggering that the people involved in dealing with the entirely new and uniquely dangerous elements emerging in these wastes didn't get the whole of this treatment-disposal question settled before they went on with the programme, and bring it all to a halt if they couldn't solve it. They hardly even tried. The irresponsibility was criminal.

Those who followed have ~~hardly~~ been no better. The statement in para. 22 that the 'Environment Department have set in hand...the preparation of an overall long-term strategy for the management of wastes" is a glaring exposure of the attitude that has prevailed all these years. The Royal Commission found it "surprising". A more drastic adjective would have been appropriate.

Para. 13v highlights the same situation. The Department of the Environment has the responsibility to "ensure that there is adequate research and development on methods of disposal". The Royal Commission also said (Para. 337, after their statement of principle): "We are clear that such a demonstration will require a substantial programme of research". If all this massive research is still needed, why does this Report say, as quoted above, that the problems can all be solved by "the systematic application of known technology"?

The UKAEA has had hundreds of millions in grants from the government, who should have insisted that the wastes question had absolute priority, in view of previous neglect. The AEA, on the contrary, has always devoted by far the largest slice of the funds provided to the development of the fast breeder. They have assumed blithely all along that vitrification of highly active wastes and putting them in deep holes in the ground would settle all that - no worry - but did nothing to prove beyond all reasonable doubt that this would work. When HARVEST (a pretty miserable effort anyway) gets to the point of demonstration it is found to be useless, and when the borehole question is subjected to "the application of sound commonsense", deep irretrievable disposal is found, quite

This is a very depressing document. The frequent expressions in it of the Government's "beliefs", "convictions" and "considered judgments" do not convince the Ordinary Citizen that there is an assured solution to the problem of radioactive waste disposal at all, after so much time and expense. The facts are glaring, and contradict such "beliefs".

The depression is increased to a remarkable extent by a review of the evidence given on the subject at the Sizewell B Inquiry, which also introduces an element of sheer bewilderment. CEGB comes to it with their various "scenarios" for the expansion of nuclear power, from which it is quite clear that the immediate aim is for at least ten more stations like the proposed Sizewell B by A.D. 2000 (as the Government have always openly stated), and these to be commissioned, not just started. The fact that this is physically and financially impossible does not appear to give them pause. Their preferred scenario goes on to add seventeen more by 2030. There is an alternative scenario which would provide a total of forty-nine such stations between 1990 add 2030. It shows what a world of fantasy they live in, that they can waste time and public money drawing up such a scenario as this one. Where do they think all these stations could go? And how could all the wastes emerging from them be absorbed anywhere, least of all in a small country like the U.K.? And all on top of the admission quoted on Day 95, p.66G, that the Sizewell B station "will not be needed until 1997 on grounds of electricity demand". (The present intention is to bring it into operation by 1991-2). If only one PWR is all that is required by 1997 (and CEGB have never been known to do anything but overestimate demand). how can ten more possibly be needed only three years later? And seventeen more in the succeeding thirty years?

CEGB have sworn over and over again that plutonium from civil power stations has never been, is not, and never will be used for weapons, either here or in America. The only other possible reason for this extraordinary programme must be to ensure a good supply of plutonium for the ten or twelve fast breeder reactors which are now planned for construction early in the next century. The retiring Magnox stations will be very much more than compensated for by the AGRs now coming on stream or under construction, as these stations have double the Magnox output. There will also be Drax B, a large and modern coal-fired station which was not ordered because of anticipated demand, but only to keep the turbine and boiler makers from collapse.

CEGB has a present over-capacity of 35-40% in the worst conditions. 20-25% is considered the desirable safety margin. It is remarkable that the South of Scotladd Electricity Board is never, never mentioned in any of these calculations. They have 70% over-capacity up there and Torness AGR will add to it. Presumably there is a power-line across the Border, but they might as well be in Alaska as far as any CEGB calculations are concerned.

The supposition that the motive for the PWR programme is solely the provision of FBR fuel is supported by the fact that a proposal for such a programme (for 18 large station) was published by CEGB in Dec. 1973, , expressly so that the U.K. could retain an option for an FBR programme by providing enough plutonium for the initial charge. A programme of FBRs was announced at the same time.

So these are not two programmes but one. A full public inquiry into the FBR has been promised repeatedly. But if billions have been spent on a programme of PWRs, and three or four times those billions on the necessary plant to deal with the wastes from them, what hope would there be that a mere inquiry would stop the enormous momentum that the whole thing would by then have acquired? Knowing

the tendency of high technology to get completely out of control once a billion or two have been spent on it, the Ordinary Citizen would guess, absolutely none. Therefore the only decent thing to do is to delay the Sizewell B Inquiry by the five years conceded by CEGB to be possible, and preferably much longer, and to hold the FBR Inquiry before any move is made to build anything. The problems of safety, cost and waste-management presented by a PWR are child's-play compared with those of an FBR, which has been described by the Pugwash scientists as "a very dangerous piece of technology". A whole programme of them could not possibly be sited at Dounreay, the transmission and transport problems would be insuperable.

There is another reason for delaying Sizewell B. CEGB piously quote in their own evidence (CEGB/S/8, Para 21) the lines laid down by the Royal Commission: "The Commission recommended that there should be no commitment to a large-scale nuclear programme until it has been demonstrated beyond reasonable doubt (not the DOE's beloved "established in principle", note) that a method exists to ensure the safe containment of long-lived highly radioactive waste for the indefinite future.....The Commission's proposition is bound to be the dominant factor in any process preceding decisions about further large-scale programmes (including any programmes for reactors)". (Do high-level wastes emerge from any other source than nuclear reactors?). And note that they do not say "a dominant factor" but "The dominant factor", which in any normal interpretation would mean that it is paramount.

That CEGB is fully aware of the state of the art in the waste management field is shown by the following: First, the attitude and the background. D.95, p.11 B-C quotes CEGB/S/142, Para.22: "The Environment Departments have set in hand, in consultation with the nuclear industry, the generating boards, and other organisations, the preparation of an overall long-term strategy for management of wastes, including those at present stored at nuclear sites". This is followed by a statement of Mr. Wedd's (p.11D), that this strategy "is in the course of preparation and revision and is likely to remain in that state for a long time to come".

So much for the theoretical side.

And what is the state of affairs in brute fact on the ground?

1. There are uncertainties about THORP.
2. The vitrification plant is only on the drawing-board.
3. The engineered store to hold the vitrified blocks for 50 years (or in perpetuity?) are not even on the drawing-board or quoted for or the site settled, although if AVM comes into operation by 1987 as promised, the store must be ready and in full running order to receive the glass blocks by then.
4. Getting beyond "established in principle" for deep disposal on land is put off for 50 years (with obvious relief - it will be someone else's pigeon by then), and there very serious question-marks over it, see p.7.
5. Deep sea disposal is not even "established in principle".

Such being the situation on the waste-management front, if the Commission's proposition "is bound to be the dominant factor in any process preceding decisions about further large-scale programmes", why does the CEGB come to the Inquiry with such scenarios, and why, in fact, is this Inquiry sitting at all? CEGB have spent £6 million preparing their case, and the immense cost of the Inquiry (borne entirely by them), rising all the time, will all end up in our electricity bills.

The mental processes at work here are simply not normal or consistent or indeed rational.

RWMAC's Fourth Report (Para. 6.2) points out that 'The Governments of a number of countries, such as Denmark, the FRG, The Netherlands, Sweden and Switzerland, have made development or further development of nuclear power conditional on acceptable schemes for disposing of high level wastes. Ultimately, the implementation of such schemes will depend on the scientific and technical demonstration of their feasibility and cost effectiveness,, and on the degree of public confidence they can command". This is the same as our Royal Commission's principle, but definitely adopted instead of being given mere lip-service. The present experience has proved that the inclusion of such principles in the publications of the bodies involved in this country is nothing but empty ritual, which has destroyed the Ordinary Citizen's faith in any such statements from now on.

It is clear that the Government fully intends to build at least ten, and preferably twelve, PWRs by the end of the century. They said as soon as they were elected that they would do it, and have said it again since. Mr. Lawson said they would build Sizewell B regardless of the result of this Inquiry. They should be taken at their word. The negotiations recently announced with hoped-for European partners with a view to co-operation on a CFBR to be built in this country (it being beyond our means alone) mean that the PWR programme and CFBR taken together, lead logically to a whole programme of FBRs early in the next century. Sir Walter Marshall said recently that the first sod could not be dug for the CFBR before 1990 - but this is almost upon us as these things go.

Such a policy shows that the Government have learnt nothing from the mistakes of the pioneers, on the contrary they are repeating them, brazenly, on a larger scale and of set purpose. Royal Commission principles, White Papers and regulations resulting from them, their own Department of the Environment, any idea that radioactive wastes present any problem at all, are ruthlessly swept aside. It is left to the DOE to put what decent-seeming facade it can on the situation, a job that would tax a super-Machiavelli, hence no doubt the strange discrepancies that have been noted.

Another piece of facade-building appears in the ANNEX to the White Paper 8607. In Section (a) is says: "All practices" - yes, ALL - "giving rise to radioactive wastes must be justified, i.e. the practice must be established in terms of its overall benefit". But why " all"? Do any other "practices" (sic) apart from running a nuclear reactor, give rise to radioactive wastes? Why wrap it up like this?

If the Government means this (which of course they don't - we get floods of propaganda but no cool judgment), they should suspend the Sizewell B Inquiry, which for the reasons given is mere hypocritical puppetry, and set up a Royal Commission to look into every aspect of the nuclear industry, including a drastic examination of its whole record (UKAEA, BNFL, CEGB, SSEB), with a dispassionate look at what the public has got for its money, which runs into many billions, some of them concealed under other headings; money which has been taken from, not voted by, the public.

NRPB, MAFF

The whole question of why these billions are never, never cut, while everything else, and then cut again to the bone, needs investigation. Why is CEGB not only allowed, but enthusiastically encouraged, to come to smaller spending lavishly to promote large programmes of nuclear power which we do not need at all?

Why has research into renewable sources of energy been treated with such extreme meanness from the beginning, and even its miserable grant of £14 million cut to £11 million just when one of its projects was coming to fruition? This situation has been a scandal for some time, and the details are filled in by Mr. D. Ross in his excellent evidence on Day 101. Why was research into renewables ever put at Harwell in the first place, under the control of AEA? It should be removed from there at once and placed at one of the universities also working on the subject, be given £100 million or more and told to get on urgently with the ~~subject~~ job.

A Government which chooses, or rather cossets with every favour, a technology which constantly churns out the worst kind of poison, when it could turn with relief to one which is really clean and has endless potential for the future, for employment and for exports, shows a desperate lack of commonsense and balanced judgment.

In America, no new station has been ordered for the last six years, and none are expected to be for the next five at least. Several under construction may never be completed. Several more which are completed, are refused licences on safety grounds and are bringing the companies that started them daily nearer to bankruptcy. In France, the large programme that was planned has been cut back drastically, and some of the stations still in it are only there because of the unemployment problems that cancellation would cause.

The reason why PWRs have become the dominant type world-wide is not because of their intrinsic merits, but because President Eisenhower rescued a faltering domestic industry in the late 50s by starting an "Atoms for Peace" campaign in Europe and elsewhere, through the Export-Import Bank and Euratom. A programme of light-water reactors was launched through this organisation by means of low-interest loans "to demonstrate U.S. leadership in atomic energy". By these means Westinghouse and General Electric built up global commercial connections, which brought them in billions of dollars in royalties, and enabled them to keep up very large plant and design staffs, resulting in a world-dominance which no-one else has been in a strong enough position to break. The situation is very different now. Such profits as they are able to make come entirely from manufacturing fuel-pins and servicing existing reactors. Also the giant oil-corporations have diversified into every form of energy, and help to keep them going out of oil profits. So why are we, and only we, being had for suckers?

Does the ludicrous disproportion between the enormous costs and delays in the construction of nuclear power-stations before, and all the dangerous and complicated and eventually unavailing processes of waste-disposal after, the actual generation of electricity, never strike the policy-makers, nor the presumably sane men who can solemnly sit discussing the possibility of drilling into the deep ocean-bed just to get rid of the rubbish? Even the electricity-generation is not efficient; a nuclear power-station spends one-twelfth of its life closed down for routine inspections - 2½ years. All have had to be downrated from planned output, Wylfa by 25%. Most of them have had long "outages" for repairs, ranging from six months to two years. They take a year to work up to "full" (i.e. downrated) power, and PWRs can take 3-4 years over it and then perform unevenly after that. Towards the end of their lives performance tails off again. And we could perfectly well have done without all the electricity they have produced.

For the sake of this "benefit" we pay the price not only of the money but of the existence of ~~HAW~~ HLW tanks and some exper in a small and crowded country, the ruin of fisheries, constant small emissions of radioactivity which will have their cumulative effect in due course, and the shame of inflicting Plutonium and its dreadful off-spring on posterity for ever. Human beings are not infallible, and there is always the possibility at least of a major disaster.

A quarter of a ton of plutonium has accumulated in the Irish Sea, some of it being carried by the Gulf Stream round the north of Scotland into the North Sea. Why has it ever been considered permissible to allow even the minutest traces of such radioactive and toxic pollutants as this and Caesium 137 to be discharged by such an obvious route into the food-chain? If "permitted levels" and MAFF monitoring and all the rest of the apparatus result in nothing better than this, they are useless. Any industry which creates plutonium is totally unacceptable in any case. The DOE Report No. 32 of 1979 says honestly and openly (Para. 4.3.3.): "The isolation of disposed waste from the environment cannot, of course, be guaranteed in perpetuity". So the Royal Commission's requirement cannot be met, and the industry as such is therefore "irresponsible and morally wrong". The Ordinary Citizen cannot understand why it was ever allowed at all, it all adds up to lunacy. This is a failed and dying industry, which is a major liability and should be closed down. The fact that plans can be made for adding to it shows an unbelievable degree of irresponsibilty in all concerned.

FINANCIAL ASPECTS OF NUCLEAR POWER REQUIRING TOTAL INVESTIGATION

1. The capital costs of Windscale, Springfields, Risley, Capenhurst and Harwell. The nuclear industry was presented with these by the Ministry of Works which had held them for Defence - and all running and ready staffed. Has a reasonable proportion of the cost ever been debited to the industry?

2. Research and Development. The basic R & D had likewise all been done already for the industry when it took over. It continued to be done by UKAEA for years and even now is only charged as to 50%. It must have been, and still be, some of the most intricate, extensive and expensive R & D ever done. What other industry has ever had these two enormous starting costs handed to it on a plate? Both 1. and 2. were probably lost in the Defence budget. There should be no taking refuge in the Official Secrets Act over this, what happened 25-30 years ago can't interest anybody except the Ordinary Citizen who provided the cash.

3. Total of grants to UKAEA since it was set up (£200,000,000 this year). These grants go through Parliament "on the nod", and appear never to be questioned or criticised. They come from a general fund for industrial R & D of which the AEA gets the lion's share. The largest proportion by far of the annual grant goes on running the Dounreay establishment and into research into the FBR generally. They also do research on the programmes of thermal reactors.

(a). The essential research for the Magnox programme was done before general commercial building started, as noted under (2) above. How much has been spent on Magnox research since, which has not been charged to the industry?

(b). Only in 1967 did CEGB start paying a very small royalty to AEA. By that time all the basic research for the AGR programme was done. Has the cost of this research been added to the capital cost of AGR?

For continuing AGR research, see under "Nuclear Energy Vote below.

(c). CEGB now pay for 50% (only) of the research done for it by AEA. When did it start to do this? A recoupment of 50% on AGR R & D is mentioned in Para.8 of AEA's 1981-2 Report. Is the other 50% counted as part of the cost of the AGR programme?

(d). The same applies to the PWR. At the Sizewell B Inquiry, on Day 47, when asked whether "in the context of an investment appraisal one is looking to the future rather than the past in the context of research costs which may have been spent on the past which are attributable to the project under review", Mr. Priddle replied: "Yes, that is exactly right. Costs in the past are <u>sunk costs</u> and are therefore not relevant".

So not only is 50% of the cost of research for the PWR programme lost in the AEA grant, but the other 50% which the CEGB has paid for, is sunk without trace (under the ocean-bed?) and considered "not relevant". Only future research on Sizewell B will be taken into account. Just where does CEGB put this 50% in their accounts? If in some general fund, it will be spread over the whole generating field, thus unfairly altering the balance between the conventional and the nuclear sections. In any case the PWR programme is thus made out to be cheaper than it really is. What is the total sum so far spent on PWR R & D?

(e). What is the total so far spent on running the FBR programme at Dounreay, and on research connected with it?

4. Total capital cost of the Magnox programme, including a fair estimate for R+D (see above). CEGB's recent admission that coal-fired would have been cheaper is probably only the tip of the iceberg. And what are the total interest charges since inception, and how funded? A proportion of the cost equal to the depreciation of all these stations was written off - but it was a cost, and was paid for somehow.

5. Total capital cost of AGR programme to end 1982, including interest charges and how funded (a major financial disaster, this one). Both programmes being a dead loss, is it reasonable to expect any Ordinary Citizen to believe that the next one (PWR) will be any better? The whole enterprise to date has been a gigantic financial failure, which would have been abandoned long ago in any free play of market forces. Only vast government subvention has kept the industry going both here and in America. Was depreciation proportion written off, also for Magnox?

6 The Nuclear Installations Inspectorate. There can be very little of its work that is not concerned with some part of the production of nuclear electricity and the disposal of its wastes, and the industry should be charged accordingly. This item is probably all lost in the accounts of the Health & Safety Executive.

7. The total cost of the armed police (600 or more strong) guarding nuclear installations. Presumably the armed forces guard what concerns them. This police-force is almost certainly paid for by the Secret Service, to which it belongs technically, and the real cost of nuclear power is thus reduced.

8. Total of grants to BNFL since it was set up in 1971.

9. Total cost of waste treatment up to 1971.

10. Total cost of all outages and breakdowns in all nuclear power-stations to date. There is more than a suspicion that when coal-fired stations are brought in to fill these gaps in supply, the costs of running them are charged against the coal-fired section of the industry, thus of course making coal-produced electricity appear that much dearer. The cost of the replacement of current is caused by the nuclear section and should be charged against it.

11. There was at the beginning of this decade, and probably still is, a fund called the Nuclear Energy Vote. At that time it was being used for research into improvements to the AGRs under construction. Have the sums spent in this way been counted in the cost of AGRs? How long has this fund been running, how much has it absorbed during the whole of its existence, how is it funded, and who, if anybody, controls it?

Extension and "refurbishing" of Magnox cooling ponds and reprocessing plant at Windscale has absorbed several hundred million within the last five years. DOE's Report No. 32 says that "existing and planned storage capacity for Magnox fuel cladding (solid HLW) will be full by 1985. What will more of this cost?

12. Full details of reprocessing contract with Japan re THORP, and of contracts with European countries for reprocessing.

13. Probable capital cost of THORP by completion date, plus interest, and how funded. Running costs.

14. Probable capital cost of the Vitrification plant, plus interest, and how funded. Running costs. By 1980, £3½ million had already been written off development costs. Total cost of HARVEST (all wasted).

15. Cost of NIREX and by whom paid.

16. Cost of engineered store to take vitrified HLW for 50 years (or longer?) and running costs.

17. Present cost of stainless steel tanks for HLW.

18. Probable cost of adapted mine or engineered cavity to take intermediate wastes. Cost of supervision (for how long?).

19. Cost of several engineered trenches to take low-level wastes, and of some degree of supervision for 200 years.

20. Cost of flasks to transport spent fuel from stations to Windscale - 50 tons of steel to carry 2 tons of wastes, each with elaborately engineered cooling arrangements. How long do they last?

21. A massive endowment fund to be provided for posterity, as some sort of acknowledgement of, and compensation for, this thing which we are inflicting on them. It can't really compensate, but it is a minimum decency.

No proper estimate can be made at all of the cost of ~5-600 years' cooling and monitoring of wastes, nor of dealing with long-lived actinides, not of the loss of health, food-sources and amenity. By the end of the day - if there is one - they must vastly exceed all the above items put together.

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