

Nuclear suppression

Brian Martin

This article draws attention to a number of cases where it seems that scientists and technologists have been penalized in various ways for having views opposed to those of the nuclear industry. Publications may be suppressed, through to careers being destroyed. The examples come from many countries.

It is not possible for one author to investigate thoroughly every claim, but the quality and quantity of cases cited here suggest grounds for concern.

DHIRENDRA SHARMA has long been a leading critic of India's nuclear policies. As a science policy researcher at the Jawaharlal Nehru University (JNU), he has criticised the aims and administration of the Indian government's nuclear power programme and its link to nuclear weapons. In 1983, Sharma published a book, *India's Nuclear Estate*,¹ which is a powerful indictment of the Indian nuclear establishment.

It seems reasonable to assume that Sharma's outspoken criticisms are an important reason — and perhaps the main reason — behind the attack on his position at JNU. Sharma has worked at the university for nearly a decade in the Centre for Studies of Science Policy, in the School of Social Sciences. In December 1983, Sharma was suddenly transferred to the School of Languages, thus formally preventing him from further science policy studies.

Sharma's experiences follow a pattern which is common in cases of intellectual dissent. My object here is to describe the Sharma-JNU case in the context of the nuclear issue and other similar cases. Suppression of expert dissent on nuclear issues can be seen as a predictable consequence of the way nuclear technology has been linked to political and economic institutions.

Sharma-JNU case

JNU's transfer of Sharma *seems* to be a response to his criticisms of India's nuclear policies. No satisfactory

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official explanation has been given for the transfer. Since there are no apparent academic or other grounds, suppression seems to be the best explanation. There are a number of points to be made in support of this.²⁻⁵

First, Sharma was appointed to work in the Centre for Studies in Science Policy in the School of Social Sciences beginning in 1975, and was confirmed in his post after the standard probationary period. His position there was associate professor. The transfer was in apparent violation of the conditions of his appointment.

Second, the executive council of JNU passed a regulation in 1979 requiring that there be consultation with the staff member concerned before any transfer occur. In Sharma's case, the decision about, and the order for, his transfer were kept secret from him until a messenger brought the order to him in the night of 16 December 1983. Thus the university acted in violation of its own regulations.

Third, Sharma has an impressive academic record. He came to JNU after many years working in the United States. In his time at JNU, he has been a leading figure in science policy research, publishing over 50 papers in Indian and international journals. He played a major role in promoting the advanced degree programme and attracting visiting scholars. He also acted as head of the Centre for a year. Sharma's transfer cannot be attributed to academic failings: quite the contrary.

Fourth, Sharma has long been a critic of India's nuclear policies. His impact in this area culminated in his book *India's Nuclear Estate*,⁶ published in mid-1983. It is important to remember that India's nuclear programme has been one of the most ambitious of any third world country. As well as a major effort in nuclear research and the nuclear fuel cycle, India exploded a 'nuclear device' in 1974. Since then, international pressure seems to have restrained the development of nuclear weapons in India. Nevertheless, the nuclear establishment in India is powerful.

India's Nuclear Estate exposes the complex of political and economic interests involved in nuclear policy-making in India. Sharma tells of large-scale economic waste due to the tight linking of interests among the Department of Atomic Energy, the Atomic Energy Commission of India, and the Ministry of Defence, a network which lacks any effective oversight.

Sharma documents the role of the Tata group of industries and the Larsen and Toubro Company in obtaining major orders on nuclear projects, and the tight links between individuals in this operation. Sharma does not hesitate to name names. He documents the close relationship that had existed between Homi Bhabha, head of the Atomic Energy Commission and nephew of J R D Tata, and Prime Minister Nehru, and the later close relationship between Atomic Energy Commission chief H N Sethna and Prime Minister Indira Gandhi.

Sharma's indictment is harsh: he alleges secrecy, lack of accountability, inefficiency, mismanagement, and corruption. It seems no coincidence that his transfer came not long after the publication of his book.

As well as his publications critical of Indian nuclear policy, Sharma convenes the Committee for a Sane Nuclear Policy. This has organised conferences, printed articles, presented petitions and otherwise played an important role in questioning official policy.⁷

The previous head of the Centre for Studies in Science Policy was due to and did retire on 7 January 1984. Sharma's transfer came only shortly before this. Sharma would have been the most senior member of staff in the Centre and therefore, most likely, its head. This would have added to his stature and to the influence of his criticisms. Furthermore, he was due to be promoted to full professor, and as such would have become an *ex officio* member of key decision-making bodies in the university.

JNU had a new Vice-Chancellor, Mr P N Srivastava, who may have seen a chance to win the favour of the nuclear establishment by attacking Sharma. In 1984, JNU was given funds of nearly £10 million (roughly US\$15 million) for a nuclear research centre.

It must be conceded that, on the non-nuclear front, Sharma had antagonised members of the JNU hierarchy by his vocal support for student and staff rights during disturbances in May 1983, when the university took harsh steps against dissident students and staff. Sharma was one of the staff members who took a forthright public stand against the administration. But unlike Sharma, other staff who openly supported the students were not victimised. They had more support from departmental colleagues and, most importantly, were in departments such as history where the work did not have the immediate critical policy implications that Sharma's did.

Lastly, the JNU administration has provided no reasons for Sharma's transfer. Sharma has made appeals for reconsideration and so forth, but these have been denied (after long delays), again with no reasons given. In the absence of any official explanation, it seems at least plausible to infer that Sharma is being victimised for being effective in criticising nuclear and academic policies.

Expertise and the nuclear state

Nuclear programmes throughout the world have been the creatures of states. The military is the key bastion of state power,^{8,9} and hence nuclear weapons programmes have always been tightly controlled by the elites in military establishments, both civilian and military. To develop and apply nuclear technology for war, scientists and technologists have had to be drawn into the service of the state. This began on a large scale in the

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United States with the Manhattan project, which is widely seen as the beginning of the major connection between government and science there.

The knowledge and skills of scientists and technologists have been utilised by states,¹⁰ but the scientists and technologists have not been passive pawns in the process. They control a vital resource: expert knowledge. By making that knowledge selectively useful to militaries, they have tailored their services for their patrons.

However, they maintain some degree of independence, especially by asserting the importance of specialist knowledge in policy-making. For example, top administrators at the US Los Alamos and Lawrence Livermore National Laboratories have promoted new developments in nuclear war-fighting and hindered negotiations for a comprehensive test ban,¹¹ relying in each case on their alleged monopoly on an expert knowledge which cannot be penetrated by outsiders.

State elites and elite nuclear scientists have a joint interest in maintaining nuclear knowledge as the preserve of the experts and the policy-makers. In practice, this means preventing members of the general public from obtaining an unsympathetic critical understanding of nuclear issues, and thereby claiming some degree of oversight or veto over nuclear developments.

A clear expression of elite opposition to the spreading of nuclear knowledge to the general public in the USA was the attempted suppression of the publication of "The secret of the H-bomb" by the *Progressive*. This article by Howard Morland describes the basic principle which makes possible the construction of thermo-nuclear weapons.

It is not as if this were a secret from the Soviet Union, nor from any other assiduous investigator; the basic idea had been presented openly before, including in an encyclopaedia article by Edward Teller. Nor did Morland's article provide information which could be used by non-state terrorists or backyard builders of weapons.

What the article did do was explain basic physical principles of the bomb's construction in the context of a critique of nuclear policy-making and of the shroud of secrecy which surrounds it. This secrecy was justified in part by the claim that a high level of expertise was needed to understand and comment on the issues, and also by the contradictory claim that there were vital yet simple secrets which could not be revealed lest they get into the wrong hands.

Morland's article exploded both these myths. The US government, in an unprecedented move, put a prior restraining order on publication. Significantly, numerous leading scientists supported the suppression attempt. The symbiotic link between the nuclear state

and nuclear scientists was being threatened.^{12,13}

Like nuclear weapons, nuclear power programmes have been creatures of states.¹⁴⁻¹⁶ One of the claims of the anti-nuclear power movement is that nuclear technology will lead to a concentration of political and economic power: a 'nuclear state'. First, the very great capital investment in the nuclear fuel cycle means that a strong financial and bureaucratic interest is built, which cannot be easily overcome even should other energy paths become more attractive.¹⁷

Second, the environmental and political dangers associated with nuclear technology (such as release of radioactive materials, non-state terrorist or criminal threats, proliferation of nuclear weapons) mean that strong political controls must be exercised over the use of the technology. These political controls in turn often lead to attacks on civil liberties, including the rights of opponents of nuclear power.¹⁸⁻²⁰

Opposition to nuclear power can be seen as one facet of a commitment to increased local self-reliance which is a key theme in strands of a number of social movements, especially the environmental movement.²¹ That nuclear power has been singled out for attack in part reflects the way it symbolises dependence on elites and experts.

Suppression

In the debates and struggle over nuclear technology, the promoters have used their monopoly over nuclear knowledge to claim that they should have the final say. Opponents have argued that the key issues are not technical but rather social, political and economic. This response has had only limited impact so long as nuclear expertise remains unchallenged. One of the potent tools brought to bear by the opponents is 'counter-experts': knowledgeable people, often with credentials and experience in nuclear areas, who openly oppose the nuclear establishment.

One of the responses to such counter-experts is attempts to suppress them. This can take such forms as blocking publications, refusing permission to give talks, refusing or withdrawing funds and staff, job transfers, sacking, blacklisting and character assassination. Instead of responding to the arguments of the critical expert, the individual is attacked personally. Such attacks are almost always justified in 'legitimate' terms, such as penalties for failure to perform satisfactorily. Seldom is dissidence itself openly acknowledged as the reason for the suppression.

The first essential element in suppression is an act of dissidence, such as a speech, letter, report or research programme which threatens the practices or legitimacy of a powerful group, such as a corporation, a state bureaucracy or a profession. The second essential element is an action by that powerful group, or by someone acting in its interests, to attack the dissident or to prevent freedom of speech or inquiry.

Suppression of intellectual dissent is a widespread phenomenon, found in a host of fields and organisational situations.²⁵⁻²⁵ In most corporations and state bureaucracies, fundamental dissidence is rare, since employees realise that speaking out would jeopardise their promotions or jobs. Even in universities, where 'academic freedom' should protect the staff, speaking out can be risky for one's career, and most never take the opportunity to find out. Needless to say, under

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military rule or state socialism, the opportunities to dissent are even more restricted.

The study of suppression of intellectual dissent is an undeveloped and disorganised area. Here I list a number of cases in the nuclear area which seem to fit the category of suppression: there is some threat to the interests of the promoters of nuclear technology, and some attempt to attack the source of the threat by the exercise of administrative power rather than to respond to dissident views by reasoned argument. The view that suppression is involved in a great many of these cases draws strength from the common pattern of events and its congruence with the theoretical explanation of suppression.²⁶

In my experience, the search for evidence about suppression — which covers everything from journal articles and books to newspaper accounts, internal documents and letters, and verbal reports — can never be completed, since single cases frequently can disclose a mountain of complications and detail, and the number of cases never seems to end. Only thumbnail sketches of cases are included here. Some of these cases may turn out to have other interpretations but, as a whole, I hope they cause some general alarm bells to ring.

Australia

The Australian Atomic Energy Commission in May 1970 withdrew permission which had been granted earlier for two of its officials to address the Society for Social Responsibility in Science on the future of nuclear power in Australia. The Chairman of the Commission, Sir Philip Baxter, called the Society "an organisation heavily tinged with a particular political philosophy" which he was not prepared to assist in any way.²⁷

While there are no prominent cases of Australian scientists who have suffered in their careers specifically because of their anti-nuclear stands (which may be related to the absence of nuclear power in Australia) there are some cases of anti-nuclear campaigners who seem to have been victimised for other activities.

The clearest case is that of Dr John Coulter, a medical researcher for 20 years at the Institute of Medical and Veterinary Science in Adelaide. He has been a leading environmentalist in South Australia for many years, speaking out, always in his 'private capacity', on environmental chemicals, uranium mining and other issues. At the Institute, he set up an environmental mutagens testing unit, and sometimes provided information to workers on hazards.

In 1980, he was sacked from his position. After a court case was begun, in which none of the alleged reasons for the dismissal were established, an agreement was reached by which the Institute said Dr Coulter had been retrenched.²⁸

Dr Mark Diesendorf, an applied mathematician, worked in the Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) in Canberra since the mid-1970s. He has been a leading public figure on a range of environmental issues for many years, including French nuclear testing in the atmosphere in the early 1970s, uranium mining and nuclear power, environmental impacts on health, and fluoridation. He has been one of Australia's leading proponents of wind power.

In about 1982, CSIRO moved to shut down all its wind power research, including Diesendorf's.²⁹ Within his division, Diesendorf's position was singled out for transfer to Adelaide and, unwilling to move for personal reasons, he was retrenched from CSIRO in 1985. Although no hard evidence is available to prove it, many people believe the transfer was politically inspired.

Britain

A number of employees of the British nuclear industry have lost or resigned their jobs after suffering harassment because, after trying to voice their criticisms internally, they raised them in public.

Trevor Brown, a scientist in the nuclear industry since 1948, in the 1970s became a Liberal councillor and became involved in safety issues on behalf of constituents. After criticising conditions at Aldermaston, a nuclear research establishment, on the BBC in 1980, he was severely reprimanded for the "public expression of views on official matters". He decided to retire early in 1981, after being threatened with a transfer.³⁰

Rodney Fordham, an engineer in the Safeguards Division of the Atomic Energy Authority where he started work in 1955, became dissatisfied with nuclear safety measures. In 1982, he was invited to give a talk at a conference concerning the Sizewell reactor. He refused to allow the Authority to examine the talk, and so did not attend the conference; at the same time, management claimed his work was ineffectual. Feeling that he was being unfairly treated, he retired early.³¹

Ross Hesketh had worked as a nuclear physicist at the Central Electricity Generating Board since 1959. In the early 1980s, he began warning that a proposed sale of plutonium to the United States could lead to nuclear weapons proliferation. Because he used his laboratory address and official notepaper in a letter to *The Times*, he was disciplined by the CEGB.

Later, Hesketh claimed that plutonium from Britain's civil nuclear power plants had been sold to the US for military purposes, contrary to routine government denials of this, (for example, by the CEGB at the then current Sizewell Inquiry). Hesketh claimed that his statements led to months of harassment in his job.

After he appeared making these claims on BBC radio, Hesketh was brought before a committee of inquiry and told to bring his work into line. Soon afterwards, he was told he was being transferred to a new job. Hesketh refused the transfer, seeing it as a demotion and as stemming from his public statements concerning plutonium. After making his views about his transfer known to the media, he was formally found guilty at a disciplinary hearing of breaching CEGB employee regulations.

In June 1983, Hesketh was dismissed by the CEGB, according to them for refusing to accept the transfer,

according to Hesketh because he had embarrassed the nuclear industry through his questioning of official statements about civilian and military uses of nuclear materials.³²⁻³⁵

John Taylor began work in the British nuclear industry as a chemist in 1966. After transferring to the safety area, he wrote reports in 1979 and 1980 about spent fuel storage and about radioactive contamination of workers' clothing. These reports were rejected by British Nuclear Fuels. After threatening to publicly disclose his evidence that workers were being exposed to unnecessary radiation, he was transferred. As a result, he resigned in 1982.³⁶

Canada

"A New Brunswick teacher whose Grade Four students asked an AECL (Atomic Energy of Canada Ltd), public relations man about radioactive wastes was threatened with the loss of his job and harassed by mail accusing him of being 'despicable'." This claim comes from a Canadian book, published by Doubleday in 1980.³⁷

The same source describes an Ottawa medical doctor, who reported to the Minister of Health and the press that radioactive dust had been improperly disposed of on an empty site. It was blowing across city streets, and this constituted a serious health hazard. The President of the Atomic Energy Control Board informed him that a protest was being sent to the Ontario College of Physicians and Surgeons, suggesting disciplinary action be taken for the "unjustified and scurrilous allegations by a person whose professional standing prompts the public to accept as factual such statements."

Federal Republic of Germany

In West Germany in recent decades, there has been increasing use of legal and police systems (such as the *Berufsverbot*) to repress many challenges to the state.³⁸ The strong anti-nuclear power movement has been one target of attack, including massive police mobilisations against anti-nuclear demonstrations. The suppression of anti-nuclear scientists takes place in this wider context of the political vetting of applicants for government jobs, and the political use of criminal law and the police.

Ingo Focke, a Bremen engineer who refused to approve inadequate valves for a nuclear reactor, suspects that his automobile was tampered with to make it dangerous to drive. He knows of other cases of suspected sabotage of vehicles of opponents of nuclear power.³⁹

Hans Walter Krause, a mechanical engineer, refused to sign a petition, put out by the management of the plant where he worked, which declared support for the West German nuclear power programme. As a result, his job responsibilities were curtailed and he was subjected to a smear campaign.⁴⁰

Jens Pommerenke lost his job at the Technical Safety Control Union, which is responsible for safety inspections of nuclear plants, after he attended a demonstration against the proposed Brokdorf nuclear plant.⁴¹ Reprisals, including dismissals and gaol sentences, were taken against many others who joined demonstrations at Brokdorf.⁴²

Jens Scheer, professor of nuclear physics at the University of Bremen, was one of a group of politically

active anti-nuclear scientists at the university in the 1970s. Scheer oriented his department towards a study of interactions between science, technology and society and in May 1975 the department published a book containing critical perspectives on nuclear issues. Scheer also participated in major anti-nuclear protests and used his status and expertise to help the anti-nuclear movement.

In September 1975, Scheer was suspended from his job after allegedly being involved in an incident on campus. The suspension was later overruled in court. More seriously, the university tried to dismiss him from his life appointment, claiming that his membership of the German communist party (KPD) was incompatible with his position.

The attempt to apply *berufsverbot* to Scheer continued until 1980, when the court of Bremen changed his dismissal to a fine, since Scheer's organisation had dissolved itself. Charges of indoctrination and violence were also brought against Scheer, but were not proved. It was widely believed that the continued efforts to sack Scheer stemmed less from his role in the KPD, but from his anti-nuclear protest.⁴³⁻⁴⁵

Klaus Traube was one of the three managers of Interatom, a nuclear development company which is a branch of Siemens. He headed the research team working on the fast breeder reactor project. Traube was not a nuclear critic, but became a victim of the monitoring of potential nuclear dissent. Due to suspicions about links to terrorists, the *Verfassungsschutz* (a secret intelligence agency) watched him, opened his mail, monitored his calls, installed microphones in his home — and found no evidence. Nevertheless the *Verfassungsschutz* were able to pressure Siemens to fire him. As a result of being harassed, Traube became critical of the 'nuclear state'.⁴⁶⁻⁴⁸

India

"The late Professor D D Kosambi, a great mathematician, and a Sanskrit scholar was a senior fellow at the Tata Institute of Fundamental Research from its very inception in 1945," writes Sharma. "In early 1962, he delivered a few lectures advocating greater R&D efforts in solar energy *vis-a-vis* the nuclear technology. Dr H Bhabha was displeased by the criticism and Professor Kosambi's fellowship was terminated without any explanation."⁴⁹

Sharma also reports the case of K S Jayaraman, a PhD in nuclear physics and a leading science journalist with the newsagency Press Trust of India. Jayaraman fearlessly reported in the national monthly *Science Today* (Bombay) on nuclear difficulties in India and was critical of leading figures in the Department of Atomic Energy. After pressure from the nuclear establishment was brought to bear on the chief of the Press Trust, Jayaraman was banned from writing for *Science Today*.⁵⁰

Japan

Atsushi Tsuchida, a physicist, has criticised nuclear power (especially fusion) since the early 1970s. Because he explains the issues very clearly for a lay audience, he is in demand by the mass media and by local governments where potentially dangerous facilities are planned. Tsuchida works at the Institute of Physical and Chemical Research, called Riken. There he has pioneered the new field of 'resource physics' which

analyses human activity from the point of view of flows of energy and materials.

The management of Riken in the 1980s has allegedly harassed Tsuchida in various ways. Tsuchida's contributions have been deleted from Riken's annual report of research, his salary rise was reduced (a severe punishment within Riken), he has been denied official permission to give outside invited lectures, he has been blocked from becoming a member of the Workplace Safety Committee, and he has been ordered to investigate areas outside his speciality.

It is widely believed that these actions are a response to Tsuchida's activity against nuclear and other types of high technology. Indeed this motive has been apparent from comments by Riken directors. Scientists at Riken and elsewhere have passed resolutions and statements protesting against Tsuchida's treatment; citizens have also protested. This seems to have had little impact on Riken, and it is possible that Tsuchida may be sacked in the near future. Tsuchida is seen as a thorn in the side of part of the government which wants to control science and technology to achieve its own style of high economic growth unhampered by outside scrutiny.⁵¹

New Zealand

Like Australia, New Zealand has no nuclear power plants, and hence the power of the nuclear lobby is limited compared with many other countries. Hence it may be no coincidence that the case of Robert Mann, a prominent opponent of nuclear power at the University of Auckland, is similar to the cases of John Coulter and Mark Diesendorf in Australia.

Mann, a senior lecturer in biochemistry, was a founding teacher of the environmental studies programme, and has been a public figure on a range of environmental issues, including nuclear power and nuclear weapons. In 1977, dismissal proceedings were begun against him by the university: no substantive grounds were given. These and later dismissal attempts failed, but alleged harassment (such as cancellation of accumulated leave) continued for many years.⁵²

Soviet Union

The pressures against dissident views on a wide range of issues are extreme within the Soviet Union and most other state socialist countries.⁵³ Andrei Sakharov is the most well known victim of harassment due to his critical views about his government's nuclear weapons policy. However, there are few documented cases of suppression on nuclear issues, for several reasons.

First, most scientists know they must toe the party line to protect their careers. Second, there is no free press to allow publication of critical views, so the potential for whistle-blowing is limited — and so is reporting of suppression cases. Finally, no public debate on nuclear issues is allowed.

The hushing up of the massive 1957 nuclear disaster at Kyshtym shows the power of Soviet censorship.⁵⁴

In the Soviet Union the public is kept in the dark and no anti-nuclear movement is allowed: such movements provide encouragement for nuclear dissidents

The public is kept in the dark and no anti-nuclear movement is allowed to arise. Such movements provide encouragement and support for nuclear dissidents.

Sweden

Hannes Alfvén has described how corporations and government authorities can suppress unwelcome advice from their research workers by direct threats to their jobs, and can suppress university critics by cutting off their grants. He describes the case of the Swedish nuclear power plant at Marviken, in which internal technical advice of a critical nature was suppressed. Alfvén was publicly critical of the project and, as a result, funds to his institution were reduced and he thereafter "felt obliged to leave the country". His account of all this concludes by saying that the plant turned out to be a \$100 million fiasco.⁵⁵

United States

The number of publicised cases of nuclear suppression in the US far outnumbers those in any other country. This is partly because of the size of the US nuclear programme. More importantly, the relative openness of government institutions allows attempts at suppression to be revealed, and fought against, which might never reach the light of day in Britain or Germany not to mention the Soviet Union.

I repeat the warning that, for obvious reasons, I have not been able to pursue a thorough enquiry into all the cases cited here. What is clear, though, is that there are grounds for believing them all to qualify for inclusion in this listing: the many references allow the thorough sceptic to follow up more of the evidence.

Rosalie Bertell, a mathematician and medical worker who has studied the effects of low-level radiation on health, in the early 1970s gave talks and wrote articles about the hazards of radiation. She was grilled by the directors of her employer (Roswell Park Memorial Institute) and later had her funding cut. In 1979, while driving home after a talk, an object was dangerously dropped in front of her car in suspicious circumstances.⁵⁶

Irwin Bross, a scientist who has been outspoken on a range of public health issues, in 1977 published research showing the increased risk of leukaemia in children who were x-rayed in the womb. Bross's work on low-level radiation was threatening to the nuclear industry. Shortly afterwards, the National Cancer Institute reviewed his programme, putting opponents of his work on the review committee. Bross's funds were cut off.⁵⁷⁻⁵⁹

Hugh DeWitt, a theoretical physicist at Lawrence Livermore National Laboratory who has spoken out against the role of the laboratory in the nuclear arms race, had sanctions imposed against him after he testified on behalf of the *Progressive*.⁶⁰

John Gofman, a medical physicist who worked for the Atomic Energy Commission, calculated figures on child deaths from fallout. Because of his rejection of a threshold for the effects of ionising radiation, his work was threatening to the nuclear industry. The Commission pressured Gofman not to publish his figures. After he went ahead, giving talks about the effects of radiation, he was subjected to vicious rumours and had his funding cut.⁶¹⁻⁶⁶

Thomas Mancuso, an epidemiologist at the Universi-

ty of Pittsburgh, in 1965 began a long-term study, funded by the Atomic Energy Commission, of the effects of low-level ionising radiation on the health of workers at the Hanford reprocessing plant. In 1974, an independent researcher, Samuel Milham, reported an increased cancer risk at Hanford.

The AEC asked Mancuso to publish a repudiation of Milham's findings, but Mancuso refused this as premature. This refusal apparently seemed threatening to the AEC. The AEC (by this time called ERDA, later DOE) organised a review of Mancuso's project. Of six reviewers, four were favourable and only one recommended termination (and even in that case transfer to another school of public health). However, the AEC in 1976 recommended termination, citing only the two unfavourable reviews.

The study was transferred to Battelle West, a private contractor, where it was placed under the direction of a former employee of the AEC (the same person who had recommended termination of Mancuso's project). It was only after Congressional investigation that these facts emerged, including the existence of the four favourable reviews.⁶⁷⁻⁷⁰

Karl Z Morgan, a leading expert on the effects of radiation on health and an employee in the Atomic Energy Commission for almost 30 years, prepared a paper for an international symposium in which he mentioned some health hazards of fast breeder reactors. Although they approved the paper, the AEC had 200 copies of it destroyed while Morgan was overseas prior to the symposium. They were replaced by a version deleting all critical references to the fast breeder, without Morgan's knowledge.⁷¹ In 1980, Morgan was dropped from his post at the Georgia Institute of Technology. "Sources close to Morgan claim that his dismissal is most probably linked to his continuing criticism of the nuclear industry."⁷²

Richard Parks, an operations engineer at the Three Mile Island nuclear plant, was suspended from his job the day after he publicly made criticisms of the clean-up there. He went public after his efforts to raise the issues internally had led to harassment, a break-in to his apartment, and threats to his children. A co-worker, Ed Gischel, who also spoke out, was pressured to take a medical examination. Parks' boss, Larry King, who supported Parks, was fired, as was King's secretary Joyce Wenger.⁷³

Robert D Pollard, a nuclear engineer at the Nuclear Regulatory Commission, thought the Commission was compromising reactor safety. After trying to alert his colleagues and superiors, he expressed his concerns on national television. A smear campaign against Pollard ensued, and he resigned from his post. He felt that the Commission suppressed internal dissent by pressures including threats to people's jobs.^{74, 75}

Morris Rosen, chief of the Systems Performance Branch of the Division of Reactor Standards at the Atomic Energy Commission, in 1971 submitted criticisms of reactor safety system standards. In January 1972, he was removed from his post and put in an advisory position.⁷⁶

Arthur Tamplin, a colleague of John Gofman, suffered many difficulties partly (if not mainly) as a result of his own work on deaths from fallout, including losing 12 of his 13 staff.⁷⁷⁻⁸⁰

Robert Thompsett and Robert Veenstra were veterinarians who inspected sheep that died after a Nevada

nuclear test in 1953. Strong pressure by members of the Atomic Energy Commission was applied to them to change their initial opinions, that the deaths were due to fallout.⁸¹

Edward Weiss of the Bureau of Radiological Health produced a study in 1965 showing increased leukaemia rates among people exposed to fallout in Utah. His report was suppressed by the AEC. Internal documents not made public until 1979 showed that the AEC commissioners were worried about the impact of Weiss's findings on the nuclear power programme.^{82,83}

Don Widener in 1971 wrote and produced a critical documentary film about the US nuclear industry. The Pacific Gas and Electric Company, in an attempt to prevent its screening, allegedly falsely claimed that Widener doctored an interview in the film, thereby destroying his career.⁸⁴ This is one example of efforts by the nuclear industry to suppress media criticisms of nuclear power.⁸⁵

Many nuclear scientists and engineers who work for companies in the nuclear industry simply assume that openly criticising nuclear power is not compatible with their employment. Nuclear engineers Dale Bridenbaugh, Richard Hubbard and Gregory Minor resigned from General Electric in 1976 at the same time that they made their initial public criticisms of nuclear power.⁸⁶

I have mainly listed cases of scientists and engineers who have been attacked because their stands have threatened the nuclear industry. There are also numerous cases of other workers in the industry who have been victimised because of their views and actions.⁸⁷⁻⁸⁹ The most well known of these is Karen Silkwood.⁹⁰

What next?

The key 'crime' of those who are victimised is not having critical ideas or doing critical research, but rather taking the critical ideas to the general public. In-house criticism sometimes can be tolerated: involving the public threatens the claimed monopoly of expertise and the control over decision-making by bureaucrats and professionals.

The most common methods of suppression in these cases seem to be cutting off funds (especially in the United States), transferring the dissident to another post or place and, if necessary, dismissal. This does not mean that these are the most prevalent forms of suppression: they just tend to be more visible.

Arguably the most common forms of suppression are blocking of publications, appointments and research funds. These decisions are usually made in secret and are unaccountable. Also important are various forms of petty harassment, which are very difficult to document.

Probably the most important consequence of suppression or the threat of it is the climate of conformity

Neither public perceptions nor private self-respect would allow open admission of suppression: for any organisation to discriminate against a critic is widely recognised as unjust

and fear of controversy found in most scientific organisations. Overt suppression of dissent is seldom required because so few scientists are willing to utilise their 'scientific freedom' to speak out. As Robert Jungk puts it, "It would appear that in the western world the fear of job loss is the equivalent of the eastern world's harsher methods of dissuasion".⁹¹

It is revealing that employers avoid openly admitting to discrimination because of a worker's views on nuclear issues. The official reasons for action (if any are given) are almost always presented in 'legitimate' terms, such as poor work performance. Neither public perceptions nor private self-respect would allow open admission of suppression. For any organisation to discriminate against a critic is widely recognised as unjust.

Finally, it is striking how seldom co-workers support victimised dissidents. To be a dissident is risky, and even to consort with critics can be dangerous to one's career. The courts seldom provide much satisfaction to those who are victimised, precisely because the official reasons are couched in legitimate terms such as transfers and supervisor evaluations. The greatest support for dissidents comes from colleagues around the world, from the anti-nuclear movement and from the media. Fear of adverse media coverage undoubtedly inhibits reprisals against dissidents.

Dhirendra Sharma's experiences appear to fit all these patterns. It is his outspoken criticisms of India's nuclear programmes which have made him the target of suppression. Other science policy researchers have made similar criticisms. Those who are not from India cannot easily be attacked. Furthermore, criticisms which are couched in cautious and esoteric terms in academic journals often have little political impact. Sharma speaks from a prestigious position in the political heart of India, and he speaks clearly and accessibly to a wide audience.

The attack on Sharma has taken the familiar form of a transfer. As is typical, opposition to Sharma's criticisms was not given as the reason for this transfer. Neither was any other reason given. The lack of a 'legitimate' explanation is not uncommon in suppression cases. In Sharma's case, the real reasons appear transparent, and this allows mobilisation of opposition.

Finally, Sharma's case is also typical in that no support from other staff at his university has been forthcoming. He has often been labelled a CIA agent (remember that India has strong foreign policy ties to the Soviet Union), a slur which provides a convenient excuse for left-wing academics in India to avoid taking a stand which might hurt *their* careers. The most effective resistance has been letters to Indian newspapers from eminent figures around the world, including Noam Chomsky and Tony Benn,⁹² and articles in newspapers.⁹³

Sharma initially refused to acquiesce in Jawaharlal Nehru University's transfer of his position. In various letters to the administration, he demanded that university regulations be followed. JNU did not respond to Sharma's letters, but proceeded by charging him with misconduct and stopping his salary while he was doing research in Britain on nuclear and science policy.

In late 1985, Sharma, "under protest", joined the School of Languages. As convenor of the Committee for a Sane Nuclear Policy, he continues to give talks and interviews and write articles about science policy,

especially in the nuclear area. He is organising an independent People's Commission on Atomic Energy.

Those individuals who make public criticisms of powerful political and economic interests provide a valuable public service by promoting public debate on important issues. In the nuclear area, the overwhelming political and economic strength has been on the side of the nuclear industry. In opposition have been a range of grass-roots movements.⁹⁴

Nuclear dissidents play a vital role in puncturing the industry's claim to a near monopoly on expert opinion. For this reason, opposition to nuclear suppression should be a high priority, not only to oppose injustice to individuals but also to maintain public discussion of critical social issues.

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