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INDIA'S NUCLEAR ENCLAVE AND THE PRACTICE OF SECRECY

M. V. Ramana

A secret is an invaluable adjunct of power.

Robertson Davies

Secrecy itself, especially the power of a few "designated" experts to declare some topic off limits, contributes to a political climate in which the nuclear establishment can conduct business as usual, protecting and perpetuating the production of these horror weapons.

Howard Morland

If I may say so, this secrecy is intended to screen the inefficiency, waste and perhaps the shady transactions of the AEC.

N. Sreekantan Nair, Indian Parliament, May 10, 1954

That the nuclear program in India operates secretively should not be a surprise to anyone. It has long been recognized that nuclear weapons pose structural necessities that contradict the spirit of democratic government, largely through the promotion

of secrecy in decision making regarding their production and use. Nuclear weapons complexes around the world have functioned largely in secret. To a lesser extent, the same charge has also been leveled at nuclear energy establishments. All of these factors would therefore suggest that the same is true in India.

In India, however, two additional factors have influenced the scope and practice of secrecy. The first has to do with the inception of the program as one ostensibly devoted only to developing atomic energy for peaceful purposes. The use of nuclear energy for peaceful purposes, however, is strongly linked to its use for defense. Those in charge of the nuclear establishment recognized this connection even as the program was being initiated; indeed, the internal view within the Atomic Energy Commission (AEC) was that its aims were to develop "atomic energy for *all purposes.*" In the face of this inextricable link, the supposed restriction of the applications of atomic energy to peaceful uses while also pursuing weapons capabilities necessarily meant that some aspects of the program had to be closed off from public gaze. This situation has changed slightly with the 1998 nuclear tests and, more recently, the U.S.-India nuclear deal that is being discussed; now some facilities within the nuclear complex have been explicitly marked off as military or strategic. Still, this has not meant that the nuclear establishment has become very open with respect to information about the other "civilian" facilities.

The second factor is the adoption, deliberately or through the vicissitudes of history and circumstance, of "opacity" as the basis of nuclear strategy.[1] In his authoritative study of the nuclear weapons program of Israel, a country that also follows a somewhat similar strategy and is widely believed to possess nuclear weapons though it has never officially declared so, Avner Cohen defines opacity as a "situation in which the existence of a state's nuclear weapons has not been acknowledged by the state's leaders, but in which the evidence for the weapons' existence is strong enough to influence other nations' perceptions and actions."[2]

A natural outcome of an opacity strategy is uncertainty about the qualitative and quantitative extent of nuclear weapons capabilities. If the size, potential or real, of the nuclear arsenal was to be kept secret, then various details about the operations and sizes of many nuclear facilities could not be revealed publicly. This is in contrast to the United States, France, and the United Kingdom, where quite a lot of information is available about the nuclear arsenal and the production complex. Even the Soviet Union, which was otherwise considered quite secretive, was *relatively* open about its nuclear weapons capabilities.

At the same time, many find the notion of a highly secretive enterprise in India counterintuitive. Cultural stereotypes of the country would have us believe that it is hard to keep anything really secret. I remember a conversation in 1997 with an academic and high-ranking member of the Communist Party (Marxist) who assured me that there was no weapons program within the Department of Atomic Energy (DAE), because in no way could such an activity be held secret. Although this might be seen as

an instance of ignorance—after all, there was a burgeoning literature at that time about the Indian nuclear weapons program, especially within the U.S. nonproliferation community—many members of the elite shared this view.

Those who do realize that nuclear matters are held secret also often make it a point to stress that this is an exception. An example is Raj Chengappa, a journalist with close access to various officials, who states in the prologue to his book on the Indian nuclear bomb that "for a garrulous nation the nuclear weapons programme is one secret that India, surprisingly, keeps well."[3]

Within the DAE, there is a sense of having to be careful to avoid public knowledge of the department's activities. Anand Patwardhan's prize-winning documentary, *Jang aur Aman,* for example, records former Atomic Energy Commission (AEC) chairman Raja Ramanna elaborating on how the planners of the 1974 nuclear test took care not to put any decisions on paper so as to avoid leaks. Similar measures were apparently adopted during the 1998 tests as well, and on both occasions only a few select individuals were informed of the decision to test. Despite this concern about maintaining a cover over its activities, the practice of secrecy by the nuclear establishment has been somewhat selective and irregular.

This paper, which looks not only at secrecy in the context of nuclear weapons but also in the arena of nuclear energy, presents in some detail the ways in which the nuclear enclave in India has practiced secrecy and documents instances of this practice in three thematic areas. The first is the intent of the program and its infrastructural components, namely, whether it is intended for making weapons or limited to electricity production. The second is the broad area of the program's safety and impacts on public and occupational health and the environment. The third is the costs associated with different aspects of the program. In each of these areas I detail several cases where the nuclear establishment has tried to conceal its activities, refused to reveal information that should be openly available in the public interest, or indulged in obfuscations of various kinds. The result has been the absence of an open and well-informed debate about the state's nuclear pursuits.

Nuclear Weapons, Nuclear Energy, and the Varieties of Secrecy

As mentioned earlier, one motivation for imposing secrecy on the nuclear program involved its supposed restriction to peaceful applications. The lack of transparency then enabled the quiet effort to cultivate and broaden a nuclear weapons capability. There is also substantial overlap in the facilities and personnel involved in the two pursuits, and the weapons and energy components of the Indian nuclear program can be said to be fungible.[4] For these two reasons alone, confining this paper to just the weapons program would be methodologically indefensible. But even if one were to be able to carve out a program solely aimed at developing nuclear energy, secrecy in such a project is an even greater affront to democratic values and so should be of inherent interest.

This is not to say that no differences exist in the levels of secrecy practiced within the energy and weapons sectors (to the extent that they can be differentiated). Even officials belonging to the nuclear establishment would admit that they do not want to be transparent about activities related to weapons (or "national security," as it is euphemistically termed). Indeed, they often pride themselves on their ability to maintain secrets. For example, the inability of U.S. satellites to detect preparations at the Pokharan test site for the 1998 explosions has been touted as a great success. High-ranking nuclear establishment officials such as R. Chidambaram and Anil Kakodkar, former and current heads of the AEC, take pride in wearing military fatigues to keep up the deception. Of course, the element of seeming resistance to U.S. imperialism also makes such concealment attractive in postcolonial India.[5] Given this backdrop and the opacity strategy described earlier, finding any official information on various aspects of the nuclear weapons program, for example, the extent of India's weapons grade plutonium stockpile, is highly unlikely. This is in contrast to the United States and the United Kingdom, both of which have published official declarations of their weapons plutonium holdings.

While discussing the atomic energy program, on the other hand, the nuclear establishment has maintained that it is open. For example, V. K. Chaturvedi, the former head of the Nuclear Power Corporation (NPC), declared: "There is no secrecy in our nuclear power programme. . . . We are transparent. You go to our site on the Internet and you find all the details about our projects and specification."[6]

There is some truth to this assertion—the NPC website does indeed offer plentiful information about various projects and some operational details, for example, the amounts of electricity produced by different reactors. This information could, inter alia, be used to calculate the approximate amount of plutonium that would be in the spent (irradiated) fuel produced by the reactor.[7] In contrast, the DAE's Web sites and annual reports give no information on the operational levels of the CIRUS or Dhruva plutonium production reactors. However, Chaturvedi is incorrect in claiming that one can find "all the details." The fact is that neither the NPC Web site nor any publications put out by the nuclear establishment provide the numerous pieces of information that are critical to making informed assessments of the economics of nuclear facilities, their environmental and public health impacts, or their potential for serious accidents.

The differences in secrecy practices between the energy and weapons sectors point up the multiple meanings that the term "secrecy" encompasses and the assorted methods that could be classified as secretive.[8] Secrecy about the nuclear weapons arsenal, for example, refers to denial of information. As we shall see later on, such denial also occurs in the case of ostensibly civilian nuclear facilities.[9] When civilian facilities are used to further the nuclear weapons program, however, "concealment" or "camouflage" better describe what is practiced than denial of information. Finally, a range of actions are practiced that are tantamount to secrecy, including publishing information in obscure documents and making them inaccessible to the public,

resorting to technical jargon in answering direct questions, and utilizing poor or confusing accounting practices.

Enabling Factors

Before turning to the actual practice of secrecy, I first describe some, though perhaps not all, of the factors that enable its practice and effectiveness. These include typical bureaucratic habits, structural characteristics peculiar to the nuclear establishment, the relatively esoteric nature of the subject and paucity of independent expertise, the prestigious status of the nuclear enterprise among the public at large, and the failure of the media to play a sufficiently critical role.

The first enabling factor is that Indian bureaucracies and institutions generally lack accountability. Despite the adoption of a Right to Information (RTI) bill in 2005, it is difficult to obtain information on a range of projects and programs, whether road construction, defense procurement, or the public distribution system for foodstuffs. The nuclear establishment also suffers from (or enjoys, depending on one's perspective) a similar lack of accountability, but it goes further. While one can resort to the use of "influence" to get, say, one's birth certificate, even relatively senior politicians often cannot obtain information about nuclear matters.

As the well-known politician Jayanthi Natarajan despaired publicly:

> I have been a Member of the Parliamentary Consultative Committee for Defence and Atomic Energy, and have tried time and again to raise issues relating to public safety, both at Parliamentary Committee hearings, and in the Rajya Sabha, and have achieved precious little for my pains. Since I was an MP [Member of Parliament] at the time, and a pretty aggressive one, I had to be dealt with. But they simply drowned me with totally obscure and incomprehensible scientific terms and explanations, which sounded impressive, and meant nothing. The rest was simply not forthcoming because they claimed it was "classified." I have repeatedly raised the issue of the hazards of radiation leaks, safety procedures, and environmental contamination that might flow from the atomic power station at Kalpakkam, but have always received the bland and meaningless reply that the radiation was "within acceptable limits."[10]

The second factor is the structure of the atomic establishment and the constraints this structure poses on external oversight. Unlike most policy matters where the cabinet has the ultimate authority, the agency in charge of nuclear affairs is the AEC, which was constituted under a special act of parliament. The AEC is composed primarily of scientists and dominated by the top leaders of the DAE. The DAE was set up in 1954 under the direct charge of the prime minister, a decision that is largely the result of the close relationship between Homi Bhabha, the architect of the nuclear program, and Jawaharlal Nehru, who offered almost unstinting support for the nuclear program and allowed strong secrecy clauses in the Atomic Energy Act.

When the bill enabling the creation of the AEC was introduced at the Constituent Assembly in early 1948, Nehru gave two reasons for the imposition of secrecy, both somewhat disingenuous: "The advantage of our research would go to others before we even reaped it, and secondly it would become impossible for us to cooperate with any country which is prepared to cooperate with us in this matter, because it will not be prepared for the results of researches to become public."[11] In response to one member of the assembly pointing out how, in the British act, secrecy is restricted only to defense purposes and demanding to know if in the Indian case secrecy was insisted upon even for research for peaceful purposes, Nehru publicly admitted: "I do not know how to distinguish the two [peaceful and defense purposes]." Nevertheless, Nehru allowed the nuclear establishment to operate without oversight and to decide by itself on the contours of its program.

Nehru's complicity did not stop with just setting up the atomic establishment in this fashion. He continued to support the AEC's secretive functioning even after several politicians and policy makers were troubled by it. In a revealing 1952 letter to his minister of finance, who had expressed concern about the high costs of the AEC, particularly when it provided so little information to justify its need for money, Nehru said explicitly, though disingenuously, "The work of the AEC is shrouded in secrecy. I try to keep in touch with it and get reports from time to time. . . . I do not know how else we can proceed in this matter."[12]

This structure makes it difficult for most politicians or bureaucrats, let alone commoners, to challenge the DAE's policies or practices. The DAE thus exemplifies Max Weber's observations about bureaucracies: "Bureaucratic administration always tends to be an administration of 'secret sessions': in so far as it can, it hides its knowledge and action from criticism. . . . In facing a parliament, the bureaucracy, out of a sure power instinct, fights every attempt of the parliament to gain knowledge."[13] The esoteric nature of nuclear science and technology, coupled with the connection to national security, has permitted the DAE to be more successful at this pursuit of secrecy than most bureaucracies.

An example of the DAE fighting an attempt by parliament to regulate the department is its struggle with the parliamentary Committee on Public Accounts, as well as the Comptroller and Auditor General (CAG), whose function is to enhance accountability of various public-sector organizations and departments to the parliament and state legislatures. The dispute stemmed from the CAG trying to estimate the cost of heavy water production at the DAE's facilities and producing a figure about three times the cost estimated by the DAE. When questioned about this discrepancy, the DAE was unable to provide any calculations to substantiate its figure. The parliamentary committee considered this "another instance of lack of proper accounting procedure which in turn is due to their disregard of accountability on their part. The Committee strongly deprecate such attitude." In its response, the DAE stated: "Heavy Water being strategic material, it is not advisable to divulge information relating to its production

and cost to functionaries at all levels." The committee did not agree and maintained that "as already recommended proforma accounts will have to be compiled. . . . [T]he Committee do not understand how preparation thereof will result in release of any sensitive data. The Committee consider such claim as a way of evading accountability by escaping scrutiny of audit and this Committee under the guise of sensitivity, public interest etc." More than a year after the Public Accounts Committee tabled its report at parliament, the CAG complained: "The proforma accounts of Heavy Water Pool Management for the years 1982–83 onwards have not been sent for audit so far despite this fact being mentioned in successive Reports of the Comptroller and Auditor General of India: Union Government (Scientific Departments) since 1987."[14]

In August 1998, finally, the Heavy Water Board "made available the pro-forma accounts for the period 1993–94 to 1996–97 . . . for audit certification." But what the CAG found, perhaps not surprisingly, was "that the cost of production of heavy water had been reckoned at a rate lower than the actual cost . . . As a result, the pool prices of heavy water notified by DAE during 1993–98 on provisional basis were less by Rs. 409 to Rs. 2168 per kg than the actual pool charges derived from the certified pro-forma accounts, except for the year 1993–94, where it was slightly higher."[15]

A third factor supporting secrecy is the legal structure. Two acts are particularly relevant: the 1962 Atomic Energy Act and the Official Secrets Act. The first act has been widely written about in the literature on the Indian nuclear program; essentially it empowers the DAE to restrict practically any information related to atomic energy. The latter posits strong prohibitions against the "misuse" of official information regarding facilities relating to the military establishment or electricity "works," especially with "foreign agents."[16] Both acts have been used only rarely, but this is largely because few occasions have occurred where the DAE was put in a position where it could have been forced to reveal information that it would have preferred not to. On those occasions the DAE invoked the Atomic Energy Act to refuse to divulge potentially embarrassing information. The judiciary has also often interpreted these laws in favor of secrecy rather than the people's right to know. More on this below.

The DAE has also used the legal structure on occasion to subject those who have exposed its technical and safety failures to harsh punishment. A tragic example involved B. K. Subbarao, a naval officer who was appointed to work on the secret nuclear submarine program. Subbarao challenged the designs produced by DAE scientists for the submarine's nuclear reactor on technical grounds, leading to the rejection of these designs.[17] In 1988 he was arrested in the Bombay airport en route to the U.S. and charged under the Official Secrets Act and the Atomic Energy Act with trying to smuggle secret documents out of the country.[18] All he was carrying with him was his Ph.D. thesis and related papers. Subbarao was imprisoned for five years and denied bail. After a prolonged legal battle, he was acquitted by the Supreme Court and awarded Rs. 25,000 as "costs for his mental suffering and financial loss." Those behind his prosecution went unpunished.

Not only has the DAE used existing laws to shield itself from adverse criticism, it has also tried to further strengthen some of the provisions to allow for harsher punishments. In 1992 journalist Rupa Chinai disclosed in an article in the Bombay newspaper *The Sunday Observer* that there had been a major radioactive leak at the Bhabha Atomic Research Centre.[19] The DAE's reaction to the article was to try to "amend the 1962 act to increase punishment for unauthorized disclosure to 5 years rigorous imprisonment instead of 3 earlier and to allow them to prosecute without first seeking the solicitor general's approval."[20]

Another enabling factor is the near absence of independent sources of expertise on nuclear matters outside the DAE. This paucity of knowledge outside the nuclear establishment about various aspects of science and technology involved acts that are, in effect, a source of secrecy in two ways: certain facts do not come out in public because no one has asked the right questions, and the establishment can escape responsibility for scientific and technical obfuscations, whether deliberate or inadvertent.

A notable instance where the DAE's assertions were challenged on technical grounds was the 1998 nuclear tests, though the challenge came from experts outside India. The DAE claimed that the total explosive yield from the tests of May 11, 1998, was about 60 kilotons. However, based on seismic signals detected around the world, international seismologists suggested that the total yield was only 16–30 kilotons. Similarly, the DAE's claims about the tests of May 13 were also disputed. Faced with such technical criticism, the DAE had to enter the debate and write a number of papers arguing for its version of the yields. Many of these papers suffered from serious scientific flaws.[21] For example, one paper about the yield of the May 13 nuclear test contained graphs with no units or markings on the axes.[22]

Even if one were to reject the yield estimates of the international seismologists, the DAE's estimates were based on inconsistencies. In particular, the DAE's estimate of about 60 kilotons assumed that the yield of the 1974 test, conducted at the same location, was 13 kilotons. Ever since 1975, the DAE had maintained that the yield of that test was 12 kilotons.[23] Without that difference of 1 kiloton, the 1998 yield estimates would be lower by about 5 kilotons, even by the DAE's own methodology.

Despite numerous scientific papers on the subject, no one in the media or even the antinuclear movement (barring a few exceptions) caught on to the debate or its implications. Some in the antinuclear movement were concerned that questioning the success of the 1998 tests might lead to renewed pressure from bomb designers to conduct further tests. However, this resulted in a wasted opportunity to question the basic technical competence of the nuclear establishment and its habit of making unscientific and wrong claims.

Incompetence in the nuclear establishment has also been displayed on matters concerning the environment and health. Two papers, for example, state how much gaseous Argon-41 was released from the Madras Atomic Power Station in 1990; however, the numbers in the papers are not the same and differ by 37.5 percent. What makes

this inexplicable is that both papers were co-authored by the same scientist, M. A. R. Iyengar.[24] Nuclear establishments elsewhere—in the United States, for example—have also been incompetent when it comes to environmental and health concerns.

The general lack of expertise in nuclear matters among laypersons has reinforced the effectiveness of DAE's secrecy practices. Many, even those who may have an anti-nuclear bent, have assumed that they are incapable of analyzing nuclear policy issues. By and large, therefore, the implications of even the limited amount of information available on economics, safety, environmental impacts, or occupational and public health effects have not been analyzed thoroughly. This also reflects on the inability of the antinuclear movement in India to attract technically trained people into its ranks and have them *use their technical expertise* to critique the nuclear program.[25] This is quite unlike the United States, where one criticism of the antinuclear movement has been its excessive focus on technical critique.

If and when anyone challenges the DAE's expertise or competence, the typical response has been to brand that person or persons as anti-national and desiring to undermine India's capabilities in a highly technical field. In 1984, the journalist Praful Bidwai, one of the few journalists with some knowledge of nuclear technology, wrote a series of five articles in the *Times of India* pointing out how poorly the DAE's heavy water production facilities were functioning. In response Raja Ramanna, chairman of the AEC at the time, protested to the prime minister and convened a press conference where he publicly branded Bidwai as unpatriotic and said that the publication of the articles was a waste of newsprint.[26]

Such accusations equating criticism of the nuclear program to anti-national attitudes resonate powerfully among India's postcolonial middle classes and elite. These classes have long had a high regard for the nuclear program, thanks in part to systematic propaganda by the DAE and the Indian state extolling the virtues of atomic energy. With the 1974 test at Pokharan, these sentiments became even more pronounced and criticism even more undesirable. As the Indian Institute of Public Opinion pointed out in 1978, "Ever since Pokharan, nuclear energy has become an issue of national prestige . . . [and] a symbol of the technology and scientific advance we are seeking and which we believe are capable of achieving."[27]

The effectiveness of secrecy is enhanced by the practical difficulties even in obtaining information that is in principle available to the public. I once participated in a collaborative study of the economics of the DAE's heavy water reactors using the Discounted Cash Flow method of accounting which required not just the total cost of the reactor, information widely available, including on the NPC Web site, but also the year-by-year breakdown of this cost.[28] Despite numerous e-mails and a personal visit, the NPC did not give us this information. At least when I visited the NPC office, the NPC's spokesperson did not refuse to give me the information but said instead that he did not have the information on him but he would get back to me soon with the details. That never happened. Ultimately I managed to obtain a copy of the DAE's

Performance Budget that had the required information. Thus, it was not that the information we were seeking was not available in the public domain but that the agency responsible refused to supply it. Such practices allow the DAE (or those who support it) to assert that the organization is not secretive and yet know that there is little chance anyone will obtain information that potentially could embarrass the DAE.

Still another factor supporting the secrecy regime is that the media generally supports the nuclear establishment and has largely avoided offering critical perspectives on nuclear issues.[29] Most articles about nuclear programs are based either on press releases issued by the DAE or on interviews with officials in the nuclear establishment. Some journalists, and the newspapers or magazines they write for, act as mouthpieces for the nuclear establishment. They are rewarded in various ways. One such journalist reportedly was given a contract by the NPC to "educate" other journalists about the many advantages of the Koodankulam project and to allay the safety concerns expressed by many. The DAE and the different organizations affiliated with it also publish their own propaganda magazines, for example, *Nuclear India* and *Nu-Power,* and a host of glossy pamphlets extolling their many achievements.

The media has been criticized often for reporting failures of the nuclear establishment. When journalists reported a leak at the Tarapur nuclear reactor on March 14, 1980, for example, the DAE secretary Homi Sethna went into "a tirade against the press" describing "reporters as 'irresponsible,' 'self-styled experts' writing about things on which they lack even 'elementary knowledge.'"[30] Often journalists who ask uncomfortable questions are ostracized by the DAE. Gopi Rethinaraj, who had a masters degree in physics and could understand relatively technical material, read a report on heavy water and found a passing reference to the extraction of tritium from irradiated heavy water in Indian reactors. He rightly recognized the importance of tritium for thermonuclear weapons and wrote about it in an international defense journal.[31] Soon after, Rethinaraj was no longer allowed into the DAE's press conferences,[32] which effectively banned him from the "nuclear beat." He ultimately quit journalism and pursued a Ph.D. in the U.S.

Barring such exceptions, the media lacks the expertise to evaluate the claims of the establishment; few newspapers and magazines seek counter views. At the same time the relative freedom of the media in India and the media's desire for newsworthiness has led on occasion to investigative journalism and exposés. However, this is often owing to a proclivity for sensationalism rather than principled commitment to transparency and democracy.

Even scientific journals are uncritical of the DAE. For example, *Current Science,* which publicized estimates of the yields by DAE scientists, refused to publish a paper by this author calculating the number of casualties that would result from the explosion of an atomic bomb over Bombay.[33] Probably the best sources of reliable information about the DAE are international nuclear trade magazines such as *Nuclear Fuel* and

Nucleonics Week. Correspondents who write for these magazines are more conversant with the technicalities of nuclear reactors and other facilities, and seem to have easier access to DAE officials as representatives of international media.

For all these reasons, the nuclear establishment has successfully managed to control the information available about the nuclear program and thereby stifle, if not altogether eliminate, criticism of its activities. The following sections elaborate the ways in which this has been done.

Secrecy and the Intent of the Program

A substantial literature now exists which demonstrates that, although India's nuclear program was ostensibly for peaceful purposes, the weapons option was consciously kept open.[34] Nevertheless, the facade of only pursuing peaceful uses of nuclear energy pervaded for decades. One way of maintaining this pretence was by not revealing the true nature of many of the activities being carried out.

An early aim of the DAE program was to acquire the capability to chemically process ("reprocess") irradiated nuclear fuel to extract plutonium, which could be used to make nuclear weapons. However, the only reason publicly acknowledged was its use in breeder reactors, which produce more fissile material than they consume.[35] Although this was technically true, for the DAE to produce plutonium in the quantities required for breeder reactors, the department would first have to set up several uranium-based reactors.[36] At the time when the reprocessing plant was established, there was no such reactor in the country; not had a single unit of nuclear electricity been produced. The true nature of the DAE's priorities for plutonium may be inferred from the fact that the first nuclear explosion conducted by the DAE was in 1974, whereas the first breeder reactor reached criticality only in 1985.

Nevertheless, with the breeder reactor program officially endorsed, the DAE could comfortably proceed and publicly announce the construction of the Trombay reprocessing plant along with the inevitable listing: "only four other countries [have] operating plutonium plants—France, the UK, the USA, the USSR." In contrast, Israel, which at that time was also acquiring the technology to reprocess spent fuel from France but had no interest in breeder reactors, was completely silent about this. As Avner Cohen observes, "the most sensitive and secret aspect of the agreement [with France] was the reprocessing plant, to which there was no reference in the official documents."[37]

The DAE's effort to create the wherewithal to produce nuclear weapons required that the plutonium obtained through reprocessing at Trombay be free of international safeguards, that is, measures to ensure that material was not diverted from nuclear energy production to weapons. This meant not only that the indigenously constructed (though based on blueprints obtained from the U.S.) Trombay plant had to be

un-safeguarded, but so, too, did the reactor where the fuel was irradiated prior to reprocessing. This reactor was CIRUS, a gift by Canada under the Colombo plan that was based on the same design as the NRX reactor at Chalk River in Canada.

Some Canadian diplomats and scientists realized that CIRUS could lead to India acquiring weapons-useable plutonium. The NRX reactor was an efficient producer of plutonium because of its high neutron economy. Nevertheless, the initiative went through because it was assumed that India would be able to acquire a reactor from some other source. Despite consistent efforts on the Canadians' part, the DAE adamantly refused to accept any kind of voluntary controls or safeguards on the spent fuel produced that would have precluded the use of plutonium produced in CIRUS for nuclear weapons.[38]

Publicly the refusal was justified by a leap of logic, namely, that the imposition of safeguards would disallow plutonium acquisition, essential for the breeder program. This was simply wrong. There is no a priori reason why the imposition of safeguards would prevent the development of a breeder program. For example, the Japanese breeder program runs fully under international safeguards. But with practically no one in the country outside of the nuclear establishment familiar with technology, questions about the proffered excuse were never raised.

Unlike reprocessing, no such publicity accompanied the establishment of groups studying various aspects of nuclear explosions and acquiring the technology needed to conduct such explosions. For example, in 1960 Bhabha sent Vasudev Iya, a young chemist, to French laboratories to absorb as much as possible about polonium, a chemical element used to trigger a nuclear explosion.[39] Two years later Bhabha set up a small group to study the physics of the materials under the high pressures experienced during a nuclear explosion. With Prime Minister Lal Bahadur Shastri endorsing the idea of studying peaceful nuclear explosions (PNEs), this group grew in strength.[40] But none of this was known publicly. Once set up, the group then acquired momentum and continued working even after Vikram Sarabhai took over after Bhabha's death and called off the PNE program. (The pro-weapons group was, in effect, engaged in an act of revolt within the nuclear establishment.)

The existence of groups working on various aspects of nuclear weapons design and manufacture was revealed at the time of the 1974 test. In an impressive demonstration of the DAE's abilities to maintain secrets, these groups continued to remain active and develop new nuclear weapons designs with no public knowledge of these activities. Many seemed to assume that these groups were quiescent. The conversation mentioned earlier with the senior CPM member is an example.

This is all the more remarkable because of the DAE's and the government's intense effort to reassure international and domestic audiences that the 1974 test was indeed a PNE and that the nuclear program remained peaceful in character. In fact, one prime minister, Morarji Desai, in office between 1977 and 1979, was strongly opposed to nuclear weapons. Still, the DAE managed to keep its weapons program going.

Secrecy in Safety and Health

The possibility of catastrophic accidents and radiation-related damage to health has always been an important consideration in the public's acceptance of nuclear power. This consideration has become even more salient after Chernobyl.[41] Not surprisingly, therefore, nuclear establishments have played down the possibility of such accidents. Similarly, they have also been anxious to persuade the public that radioactive materials from nuclear fuel-cycle facilities have not damaged anyone's health.

Indian officials are no exception to these tendencies. For example, following the Tokaimura accident in Japan, India's AEC chairman claimed that there was no possibility of any nuclear accident in India because the DAE had a track record of "150 reactor years of safe operation."[42] Likewise, A. N. Mullick, who served as UCIL's chief medical officer for twenty-five years reportedly said: "I have not come across any radiation-related ailments during my entire career."[43]

Yet practically all nuclear reactors in India have had accidents of varying severity. As a result of several such accidents, in 1995 the Atomic Energy Regulatory Board (AERB), which oversees the safe running of all civilian nuclear facilities in the country, initiated an evaluation of the safety status of all nuclear installations. The resulting report identified 134 safety issues, of which about 95 were considered "top priority." That many of these problems had been identified in earlier DAE evaluations in 1979 and 1987 as items requiring "urgent action" but had not been addressed reveals the low priority that the DAE placed on safety. Not surprisingly, the DAE kept the AERB report a secret.

When news of the report came out, the People's Union for Civil Liberties (PUCL) filed a public interest petition in the Bombay High Court calling for the AERB report to be made public. The Sarvodaya Mandal, a Gandhian organization in Mumbai, also filed a supporting petition. Their primary argument was that safety dangers in nuclear plants constituted a challenge to people's "right to life" and that the people also had the "right to know."

In response, R. Chidambaram, then head of the DAE, filed an affidavit which said:

> I say that the aforesaid document, prepared by the Atomic Energy Regulatory Board in November 1995 which, among others, is a subject matter of this petition, is a document classified as Secret as it pertains to the nuclear installations in the country which include several sensitive facilities, carrying out activities of a highly classified nature, under the enabling provisions of the Atomic Energy Act, 1962.[44]

Chidambaram also invoked the provisions of Section 5 of the Official Secrets Act, 1923, and Section 18 of the Atomic Energy Act and stated, "I am the appropriate authority empowered to act on behalf of the Central government for the purpose of Section 18 of the Atomic Energy Act."[45]

Chidambaram's affidavit went much further:

> In the event of this hon'ble court holding that the plea of privilege is required to be taken even in a case of a document in respect of which an order has been issued under Section 18 of the Atomic Energy Act, I hereby claim privilege in respect of this particular document, viz. "Safety Issues in DAE Installations," in view of the fact that the government of India is apprehensive of the possible repercussions of the public disclosure of the said document on matters concerning national security. Privilege over the said official document is, therefore, claimed under the enabling provisions of Sections 123 and 124 of the Indian Evidence Act, 1872. I say that I have gone through the document personally and have given my careful attention to the said aspects before claiming privilege. I respectfully say and submit to this Hon'ble Court that if this document (which was submitted to the Atomic Energy Commission and is classified as SECRET) is required to be published, then it will cause irreparable injury to the interests of the State and will be prejudicial to national security.[46]

Chidambaram's affidavit was accompanied by six other massive affidavits and two sur-rejoinders from the senior officials of the nuclear establishment. Every affidavit, in effect, assured the Bombay High Court that all was well in the DAE's nuclear reactors. As B. K. Subbarao, the lawyer who represented PUCL and, as mentioned earlier, a trained nuclear engineer himself, noted: "To assure nuclear safety through affidavits is a unique invention of our nuclear establishment."[47]

On the basis of the affidavits submitted by the nuclear establishment, the Bombay High Court dismissed the petition from PUCL and the Sarvodaya Mandal. The two citizens groups then appealed to the Supreme Court. A. Gopalakrishnan, who headed the AERB when the 1995 report was prepared, was also a petitioner. He contended that "serious nuclear accidents" could take place at some facilities.

In January 2004 the Supreme Court rejected the appeal and ruled that information relating to nuclear installations could not be made public. Rather than view the case as "an opportunity to decide what was required for [the] protection of human health and environment," the Court restricted itself "only to the issue of confidentiality vis-à-vis right to information."[48] As justification for its decision, the Court said that the citizen's fundamental right to information was subject to restrictions in the interest of national security and the only test was "how reasonable" the restriction imposed by *the government of the day*.[49]

The Court took the extreme view that, although the government had supplied the court with sealed copies of the 1995 AERB Report and Attorney-General Soli Sorabjee, who represented the government and the DAE, had offered to read the report, the Bench noted, "We do not think it appropriate to open the seal and read the same."[50] Sorabjee claimed that the AERB report would reveal to "enemies" data containing "inventories, spent fuel, waste, etc., facilitating the calculation of the country's nuclear programme potential." Its contents, therefore, should not be revealed even in the name of "fundamental right to information."[51] The Court appears to have essentially accepted this line of reasoning without scrutinizing these contentions.

Two ironies underlie this decision. First, knowledge of the deficiencies listed in the 1995 report would not reveal the "nuclear programme potential"; the nuclear program *potential* depends essentially on just the broad design features of the reactors discussed in the AERB report. These details are publicly available at a number of places including the Internet sites of the DAE and the Nuclear Power Corporation (NPC) or assorted publicity material published by the nuclear establishment. Thus, if the Court were to be truly concerned about enemies spying on the country's nuclear potential, it would have to order these agencies to censor themselves.

More to the point, there is little technical basis for classifying the potential problems listed in the AERB report. Examples of problems identified by the AERB as likely to lead to serious accidents appear in Gopalakrishnan's various articles in magazines and journals. These include serious deficiencies in the emergency core cooling systems in some of the operating power reactors, and cracking or structural weakening of certain system components or internals needing repairs or replacement. Other problems involved the reactor instrumentation and protection systems, which had degraded the reliability and safety of the reactors. None of these is related in any way to the nuclear weapons potential of these facilities. Knowledge of these foreseeable problems, however, is likely to cause greater public concern about these facilities; hence the DAE's reluctance to make the information public.

The second irony is that many of the problems listed in the 1995 report appear to have been remedied in subsequent years. In 2002 Gopalakrishnan himself attested that "according to a recent communication from AERB Secretary K. S. Parthasarathy . . . 119 out of the 134 safety issues are reported to have been completely resolved. The AERB communication does not, however, state which of the high-priority issues are still among the unattended ones, nor does it clarify any details of the already resolved issues."[52] The DAE did not, however, use the Supreme Court case to publicize its efforts to address safety problems.

Though the DAE has argued that nuclear accidents are not possible in India, it has also prepared emergency plans for dealing with such accidents. Such plans are typically justified as "a measure of abundant caution" by DAE personnel.[53] But again, typically, the DAE has made these emergency plans inaccessible to the public, who should be the real audience for these plans. Apart from the culture of secrecy and arrogance characteristic of the nuclear establishment, there are two other plausible reasons for this: first, publicizing such plans would make people realize that nuclear reactors and other fuel-cycle facilities are hazardous; and, second, examination of these plans by those outside the bureaucracy would reveal that they would not work.[54]

Consider, for example, what occurred when the emergency plan for the Kakrapar reactors in Gujarat was accidentally revealed. The Kakrapar reactor is located on the banks of a river that has only one bridge across it in the vicinity of the reactor. The plan, which required all evacuees in the event of an accident to cross this single bridge, was a sure recipe for a major traffic bottleneck. The plan also absurdly required people

in villages and towns farther up the river to come *toward* the reactor first, cross the bridge, and then move away from the reactor. Finally, several of the facilities such as schools that were assigned as temporary shelters were grossly inadequate for the likely number of people to be housed there.

The DAE has also made efforts to curb public discussion of safety in its nuclear reactors. In 1985, for example, Max Mueller Bhavan of Bombay had organized a seminar on nuclear safety in Germany and India. Five days before the event, the seminar was cancelled at the instruction of the External Affairs Ministry, acting on the behest of the DAE.[55]

A widespread concern about nuclear power and weapons facilities is that these produce high-level waste that remains radioactive for tens of thousands of years. While the public has generally been concerned about these wastes and their impact on the environment and health, nuclear establishments have portrayed the problem of waste disposal as nonexistent or at most a minor, largely solved, concern. The DAE has even expressed the view that highly radioactive spent fuel should not be considered waste, that "it is a resource to extract plutonium."[56]

Once having decided that radioactive waste is not a problem, it is not surprising that the DAE has neither announced how much waste has been or is being produced and where it will eventually be disposed. Further, when discussing waste quantities, many DAE papers typically use figures from the Western literature, which are derived for Light Water Reactors (LWRs) rather than the heavy water reactors the DAE uses—yet another display of scientific and technical incompetence.

The DAE's efforts at trying to identify a site for geological waste disposal are also shrouded in secrecy. In March 1997 the inhabitants of Sanawada village near Pokhran were told that the Minerals Exploration Corporation Ltd. (MECL) was digging for precious stones. It was later discovered, accidentally, that the drilling was being done by the BARC and that Sanawada was being considered as storage location for nuclear waste. Apparently even the chief minister of Rajasthan did not know of these plans. Thanks to a campaign by antinuclear activists, the BARC stopped drilling. Shortly afterward, BARC director Anil Kakodkar maintained that a final decision had not been taken and that India was still "several decades away from the necessity of having such a site."[57] The DAE's plans for disposing of high-level waste are still secret.

Secrecy and Costs

The costs associated with the nuclear program are important for two reasons. First, unlike many other countries, the elite debate in India over the acquisition of nuclear weapons has focused at great length on the costs it would impose on the economy.[58] Opponents of the bomb typically claimed that these costs would be significant, perhaps prohibitive, for a developing country like India. In return, nuclear weapons advocates argued that they were cheap and affordable. Prominent among the latter

was Homi Bhabha. On October 24, 1964, for example, in a broadcast on the state-run All India Radio (AIR), Bhabha quoted a paper published by the Lawrence Radiation Laboratory in Livermore, California, to assert that a 10 kiloton (kT) bomb would cost only U.S.$350,000 or Rs.17.5 lakhs. Based on these figures, he claimed that "a stockpile of fifty atomic bombs would cost under Rs.10 crores and a stockpile of fifty-two-megaton hydrogen bombs something of the order of Rs.15 crores" and argued that this was "small compared with the military budgets of many countries."[59] This pattern of debating the cost of a nuclear arsenal and its economical significance has persisted. Secrecy about the economic costs associated with the different components of the nuclear program has made this debate baseless.

Second, as generally understood at the time it was set up, the DAE's primary task was to provide cheap nuclear electricity. As early as 1958, barely a few years after the DAE was established, Homi Bhabha, the chief architect of the program, projected "the contribution of atomic energy to the power production in India during the *next 10 to 15 years*" and concluded that "the costs of [nuclear] power [would] compare *very favourably* with the cost of power from conventional sources in many areas."[60] The "many areas" referred to regions that were remote from coalfields. This projection was not fulfilled. In the 1980s the DAE stated that the cost of nuclear power "compares quite favourably with coal fired stations located 800 km away from the pithead and in the 1990s would be even cheaper than coal fired stations at pithead."[61] This projection, too, was not fulfilled.

A Nuclear Power Corporation (NPC) internal study from the late 1990s came to the less optimistic conclusion that the "cost of nuclear electricity generation in India remains competitive with thermal [electricity] for plants located about 1,200 km away from coal pit head, when full credit is given to long term operating cost especially in respect of fuel prices." This seems to be the DAE's most comprehensive study so far, at least on the basis of the summary of this study that is available on the Nuclear Power Corporation's Internet site.[62] However, when asked for a copy of the full study, the Nuclear Power Corporation's spokesperson maintained that it was not available to the public. Thus, we cannot know the methodology used or the assumptions made in any great detail. Many of the assumptions listed in the publicly available summary—for example, about the capital cost of reactors—do not hold up to scrutiny. Our independent comparison of the costs of electricity from nuclear reactors and thermal plants showed that nuclear electricity would be cheaper only under unrealistic circumstances.[63]

Despite the importance of the economics in the nuclear weapons debate, it is difficult if not impossible to examine the costs of the weapons program for a number of reasons. First, even government bureaucracies like the Comptroller and Auditor General (CAG) and the Ministry of Statistics and Programme Implementation, whose function is to monitor expenditures and criticize cost overruns, do not seem to have access to expenses relating to weapons facilities. Second, the overlap between the two

programs and the use of the same facilities for both purposes means that expenditures on the weapons program can be passed off as part of the energy program. Finally, in the case of most nuclear fuel-cycle facilities (with the exception of reactors, whose electricity generation is publicly known), the level of performance is never revealed. The DAE Annual Performance Budgets list, for example, the annual electricity production at various reactors; conspicuously absent, however, are any numbers for heavy water production or the throughputs of reprocessing plants. The DAE has claimed that because of its strategic value, it would not disclose production levels of heavy water.

Technically there is nothing more strategic about heavy water than, say, coal. The only way that heavy water could be seen as having a strategic implication is if the reactors in the country involved in plutonium production were facing a shortage of heavy water and therefore could either not be commissioned or function efficiently. In such a circumstance, if people know that there is a shortage of heavy water, they could conclude that the country's stockpile of weapons-usable plutonium is smaller than estimates based purely on reactor size. In other words, the strategic value of heavy water is generated only by the DAE's difficulties at producing adequate quantities of it.

The same excuse of having strategic value has also allowed the DAE to explain away cost overruns. For example, in the case of the Manuguru Heavy Water Plant, the CAG found that the cost of the facility had increased by 133 percent; when questioned about the cost escalation, the DAE stated that "the grounds for sanction of this project was strategic and not commercial."[64]

Finally, referring back to the earlier discussion about different forms of secrecy, the DAE is not being secretive by refusing to reveal the cost of making, say, a single bomb. In all likelihood, the DAE has never engaged in a rigorous calculation of this cost and so does not even know the true answer to that question. Secrecy in this context is an effect of the DAE not revealing the costs of specific facilities, for example, the one involved in plutonium metallurgy, or the performance figures for many more facilities, for example, reprocessing plants. This has made it impossible for anyone to calculate the costs of weapons production with any confidence.

Secrecy: Selectiveness and Irrelevance

Nuclear reactors, according to Langdon Winner, "require authoritarian management and extremely tight security. It is one of those structures, increasingly common in modern society, whose hazards and vulnerability require them to be well policed. What that means, of course, is that insofar as we have to live with nuclear power, we ourselves become increasingly well policed."[65] In some ways the nuclear establishment fits this description.

In other ways, however, the practice of secrecy by the nuclear establishment has been quite uneven. In a stereotypically Indian fashion, the DAE has not followed or implemented the rules it has itself set. An illustration is the rule that nuclear reactors

must have an exclusion zone, a circle of radius 1.6 km around the facility where the public is not allowed.[66] But if one were to look closely at the fence that cordons off this area around one of DAE's reactors, one might well discover a hole that some enterprising local inhabitant has cut. Through this hole, goatherds routinely take their animals into the exclusion zone to graze. Others may go in to collect biomass for burning. DAE personnel discovering such activities are quite likely to look the other way.

In addition to such security breakdowns, lapses in secrecy have occurred that embarrassed the DAE. Some of these lapses have involved information leaks from the nuclear establishment, which have come in at least two forms. The first are public revelations typically made by workers and their unions of radioactive leaks or safety violations. At the Kalpakkam Reprocessing plant in January 2003, for example, six workers were exposed to high radiation doses following a valve failure.[67] This accident came after repeated warnings by the Workers Association of safety problems. Following the accident, the association reiterated these problems in a letter to the authorities demanding that the problems be addressed immediately. When the authorities did not act on their demands, the workers went on strike. The authorities retaliated by transferring one of the key leaders of the strike, and others who participated were served warnings. The Association then leaked information about the safety violations to the media, and the accident became public news, but about six months after the event. Another instance of the worker's union using press publicity to negotiate with the authorities occurred in 1999, when a major heavy water leak occurred at the Madras Atomic Power Plant.[68]

The second form of information leak involves passing on information in order to achieve some strategic goal or settle internal differences. For example, in a recent article referring to the May 11, 1998, weapon test, nuclear strategist Bharat Karnad talked about the "40 kiloton dud" and pointed out that evidence for the failure of the test included "crater morphology [and] large traces of lithium at the site indicating that the lithium deuteride fusion fuel did not fully burn, whence the small, insignificant, yield."[69] Clearly the DAE would have liked to keep this information secret. It is also apparent that Karnad had been fed this information by insiders who are presumably interested in a resumption of explosive testing. Another form of lapse in secrecy has been information about the DAE's activities or blunders gathered by investigative journalists or antinuclear activists. Some instances have been described earlier.

The DAE has responded to this kind of activity in an uneven manner. We have already discussed the cases of people such as Gopi Rethinaraj and B. K. Subbarao. In contrast, the DAE dealt with Surendra Gadekar, a well-known antinuclear activist, largely by ignoring his activities. In July 2000 Gadekar was measuring radiation levels near the tailings pond at Jaduguda (where the radioactive waste from the uranium mill is dumped). "While I was taking the readings a guard came but I just ignored him and continued to take the readings as if I was an official of the department and if he wondered about the strange officer who wore pyjama kurta that was his problem."[70]

Gadekar has also been publishing *Anumukti,* India's only dedicated antinuclear journal for two decades, without the authorities trying seriously to prevent it.

There are three reasons for this uneven approach. One is the need for the DAE to maintain the appearance of legitimacy or openness and avoid overreaction. Historically the important period was the 1980s and 1990s, when the DAE and its allied organizations suffered some loss of legitimacy because it failed to generate the promised quantities of electricity and so it attempted to reinvent itself publicly as a more transparent organization. The push for greater openness in some measure was owing to the personality of M. R. Srinivasan, head of the Atomic Energy Commission in the late 1980s, who has always advocated greater transparency.[71] This pressure for relative transparency has been accentuated by recent efforts to involve the private sector in generating nuclear energy.

The second reason is that the effort involved in purging those responsible for security breaches, and the possible negative publicity that would result, are not deemed worth the gain in maintaining secrecy about, say, radiation levels. Activist researchers who do collect such classified information would be faced with a number of hurdles. It would be difficult to get such material published in a media outlet given the incomprehensibility of the subject to the wider public. Even if the media were interested, they almost certainly would ask the DAE for comments, and the DAE would cast doubt on the researchers' competence, accuse them of undermining the nuclear program and challenge their patriotism. Finally, the DAE would subject the media outlet to a litany of technical balderdash: exposures are ALARA (As Low As Reasonably Achievable); what we had was not an accident but an incident; or the risk of dying of cancer from this dose is much smaller that the probability of dying from a road accident.

Even if a media outlet published a sympathetic account of an activist researcher's findings, the matter would generally end there, as the available structures of governance and decision making do not offer any avenues to challenge the DAE or hold it accountable. This is the third and possibly most important reason for the DAE not being as draconian as it could and for remaining relative lax in dealing with lapses in secrecy. Time and again we have had revelations of radiation leaks, safety errors, cost overruns, and workers subjected to high levels of radiation, but none has forced the DAE to undertake major policy changes. The lack of accountability begins at the highest levels; seldom have any meaningful debates on these issues been held in parliament or in legislative assemblies. Courts have generally favored the DAE in their interpretation. Thus, even lapses in secrecy do not substantially affect the DAE's ability to carry on as it pleases.

Public debates, even if they do influence popular opinion, have not resulted in changes in the DAE's mode of functioning. A rare public debate occurred in the late 1980s over the construction of a nuclear power plant in Kaiga, Karnataka. As part of the debate, a National Workshop on Nuclear Power that was organized in Bangalore in December 1988, involved both officials from the DAE and others from civil society.

An important component of that debate was economics. It turned out that those who argued that nuclear power was uneconomical had done more careful analysis and used better methodology and more reliable data compared to DAE officials.[72] But construction of the Kaiga nuclear power plant continued unaffected.

One of the more amusing reasons given for the DAE's refusal to part with information emerged at the Bangalore workshop when the AEC chairman M. R. Srinivasan said, "We have no objections to giving information. But giving all the information needs a lot of paper which we cannot afford."[73]

The lack of forums for challenging the DAE also means that it is more difficult for potentially embarrassing information to be forced out. In the United States, for example, various flaws in reactor design have come to light during the course of public hearings. A good example is the case of the hearings on the Emergency Core Cooling System (ECCS). The ECCS is designed to inject large amounts of water into the reactor core in the event of an accident that drains out some of the coolant so that the core threatens to overheat and melt. In July 1971 the Union of Concerned Scientists (UCS), a nongovernmental organization, "published a report critical of the ECCS, saying that there was little evidence other than abstract computer simulations that these vital systems would work when needed."[74] The report resulted in the U.S. Atomic Energy Commission (AEC) holding hearings on the ECCS beginning in January 1972.[75] Originally intended to last six weeks, the hearings lasted more than a year and became a forum for the UCS to bring to light intense disagreement within the nuclear establishment about ECCS technology. Much of the disagreement came from engineers within the establishment who supported nuclear power in general but believed that safety was being compromised in the effort to build more reactors quickly. Although, in the end, the hearings did not produce dramatic changes in the U.S. AEC's approach to safety, it did prompt reorganization to provide for greater emphasis on safety research.[76]

Contrast this with the case in India, where again reactors rely on the ECCS as a safety measure.[77] Yet, the Kakrapar-I (KAPS-I) reactor was commissioned without "integrated testing of the ECCS."[78] As in the U.S., the information was leaked by someone within the nuclear establishment, possibly someone involved in the workers' union.[79] The revelation prompted some antinuclear activists, particularly the well-known Gandhian Narayan Desai, to fast and resort to other means of protest. Despite these efforts, the reactor was commissioned without adequate testing.[80] This is one more example of how the DAE was under no pressure to respond to public concerns.

One more question can be asked in this context: Why have there not been many whistle blowers, or truth tellers, as some others have named them. As mentioned earlier, there have been instances of such actions, but that alone cannot suffice to induce more. Rather, what might inspire or discourage others from being whistle blowers is knowledge of what happened to the people who did speak up about hazardous practices. An example concerns Gopalakrishnan, who headed the Atomic Energy

Regulatory Board in the 1990s and produced the report listing 134 safety problems with the DAE's reactors. After some years of criticizing the DAE publicly, in his recent articles Gopalakrishnan has taken a more conciliatory attitude toward the DAE.[81] Even without knowing the reasons for his apparent change of attitude, this shift by a well-known personality like Gopalakrishnan would likely only demoralize anyone within the establishment who might be contemplating taking on the DAE. More demoralizing would be the case of Subbarao discussed earlier. There are also those who have challenged the DAE and, in the process, came to be regarded as cranks.

Conclusions

Pronuclear advocates in India often claim that the May 1998 tests proceeded after a quarter-century of democratic debate on whether to "go nuclear."[82] The extent of democracy in the debate is itself highly debatable. An exit poll conducted during the 1999 national elections found that, despite the massive official propaganda effort extolling the tests, 54 percent of those polled had not even heard of the nuclear tests conducted the previous year.[83] Even among those cognizant of nuclear issues, few feel they have adequate information about the nuclear program. A 1996 poll among elites found that only 13 percent thought that information on nuclear issues was easily available.[84]

It is only partly true that information is unavailable. As we have seen above, the Indian nuclear establishment does not employ secrecy in the all-encompassing totalitarian way that some suggest. The pressures of legitimizing the establishment within a democratic society, the demands posed by other organs of the state such as accounting bureaucracies, as well as jockeying for a place in the partly competitive business of electricity generation does lead to some openness.

At the same time, the information available is very limited and significant pieces of information are denied. This state of affairs has not changed even with the adoption of a Right to Information (RTI) Act. The DAE and its attendant organizations all have prominent pages on their Web sites about how they have been implementing this right. Yet, when we recently sent an RTI petition to IGCAR and BHAVINI—the organizations involved in designing and building the PFBR—asking for data on the estimated costs of various steps of the construction and operation of the reactor, such as the cost of fabricating fuel and of waste management, concerned authorities refused to provide most of the requested information. Their excuse was that Section 8(I)(a) of the RTI Act stipulated that there shall be no obligation to give information, among other things, pertaining to "information, disclosure of which would prejudicially affect the sovereignty and integrity of India, the security, strategic, scientific or economic interests of the State, relation with foreign State or lead to incitement of an offence." Their reply stated: "It is felt that the information you have requested falls within the above definition and, therefore there is no obligation to give the information requested to anyone."[85] How, for example, annual waste management costs would fit the description

above is anybody's guess. An appeal under the RTI Act resulted only in a few more numbers and a continued denial of most of the sought-after information.

By and large the information kept secret typically relates to the major, publicly perceived problems with nuclear energy: its connection to nuclear weapons; the possibility of catastrophic accidents with the release of radioactivity into the environment and the consequent effects on public health; the as yet unsolved problem of dealing with nuclear waste that remains radioactive for tens of thousands of years; and the poor economics of nuclear power generation. With the 1998 nuclear tests, the connection with nuclear weapons became a moot point, and the nuclear establishment has begun taking pride in something that was always privately or unofficially acknowledged—the use of facilities that supposedly were intended only for nuclear energy production to aid in the development of nuclear weapons. Ever since those tests, national security has been increasingly invoked as the necessity for imposing secrecy on practically all aspects of the nuclear program.[86]

The virtually impenetrable secrecy of the Department of Atomic Energy and its power to function without any forum where it can be held accountable has resulted in a stunted debate on an issue that can literally be termed a life and death matter. Even without prejudging the results of such a debate, the best interests of democratic decision making will be served by curbing this secrecy and increasing transparency in the Department of Atomic Energy.

Notes

I thank all the people who attended the two intense workshops on Culture, Society, and Nuclear Weapons in South Asia in Amsterdam and Washington, D.C., and offered comments, criticism, and suggestions to improve this paper. In particular, I thank Itty Abraham for pushing me to closely examine the notion of a secret itself and to point out the nuances in the practice of secrecy. I am also grateful to Surendra Gadekar, Sharad Lele, J. Y. Suchitra, and the anonymous reviewer for useful comments and suggestions. I alone am responsible for any remaining deficiencies.

Epigraphs from, respectively, Robertson Davies, *The Manticore* (New York: Penguin Books, 1972), p. 114; Howard Morland, "The H-Bomb Secret," *The Progressive,* November, 3–12, 1979; and Santimoy Chatterjee and Jyotirmoy Gupta, eds., *Meghnad Saha in Parliament* (Calcutta: Asiatic Society, 1993), p. 201; cited in Ravi Shukla, "Technology and Democracy: Exploring the Nuclear Energy Debate in India," M.Phil. diss., Jawaharlal Nehru University, 2006.

1. In India's case, it has been argued that this opacity was the outcome of "indecision at the highest levels of political decision-making" (Itty Abraham, "The Ambivalence of Nuclear Histories." *Osiris* 21 [2006]: 49–65). Others, like former national security adviser Satish Chandra, have argued that as "a new Nuclear Weapons State, [India needs] to have opacity." See Sheela Bhatt, "World doesn't know how many bombs India has": Interview with former deputy national security adviser Satish Chandra, Rediff, August 11, 2005.
2. Avner Cohen, *Israel and the Bomb* (New York: Columbia University Press, 1998), p. ix.
3. Raj Chengappa, *Weapons of Peace: The Secret Story of India's Quest to Be a Nuclear Power* (New Delhi: Harper Collins, 2000), p. xv (my emphasis).

4. If the commitments India made as part of the Indo-U.S. agreement of July 2005 to separate its civilian and military nuclear program were implemented strictly and comprehensively, then this situation may change, though not completely. There seems, however, to be substantial resistance to this separation, or at least efforts to minimize it, from many within the DAE.

5. One of the double standards in Indian, and even global, discourse about nuclear activities in South Asia is that any secrecy on the part of Pakistan regarding its nuclear activities is portrayed as a sign of the weakness of its democracy and institutions, as well as a general lack of accountability, but, in the view of Sankaran Krishna, the author of chapter 4 in this volume, such questions are seldom raised about India (personal e-mail to this author, 2005).

6. Interview with V. K. Chaturvedi, November 25, 2000.

7. Such calculations were presented by Zia Mian, A. H. Nayyar, R. Rajaraman, and M.V. Ramana in their report "Fissile Materials in South Asia: The Implications of the U.S.-India Nuclear Deal," International Panel on Fissile Materials, 2006.

8. I thank Itty Abraham for emphasizing this.

9. The denial of information is justified usually on the grounds of national security. But although national security is the stated reason, a multiplicity of reasons could cause such denial of information, for example, the arrogance of people on the inside, who believe "they know best," and the resistance to opening up nuclear policy making to public debate or questioning. At an arms control meeting in 2004, a former head of the Indian Air Force said, quite bluntly, that he would not answer any questions relating to the nuclear arsenal because he felt that what he said could lead to a public debate about the characteristics of the arsenal. This was, in his opinion, undesirable because the subject should only be debated by "knowledgeable people" within the establishment. At the same time he revealed, indeed boasted, that he had recommended air attacks on Pakistani supply lines and other facilities across the border during the Kargil War.

10. Jayanthi Natarajan, "Classified Dangerous," *New Sunday Express,* July 29, 2003.

11. Shyam Bhatia, *India's Nuclear Bomb* (New Delhi: Vikas, 1979).

12. Jawaharlal Nehru, Letter to C. D. Deshmukh, June 23, 1952, in *Selected Works of Jawaharlal Nehru,* ed. S. Gopal, 2nd series, Vol. 18 (Delhi: Jawaharlal Nehru Memorial Fund, 1996); cited in Robert Anderson, "Why Lord Buddha Smiled," *Times Literary Supplement,* January 8, 1999, 26.

13. Max Weber, "Bureaucracy," in *Essays in Sociology,* ed. H. Gerth and C. Wright Mills (New York: Oxford University Press, 1975).

14. CAG, "Report by the Comptroller and Auditor General of India" (New Delhi: Comptroller and Auditor General of India, 1994).

15. CAG, "Report by the Comptroller and Auditor General of India" (New Delhi, Comptroller and Auditor General of India, 2005), p. 21.

16. The Official Secrets Act has been used extensively to indict many people on charges of spying. See, for example, Iftikhar Gilani, "Inside Tihar Jail: 'Nothing Official or Secret,'" Confederation of Human Rights Organizations. Available at http://www.humanrightskerala.com/modules.php?op=modload&name=News&file=article&sid=604 (accessed September 20 2005).

17. T. S. Gopi Rethinaraj, "ATV: All at Sea before It Hits the Water," *Jane's Intelligence Review* (1998): 31–35.

18. M. S. Siddhu, "Victimised by the Official Secrets Act: The story of Dr. B. K. Subbarao," *Manushi* 108 (1998).

19. Rupa Chinai, "Radioactive Leakage at the Bhabha Atomic Research Centre," *Sunday Observer*, September 6, 1992.

20. Surendra Gadekar, personal e-mail to this author.

21. M. V. Ramana, "The Question of Nuclear Yield," *Frontline,* January 21, 2000, pp. 94–96.
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70. Surendra Gadekar, personal e-mail to this author.
71. In a recent newspaper article, for example, Srinivasan argues that "the DAE must adopt an enlightened policy of keeping the public informed at all times about safety aspects of its installations" (M. R. Srinivasan, "The Fast Breeder Reactor," *The Hindu,* September 17, 2003.
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74. James M. Jasper. "Nuclear Politics: Energy and the State in the United States, Sweden and France" (Princeton, N.J.: Princeton University Press, 1990), p. 11.
75. The AEC held such centralized hearings primarily to avoid multiple repetitions of the arguments regarding the safety of the ECCS that utilities around the country would have to make as part of their licensing procedures.
76. Joel Primack and Frank von Hippel, *Advice and Dissent: Scientists in the Political Arena* (New York: Basic Books, 1974), pp. 230–231.
77. However, four of the older reactors, RAPS-I and II at Rajasthan and MAPS-I and II at Kalpakkam, operate with an inadequate, obsolete, and unsafe ECCS (A. Gopalakrishnan, "Issues of Nuclear Safety," *Frontline,* March 13–26, 1999.
78. Rupa Chinai, "Critical Safety Checks Not Being Observed in KAPP-1," *Sunday Observer,* July 26, 1992.
79. On many occasions unions have been the source of information about safety- and health-related violations in nuclear facilities.
80. It is not clear whether the reactor was commissioned without any testing or that tests were conducted but the ECCS did not function as designed. A likely reason for the haste in commissioning was that P. K. Iyengar, then head of the DAE, was due to retire and thought that bringing KAPS online might help him get an extension of his term. His hope did not materialize (Surendra Gadekar, telephone interview by author, March 15, 2005).
81. For example, see Gopalakrishnan, "Evolution of the Indian Nuclear Power Program," pp. 369–395.
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85. Letter dated August 4, 2006, from A. Ananth, BHAVINI, to J. Y. Suchitra.
86. National security has been the justification for secrecy even earlier. Its invocation, however, especially even by people and institutions not necessarily connected with the nuclear establishment—the Supreme Court, for example (see section on Secrecy in Safety and Health), certainly seems to have increased.

SOUTH ASIAN CULTURES OF THE BOMB

Atomic Publics and the State in India and Pakistan

Edited by Itty Abraham