

3 The State's Authority Under Challenge

The controversy which for more than a decade has dominated nuclear power development in much of the industrial western world arose in the first instance from public anxiety about the immediate effects of nuclear technology. Although economic, legal and political considerations were all to contribute to growing public disenchantment with nuclear energy programme, the initial crystallising factor was the increasingly sharper perception of the environmental and health risks associated with the construction and operation of nuclear power plants.¹ Local apprehensions were fuelled by periodic reports of nuclear accidents, but these do not appear to have had a decisive influence on public attitudes in the early years of nuclear power development. During this period media coverage of the Chalk River accident in 1952, the Enrico Fermi controversy in 1956, and even the serious Windscale fire in October 1957, to name but a few examples, occasioned intermittent local concern but no wide-ranging debate around the complex issues of reactor safety.

Nevertheless, as plans for the commercialisation of nuclear power gained momentum, proposed reactor sites soon became a focal point of opposition amongst communities who viewed with suspicion any project likely to disturb their immediate environment. A more favourable attitude emerged in areas of relatively low employment and income, where workers and tradesmen hoped to derive some benefit, at least during the period of construction activity; on the other hand, in areas where nuclear facilities were expected to threaten existing patterns of land use, the reaction was generally hostile. Local farmers were often fearful that their crops would be adversely affected by the steam from cooling towers; fishermen were concerned

by the consequences of thermal and perhaps radioactive pollution, particularly for the value of their catch; and there were often objections to the visual impact of nuclear power stations on the natural landscape, reinforced in many instances by commercial considerations, including the wish to protect property prices and tourist income.

EMERGENCE OF DISSENT

By permitting interested citizens to participate in construction permit hearings, the 1954 US Atomic Energy Act had itself opened up the possibility of public intervention in the nuclear decision-making process. Yet despite the rapid growth of the American nuclear industry during the 1960s, community opposition, apart from a few notable exceptions, remained generally muted. The signing of the partial Test Ban Treaty in 1963 and community preoccupation with other politically sensitive issues, notably civil rights and the Vietnam War, may account for the relatively dormant public involvement in nuclear matters.² By 1968, however, the rapidly-growing environmental consciousness that had penetrated deep into middle-class America was beginning to make itself felt in the nuclear arena.

Perhaps the best indication of things to come was provided by the controversy surrounding the proposal for a plant at Lake Cayuga, first announced by New York State Electric & Gas Company (NYSE & G) in June 1967³. Groups of scientists and citizens, concerned about the effects of thermal pollution, demanded that design alternatives be considered which would minimise likely damage to the lake. Fearing costly delays, NYSE & G announced in 1969 the indefinite postponement of its application for a construction permit. By 1970 the AEC was openly acknowledging that the increasing opposition of writers, scientists and local communities had slowed down the anticipated growth in nuclear energy.⁴

But the utility companies were determined to proceed with their plans. Accordingly, in March 1973 NYSE & G resurrected their proposal for a boiling water reactor with a once-through cooling system. The local reaction to the utility's decision was swift and effective.⁵ The close proximity of Cornell University provided citizen groups with access to a great deal of expert advice and information. The very fact that Cornell scientists were questioning the conclusions and methodology of the technical report issued by the utility and its

consultants enabled the local community to point to serious disagreement among technical experts, a fact widely interpreted as sufficient justification for the abandonment of the plan. In response to a succession of letters, polls and petitions, which now formed part of an intensified campaign of outright opposition, the company decided against further participation in public debate, thereby isolating itself from the public and further undermining its credibility. In July 1973, NYSE & G finally abandoned its plans for a nuclear power facility on Cayuga Lake.

Although a little slower in developing, a similar pattern of local dissent emerged in various parts of Europe, particularly in the Upper Rhine valley where the German nuclear industry, in collaboration with its French and Swiss partners, was committed to building one of the densest concentrations of nuclear reactors anywhere in the world. Following a proposal in 1970 for the construction of a reactor at Breisach, south of Wyhl, the local residents, concerned that the steam from cooling towers would damage local vineyards, formed the Karlsruhe Burgeraktion Umweltschutz and organised a petition for which they collected 65,000 signatures.⁶ Confronted with such opposition, the electric utility (Kernkraftwerk Sud AG) was compelled to drop the Breisach proposal and applied instead for a construction licence for two large reactors at Wyhl. In spite of a series of demonstrations in 1974, the company received approval for the plant from the Baden-Württemberg Land government and, after a local referendum necessitated by further legal objections, was granted a construction licence in January 1975. However, as we shall see, this was only the beginning of a bitter and protracted battle between the authorities and anti-nuclear groups whose campaign rapidly assumed national and even international dimensions, and whose objections now encompassed not only the effects of thermal pollution but a wide range of technological problems, including radiation, reactor safety and waste disposal.

As in so many other instances, the Wyhl controversy, which began as a local reaction against a particular siting proposal, soon developed into a far-reaching critique of the entire nuclear programme. The local community, which we may for the purposes of analysis designate as the *periphery*, was naturally resentful of the dictates emanating from the *centre*, increasingly identified with remote and anonymous political, bureaucratic and corporate decision-making structures.⁷ What often started as a series of

'peripheral' objections to one or more specific aspects of a proposed nuclear facility thus gradually formed the basis for a generalised response involving a coalition of diverse interest groups – some explicitly anti-nuclear, others espousing a more general environmentalist position.⁸

In most countries the development of significant opposition to nuclear power was a slow and painful process. In Sweden, early nuclear plans encountered little hostility and as late as 1971 and 1972 debates in the Riksdag produced very substantial support for the nuclear programme. A report issued by the electricity industry in 1972 recommended that, in addition to the eleven reactors already in operation or under construction, another thirteen reactors be built by 1990. The critical views of Nobel physicist Professor Alfvén and the vigorous debate under way in the United States were nevertheless beginning to have an impact, as may be gauged from the decision of the Riksdag in 1973 to defer any authorisation of new nuclear plants pending a review of reactor safety and waste disposal problems.⁹

A somewhat similar situation obtained in Britain where, despite the 1957 Windscale accident, the nuclear controversy remained extremely low-key. After the early 1970s a network of environmental organisations, notably Friends of the Earth (FOE), became increasingly concerned with nuclear hazards, but few misgivings were voiced in Parliament, where the Conservative and Labour Parties remained staunch supporters of nuclear energy. Yet, by 1975 nuclear opponents had gone a long way towards documenting and publicising the economic and technical grounds of their case.¹⁰ Their arguments were greatly strengthened, and in a sense legitimised, by the publication in September 1976 of *Nuclear Power and the Environment* the sixth report of Britain's standing Royal Commission on Environmental Pollution.¹¹

In the early stages of the controversy it was in the United States that concerns about nuclear safety were most widely and sharply aired. Drawing upon the experience gained from earlier skirmishes over specific reactors, scientists, lawyers and economists helped to bring the challenge to nuclear power into public view.¹² A particularly sharp attack came late in the 1960s when, as a logical extension of the concern about atmospheric testing, the question of routine radioactive emissions was raised by Sternglass, Tamplin, Gofman and others.¹³ Sternglass, for example, alleged that there was a correlation between emissions from the AEC's experimental

Brookhaven reactor and a rise in infant mortality in Suffolk county. Similar claims were made regarding changes in infant mortality rates in the vicinity of several nuclear power plants in Illinois, Michigan, Pennsylvania, New York and California, but all such correlations were 'routinely rejected by the AEC as unscientific and erratic'.¹⁴ Although the Sternglass estimates were subsequently refuted, the linear relationship between radiation dose, even at low levels, and cancer deaths was accepted by numerous expert committees, including the Advisory Committee on Biological Effects of Ionising Radiation convened by the National Academy of Sciences. In due course, the political pressure generated by the controversy was sufficient to prompt the AEC to impose stricter limits on nuclear power plant emissions.

No sooner was this particular debate dying down than another quickly rose in its place. It involved the adequacy of the AEC's design standards for a key safety system in commercial nuclear power plants, the emergency core-cooling system (ECCS). The question, first raised by the Union of Concerned Scientists (UCS), became in 1971 the subject of a special hearing and a matter of debate in other licensing proceedings across the country.¹⁵ In summarising their case, UCS argued that AEC claims on reactor safety were based on a faulty experimental and analytical structure whose computational predictions were critically weak and unreliable and the subject of serious dispute amongst professional and qualified persons.

The hazards of reactor failure were first examined in 1957 in the WASH-740 study commissioned by the AEC to investigate the consequences of a conceivable catastrophic accident for a 150 MWe reactor. The study was updated in 1965 for the 1000 MWe reactors that were then planned. But neither study had calculated the probabilities of failure, and the fact of 300 reactor-years of catastrophe-free commercial reactor operation did not of itself constitute adequate empirical support for the AEC's low core meltdown probability. This, then, was the background to the new Reactor Safety Study commissioned by the AEC and directed by Professor Rasmussen. Although the probability of major accidents was estimated to be rather low, the study's estimate of the core meltdown probability was nevertheless much higher than previously calculated (5×10^{-5} per reactor-year as opposed to 1×10^{-6}).¹⁶ In any case, the Rasmussen report, far from disposing of the reactor safety debate, merely brought it to a higher level of technical

complexity and confirmed that estimates of probabilities and possible effects of accidents would remain the subject of considerable scientific disputation.¹⁷

Another major source of concern related to the possible entry of highly toxic nuclear waste into the biosphere. The issue of waste disposal was one of the principal considerations in the Sierra Club's 1974 decision to oppose the continued development of nuclear energy.¹⁸ The demand for an acceptable solution to the waste problem featured in several state initiatives and was one of the overriding concerns expressed by an eminent panel of scientists and scholars in a report prepared for the National Council of Churches in 1975 and entitled the *Plutonium Economy*.¹⁹ By the mid-1970s, the dangers posed by the long-term disposal of radioactive waste, whether at sea or underground, had become central to the case against nuclear power which was now gaining currency throughout the western world.

Particularly disturbing for many was the toxicity of plutonium and the adequacy of existing standards and regulations. Not unexpectedly, the decision of the US Administration to proceed with the liquid-metal fast breeder reactor as a matter of priority provoked considerable opposition and gave rise in 1971 to a suit against the AEC. Although dismissed by the district court of the District of Columbia, the case raised many of the issues which were to form the basis of environmental protest against the breeder.²⁰ The development of reprocessing and breeder technologies tended to fuel fears of the plutonium economy and gave rise to declining public confidence in available safeguards for the handling, storage and transport of plutonium and to a heightened perception of the risks of plutonium diversion into unauthorised hands, whether national or sub-national in character.

Separate from, but closely related to, these criticisms was the argument that nuclear authorities, and particularly the AEC, had been less than frank with the public. A case in point was the failure to divulge the miscalculations that had been made about radioactive fallout from above-ground weapons testing in Nevada. For several years the AEC had done its best to conceal that people had been exposed to low-level radiation throughout the 1950s, that nursing mothers were found to have iodine 131 in their milk, and babies strontium 90 impregnated in their bones and teeth.²¹ In subsequent years it was alleged that the AEC had tried 'to suppress discussion of

reactor safety issues' even within the nuclear profession, and inhibited top level safety researchers from 'speaking directly with the AEC's own regulatory authorities on matters pertaining to the licensing of nuclear power plants.'²² The refusal to disclose fully the nature of nuclear power research and the safety implications of a large-scale commercial programme was seen by many writers as part of a deliberate policy by nuclear policy-makers to mislead the public or, at least, to manipulate information so as to minimise opposition to their plans.²³

Accusations of secretiveness and duplicity against the nuclear establishment were by no means confined to the United States. Such criticism was sharply voiced in France where the public was normally given little or no information about reactor safety, pollution dangers or the economics of nuclear power. Even as late as 1975 the often promised public debate had produced very little except for the perfunctory consultation of regional assemblies on the choice of reactor sites.²⁴ Although Brazil may be regarded as a special case given the political conditions arising from military rule, it is nevertheless significant that Brazilian scientists should have openly criticised the closed character of nuclear decision-making in their country. They were disturbed, among other things, by the absence of free discussion on the terms of the 1975 German-Brazilian deal and its long-term technical, economic and ecological implications for Brazilian society.²⁵

In response to the numerous attacks that were now levelled against it, the nuclear industry insisted on its impressive safety record. Persons living in the vicinity of a nuclear plant, it was argued, were permitted a maximum annual radiation exposure which was considerably below the equivalent exposure from natural and medical sources. Regarding the likelihood of a catastrophic reactor accident, the most detailed studies had placed the probability of a major radioactive release at no more than 1 in 100,000 reactor-years. As for the carcinogenic effects of plutonium, there was no conclusive evidence that they could definitely be attributed to plutonium in the several thousand workers who had handled the material.²⁶ Yet these confident claims, even when supported by the findings of prominent scientists, did not prove fully reassuring. The opponents of nuclear power may not have swung the whole of public opinion behind them, but they had seriously dented the credibility of the nuclear industry.