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'We Are All Harrisburg': Three Mile Island and the Ultimate Indivisibility of the Atom[1]

> Due "to loss of feedwater flow … occurred as a result of an operator entering the condensate polisher control cabinet and, while trying to locate the light switch for the lights inside the cabinet, inadvertently 'hitting the breaker' for the power supply to all the demineralizer vessel discharge valves causing these valves to close and feed flow to cease. Met Ed has initiated changes to preclude this problem in the future by relocation of the light switch."[2]

This article discusses the impact on U.S. nuclear policies of the incident at the Three Mile Island reactor in Pennsylvania in March 1979 by focusing on three interrelated issues: the inescapable connection between the civilian and the military dimensions of the nuclear power; the effective mobilization from below against nuclear energy in 1970s' America and the ability of anti-nuclear groups to appeal across the political and cultural spectrum; and how the political and cultural transformations of the 1970s challenged the certainties of the previous decades and hindered the development of nuclear energy.

The article is divided in three parts, dealing respectively with the inner contradictions of nuclear power, the increasing difficulties of the nuclear industry in the 1970s and, finally, the impact of Three Mile Island.

The Wonders and Contradictions of Nuclear Power

"Power too cheap to meter": that's what atomic energy promised to deliver. The wonders of the atom had been extolled well before it was finally split to release unprecedented quantities of energy. When triumph was finally achieved – when man at last succeeded in "stealing God's stuff," in

author E. B. White's famous phrase – there was no way to restrain these pre-existing, hyperbolic fantasies and dreams (Winkler 29).[3] Atomic energy, the first chairman of the Atomic Energy Commission (AEC) David Lilienthal claimed, "was so gigantic, so terrible, so beyond the power of imagination to embrace, that it seemed to be the ultimate fact ... the final secret of Nature." Albert Einstein presented it as "the most revolutionary force since prehistoric man's discovery of fire." So revolutionary it was, that a divine intervention was regularly invoked to explain and justify America's success. "God" – President Truman proclaimed – had "given … through this tremendous discovery of atomic energy the unique opportunity to build one single human community, on the highest spiritual level, accompanied by unlimited material facilities." Another AEC leader, and nuclear power cheerleader, Lewis Strauss, claimed that "the knowledge of the atom" was "intended by the creator for the service and not the destruction of mankind." "A Higher Intelligence," Strauss claimed, had "decided that man was ready to receive" nature's secret. Cowboy singer Fred Kirby concurred: "Atomic power, atomic power" – he cried in a song written just one day after Hiroshima – "was given by the mighty hand of God." A few years later, a more profane chair of the AEC, Glenn Seaborg stepped outside monotheism and Christianity, to describe the new breeder reactor as "the nuclear Goddess of Fertility, so fecund that, while producing power in plenty, it also breeds more fissionable material than it consumes" (Winkler 28, 36, 137, 138; Herring 10, 14; Bedford 64).

Scholars and commentators have frequently juxtaposed the alleged civilian/sunny side of nuclear power to its military/dark side: the cheerful hope offered by the former to the gloom and despair exemplified by the latter. In this simple binary, construction was opposed to destruction, creation to annihilation, progress to barbaric regression, Heaven to Armageddon. Through this reading, civilian nuclear power – the "peaceful atom" – acquired an almost tranquillizing and sedative effect. It anesthetized the fears nourished by the "un-peaceful" atom and its ever-expanding destructive potential. And it did so by appealing to larger and well ingrained themes of technological progress, promising a clear-cut solution – a "technofix" indeed – to the problems of energy scarcity and dependence, while celebrating once again America's ingenuity and scientific prowess (Boyer; Gamson and Modigliani).

Fascination, if not outright infatuation, with technology and progress buttressed this narrative. Praising and magnifying the sunny and progressive side of atomic energy served to normalize the abnormal: to guarantee that the uncontrollable could well be controlled and exploited. Initially, this confidence – this faith in the manageability of the atom – applied to the military as much as to the civilian realms. Both revealed the inner dialectical tension of all things nuclear, whose basic contradiction lies quite simply in their excessive power. Nuclear power was from the beginning a power beyond power, and therefore a tool beyond politics. It was so destructive that it could not be managed or strategically rationalized; so poisonous that it left highly contaminating waste for generations; so mighty that absolute safety could never be certain; so invisible and mysterious that no one had real and total control over it.

At first, this tremendous power elicited immense enthusiasm in the United States. Just as nuclear weapons promised to endow the United States with renewed and full security, nuclear power promised independently-generated progress and prosperity. It was not just progress that atomic energy guaranteed: it was a U.S.-dominated and controlled progress. The road to prosperity was thus further connected to the notions of autonomy, independence, and freedom. There was nothing to fear (and much to wish for) in the atom: "our friend, the atom," as in the title of a famous 1956 Disney's children book, and later film.[4]

This celebration of the peaceful and marvelous atom, of the wonders it was destined to deliver, continued for two decades or more, in parallel with the regular flights of strategic experts into the cuckoo's nest of nuclear war planning, where attempts to rationalize and normalize nuclear weapons were discussed and suggested. In this generally nuclear-friendly narrative, progress, plenty, and independence guaranteed by nuclear power represented the dominant tropes. They were part of a "progress package," sociologists William A. Gamson and Andre Modigliani have argued, which framed "the nuclear power issue in terms of society's commitment to technological development and economic growth" (4).

This "progress package" outlived even the end of the U.S. military monopoly of nuclear power, the Cold War arms race, the progressive abandonment of the idea that a nuclear war could be pursued and won,

Duck and Cover, the shelter frenzy, and the fallout controversy of the late 1950s. Furthermore, it seemed to appeal to political groups across the board: right and left, progressive, and conservative. Even the 1962 Port Huron statement from Students for a Democratic Society applauded the possibilities offered by the mighty atom: "our monster cities" – it proclaimed – "based historically on the need for mass labor, might now be humanized, broken into smaller communities, powered by nuclear energy, arranged according to community decision."

Lauded in the name of progress and modernity, nuclear power was somehow de-politicized: inserted into a teleological, and therefore neutral, narrative of linear, uncontestable development. Through very modern categories – the primacy of the political, the faith in technology, the admiration for (and deferential respect to) experts and technocrats – it was thought possible to administer, productively use, and ultimately control such power-beyond-power (Winner).

A backlash was nevertheless coming. The reaction against civilian nuclear power – the first, timid anti-nuclear activism – was initially framed in anti-modern and quite parochial terms. Conservationists and conservative environmentalists mobilized against the disfigurements nuclear reactors could inflict on nature's aesthetics and pristine landscapes. Safety and contamination were at first rarely mentioned, although the fallout controversy and the first wave of protests against nuclear tests were destined to have an impact, raising the issue of radiation and its effects on population. Destined to become the quintessential, sinister symbol of nuclear power, cooling towers were often deemed incompatible with the majestic sceneries offered by the sites chosen for their construction. The necessary proximity to water – rivers, lakes, and sea – needed to cool the reactors did not help supporters of atomic energy. This sort of proto-anti nuclear activism developed in the late 1950s. In California, the ill-considered idea of building a nuclear plant on the scenic harbor of Bodega Bay, 50 miles north of San Francisco, mobilized local residents who were able to stop the project. Similarly, citizens' mobilization blocked the proposal of the Consolidated Edison Company of New York to place the largest reactor ever built in the heart of New York City, in Long Island, on the East River Waterfront (Mazuran; Walker "Reactor at the Fault"; Wellock "The Battle for Bodega Bay").

But it wasn't this proto (and, in some instances, paleo) anti-nuclearism that initially obstructed the development of civilian nuclear power, either in the United States or in the rest of the world. The obstacles were more mundane: technological breakthroughs were slow to come; costs, then as later, remained immensely high; results proved often disappointing. The Eisenhower administration, with its unassailable faith in the higher efficiency of business, had shifted responsibility to the private sector. In 1954 the Atomic Energy Act established the Atomic Energy Commission (AEC). The law allowed the dissemination of basic information about atomic energy for civilian applications and gave states control over economic aspects of nuclear power. More important, AEC was assigned the dual task of both promoting civilian atomic energy and guaranteeing public safety from its potential hazards – of being promoter and regulator – creating what was in all respects a significant conflict of interests. Finally, to further promote industry's participation in nuclear power, in 1957 Congress passed the Price-Anderson Act, which limited utilities' liability to $560 million, "effectively transferring liability to the government via taxpayers' wallets." Insurance companies, in fact, had declined to provide liability coverage for private utilities and their major suppliers (Delmas and Heiman 441).

Business, however, was very slow to deliver. "The industry," Henry Bedford has written, "benefited from the reflected prestige of atomic scientists, the widespread respect for technical expertise, and the silence of governmental agencies about some of the dangers inherent in the new technologies." It could do little, nevertheless, against a technology that was moving much slower than imagined, costs that were not abating, and hazards that had not yet been solved (66) . The "dazzling nuclear future" promised by the industry's advocates thus did not at first materialize. Ubiquitous propaganda and strong public favor notwithstanding, in the early 1960s only a handful of private nuclear plants were operational and generating power on the commercial grid (Winkler 136; Walker *Three Mile Island* 4-5; Balogh).[5]

This situation changed dramatically as the decade progressed. Various factors contributed to this sudden and unexpected shift: competition among builders of nuclear plants; growing concern with air pollution and the belief that nuclear energy could offer a solution to it; technological

improvements; government support (in the form of massive subsidies); and, finally, a certain degree of negligence with regard to safety. Again, what was happening in the United States reflected a more general worldwide trend. The political and cultural climate of the period – the heyday of modernization and "techno-arcadia" – proved itself very receptive to nuclear technology. As environmental historian John McNeill has written, in the 1960s "nuclear power held some of the same political attraction as dam building: it signified vigor and modernity" (312).

Between 1966 and 1968, utilities in the U.S. committed to purchasing 68 nuclear units (there had been only 22 between 1955 and 1965). The boom continued in the following years: by 1973, 37 nuclear plants produced commercial power or had received operating licenses. Many more were on line. The in-house magazine *Nuclear Industry* confidently proclaimed the "virtual collapse of competition from fossil fuels." In 1971 Glenn Seaborg and the physicist William Corliss published *Man and the Atom: Building a New World Through Nuclear Technology*, a paean to atomic energy, a call to renewed technological greatness, and a harsh denunciation of what they consider to be widespread "anti-rationalism" and "anti-intellectualism." "In the past," Seaborg and Corliss argued, "we have exploited both man and nature. Today it is becoming possible to exploit knowledge" (364-5). Richard Nixon predicted that by 2000, nuclear power would provide half of the country's electricity. After the first oil-shock, Nixon proceeded to announce his "Project Independence," which intended to promote a further, relevant expansion of nuclear power. His successor, Gerald Ford, was also a staunch supporter of atomic energy: "we must rely more and more on nuclear power as a major source of energy for the future," he proclaimed in 1975 when opposition to nuclear energy was gaining strength nationwide; in order to achieve this objective he set the goal of having at least 200 nuclear power plants in operation within a decade (Walker 7).[6]

This confidence in the future of nuclear power appeared well-founded. Some of the major transformations of the 1970s seemed to open a highway to atomic energy. The skyrocketing prices of oil signaled the end of what had been the dominant "energy regime" since the 1930s. Along with efforts at better conservation, alternative energy sources – including nuclear power – offered the only possible solution. In the transition to a new and more

diverse energy regime, it was common to believe that nuclear power would play a major role. Furthermore, ten years of negotiations on arms control had alleviated the strong nuclear scare of the previous years, removing another potential obstacle. Finally, nuclear enthusiasts could continue to play the technological card: the appeal of technology and progress, or the promise of a "technological salvation" to the energy crisis. "Nothing appeals to the American spirit of self-reliant tinkering like a techno-utopia … [a] will to believe in a technological fix," sociologist Todd Gitlin would later argue. For nuclear supporters, atomic energy embodied that "techno-utopia" and offered another "technological fix" (Berkowitz 128).[7]

Reality, however, proved to be very different. Powerful economic, social, and cultural trends were operating in an opposite direction, eroding the popularity of nuclear energy among the public and establishing the conditions for its final failure. At least four factors explain the problems of atomic energy in the 1970s. The first was the spread among the public of a new ecological awareness. The development and mobilization of various environmental groups, at the local as well as national level, was in part connected to the more general social upheaval of the period. And it was part of the critique of the post-war affluent society: a reaction to the excesses – of waste, pollution and contamination – of the post-1945 "age of exuberance" (McNeill, "The Environment" 266).

The second obstacle was the plummeting faith in technocrats and politicians alike. The 1960s had witnessed some of the most dramatic failures of various modernizing schemes, both at home and abroad. Faith in politics, as well as expertise, had been badly shattered. One of the prerequisites for the development of nuclear energy had been the public's willingness to delegate responsibility to experts and politicians. It is perhaps an exaggeration to argue, as political scientist Langdon Winner did, that atomic energy requires acceptance of some form of "authoritarianism." Certainly, however, the anti-authoritarian mood of the late 1960s and early 1970s posed serious and unprecedented problems for the nuclear industry (174-6).

Third, utilities made several mistakes, out of arrogance and lack of realism. They clearly misread what they could achieve in the political and economic climate of the time and ended up overselling – to the public,

to the politicians, and possibly to themselves – the wonders of nuclear technology. In addition, they overestimated the rise of energy prices by not taking into consideration the inevitable contraction in consumption following the oil shock, while nuclear plants were themselves consumers of ever more expensive oil and other fossil fuels, on which they run (Lanouette).

Finally, the age of unregulated development was rapidly coming to an end. New environmentalism, both mainstream and more radical, targeted the lack of regulation and oversight of nuclear power plants. The National Environmental Policy Act of 1969, for example, imposed to consider environmental consequences of federally sanctioned initiatives, including water pollution. This had a major impact on nuclear plants that use water as a coolant and, in the process, return it at a much higher temperature (the process is known as thermal pollution) (Walker "Nuclear Power and the Environment").

The nuclear industry thus became one of the main victims of the growth (and, also, professionalization) of the environmental movement. By operating as effective lobbies, nationally and locally, various environmental groups succeeded in passing a vast array of laws which created a complex environmental bureaucracy: a "broad and expansive environmental policy system," Robert Gottlieb has shown, "centered around efforts to control the environmental by-products of the urban and industrial order" (176). All of a sudden, what had been under-regulated became hyper-regulated. Anti-nuclear groups began to effectively employ litigation and the possibility to act as interveners in the permit process. By doing so, they were able to postpone, and often sink, planned constructions of new nuclear plants. A crucial event in this regard was the creation in 1974 of a new, independent regulatory body, the Nuclear Regulatory Commission (NRC), which was vested with executive, judicial, and legislative powers. The creation of the NRC aimed at solving the original conflict of interests of the AEC, finally separating its promotional and regulatory functions. While often criticized by nuclear opponents for its alleged timidity, the five-man agency introduced new forms of control and supervision that strongly irritated nuclear industry representatives. Furthermore, states themselves adopted new regulatory measures. Preliminary Environmental Impact Reports (EIR) were often

asked in order to approve the construction of a new plant. Projects were now subjected to unprecedented scrutiny, while litigation and legislation empowered citizens and localities (Wellock "Stick It in L.A.!").

Antinuclear activism, stricter controls and regulations, and higher costs increased by the long application procedures hit the nuclear industry very hard. Grass-root mobilizations proved particularly effective, especially in those regions (the West Coast and part of the East Coast) where environmentalism had become a political force to reckon with. Already in 1970, citizens in Eugene, Oregon, voted for a 4-year delay of a proposed nuclear plant. Other, similar initiatives followed throughout the decade, the most important being the mobilization of the Clamshell Alliance in New Hampshire. Together, these efforts shook public support for nuclear energy and placed it in the media spotlight as never before. Even the highly moderate Sierra Club urged a nuclear moratorium in 1974 (Joppke 65-69; Wellock, *Critical Masses* 147-51).

The "Not-In-My-Back-Yard" (NIMBY) effect was proving almost irresistible, not least because of its quasi a-political (or post-political) nature. As historian Thomas Wellock has convincingly shown, "in the seventies and eighties, diverse coalitions embraced anti-elitism, localism, and the new grass-roots political weapons to gain local control over new technology, busing, MX missile basing, low-income housing, waste disposal, and development projects. The loss of public faith in the nation's elites and the expansion of public participation in government decisions permanently expanded community control over nuclear issues and a host of others where citizens did not want to negotiate or compromise" (Wellock, "Stick It in L.A.!" 951).

Enter Jimmy Carter

On nuclear matters, Jimmy Carter had a level of expertise and knowledge that was unique among U.S. presidents. A former naval officer with training in nuclear engineering, he had been involved in one of the first civilian nuclear accidents, when in December 1952 he lead the U.S. team assisting its Canadian counterpart in the shutdown of the experimental

Chalk River Nuclear Reactor, in the province of Ontario, where a partial meltdown had occurred.

While not prejudicially hostile to nuclear energy, Carter was no fan of it. He did not share the sanguine views of his predecessors and was possibly the least pro-nuclear president ever. Two factors shaped his position on the issue. The first was political calculations. Carter was deeply aware that the controversy over atomic energy could shatter the Democratic Party. Environmental groups had become a powerful constituency, supported by important public figures such as California governor Jerry Brown and consumer advocate Ralph Nader. Surely, nuclear advocates were not in short supply in the party (among them Senator Henry Jackson of Washington State and AFL-CIO leaders), but they were less influential. The second, crucial factor was the connection, now even more explicit, between the civilian and the military dimension of nuclear power (Gavin).

The battered nuclear industry had placed most of its hopes in the new Liquid Metal Fast Breeder Reactors (LMFBR), in which both the Nixon and Ford administrations had invested heavily. The cycle of a breeder reactor is very different from that of the Light Water Reactors in use in the U.S.: it starts with a fissile material that initiates a chain reaction and ends with the creation of more fissile fuel (plutonium-239). During the process more fissile material is created, reducing the need for uranium mining and refining, and thus partially solving the problem of waste, since the spent fuel can be reprocessed and the plutonium-239 re-used. However, through this sort of recycling, weapon potential material (again, plutonium-239) is produced. The fissile fuel produced in the cycle can be used, in other words, in the production of nuclear bombs. Light Water Reactors instead use low-enriched uranium that cannot be used for nuclear explosives. Until the development of the LMFBR, civilian and military technology had somehow been kept separate, practically and symbolically. Moving to a breeder technology would *de facto* erase this civilian-military divide.

Carter strongly believed in the necessity to promote a more incisive anti-proliferation policy, particularly after the Indian nuclear test in 1974. For this reason, and because of concerns about what he saw as its prohibitive costs, he opposed the breeder reactor program, while clashing with allies (France and the Federal Republic of Germany in particular) over

their decision to sell reprocessing plants to countries like Brazil, South Korea, and Pakistan, which intended to develop a nuclear arsenal. By adopting this position, J. Michael Martinez has argued, "Carter began to bridge the gap between American foreign policy on nuclear weapons and American domestic policy on nuclear technology." This bridge, however, opened a rift with several important allies and pro-nuclear groups at home (Walker, "Nuclear Power and Nonproliferation" 215).

Carter announced his position on nuclear energy in a speech he gave at the United Nations in May 1976, a few months before his election. "U.S. dependence on nuclear power should be kept to the minimum necessary to meet our needs," Carter declared. "We should apply much stronger safety standards as we regulate its use. And we must be honest with our people concerning its problems and dangers." "The widespread use of nuclear power brings many risks." They could cause "widespread radiological damage," while "radioactive waste" could be a "menace to future generations and civilizations." "Beyond these dangers, there is a fearsome prospect that the spread of nuclear reactors will mean the spread of nuclear weapons to many nations." And, using a historical analogy which would be constantly played by nuclear opponents in the following years, he concluded that "by 1990, the developing nations alone will produce enough plutonium in their reactors to build 3,000 Hiroshima-size bombs a year."[8]

Supporters of the nuclear industry immediately contested Carter's speech. In a letter to the future President, Senator John Pastore (D-Rhode Island), the chairman of the Joint Committee on Atomic Energy, reaffirmed his faith in the "safe and prudent development of the peaceful atom." "I view the energy policy of this country, including the role of commercial nuclear power, as a vital and inseparable part of the national goal which the leaders of our country have been seeking for years," Pastore stated. Investing in nuclear energy was vital to preserve U.S. "strength as a nation."[9]

After the election, energy problems occupied the center stage almost immediately: they were the "moral equivalent of war," Carter claimed. During the electoral campaign Carter often presented atomic energy as a "last resort," which required the strictest possible safety precautions. He instead placed greater emphasis on conservation, the necessity to modify consumers' habits in order to reduce energy demand, and the possibilities

offered by renewable sources, solar in particular. Once elected, Carter reaffirmed this position, created the Department of Energy, set various efficiency standards, and filled his administration with anti-nuclear "envirocrats."[10]

But pro-nuclear groups were still well represented: in the country, Congress and the Administration itself, where Secretary of Energy James Schlesinger loved playing the part of the adult in the room and did not share Carter's hostility to the Breeder Program (National Security Adviser Zbigniew Brzezinski, instead, supported the position of the President). Congress had just turned down an attempt to amend (and reduce) the 1957 limitation of liability. Several governors and members of Congress explicitly criticized Carter, arguing that the energy independence of the United States could be defended and guaranteed only through the promotion of new, advanced forms of nuclear technology. In particular, Congress and the administration clashed over the Clinch River Breeder Reactor (CRBR), a plant at Oak Bridge, Tennessee, whose construction had been approved in 1972. The CRBR was a highly expensive joint government/industry program aimed at testing the new breeder technology. After a congruous period of time, the reactor was destined to be turned over to utilities[11] (Kahn).

While making verbal concessions over the need to preserve nuclear power as part of a diverse energy panoply, Carter was adamant in its opposition to the Breeder technology, which he considered contrary to the "efforts to establish the U.S. as a leader in preventing the proliferation of nuclear weapons, and … a gross waste of taxpayers' dollars." Once in office, he proceeded to terminate the program. He scrapped the $150 million request and allocated $33 million for the cancellation of the CRBR. Congress refused and decided instead to authorize a reduced sum ($80 million) to the project. Carter issued then the first veto of his administration to block the authorization[12] (Lefevre).

The breeder controversy was just the clearest example of the dilemmas the United States and its president had to face when dealing with nuclear matters. The issue of nuclear safety had been embraced by the variegated environmental archipelago and its representatives within the administration. Meanwhile, high costs and NIMBY-driven local activism

had posed significant obstacles to the expansion of civilian nuclear power. Finally, the explicit connection between civilian nuclear power and arms proliferation inserted a further variable in an ever-more complicated and ambiguous equation.

While Congress and the Administration debated (and clashed over) the merits of the breeder technology, grassroots mobilization exploited the tools now available to block further expansion of atomic energy. Electricity produced by nuclear plants had grown exponentially in the previous 15 years: from 0.3% of the total in 1963 to 4.5% in 1973 to 11.3% in 1979. It was still very distant from the targets indicated in Nixon's "Project Independence," however, and most of the increase had taken place thanks to reactors licensed in the late 1960s, which had finally come on-line. After the impressive expansion of the previous decade, in the second half of the 1970s new constructions came to a virtual halt. In 1975, 122 of the 191 nuclear plants under construction had been deferred, while 9 had been cancelled. Between 1975 and 1978 only 11 new plants were ordered (Osif et al. 13-15; Walker, *Three Mile Island* 8-9).

Higher capital costs, more intense (and serious) regulations, and stricter safety procedures, all contributed to this first crisis of the nuclear industry. Equally, and possibly more important, however, was the mobilization from below. A barrage of anti-nuclear initiatives swept the United States in the second half of the 1970s. In 1977, several Vermont and New Hampshire towns approved nonbinding nuclear construction and transportation bans. Montana, Hawaii, and Oregon adopted antinuclear measures that gave the power to veto construction to the state legislature or the public. In California, 70% of the voters turned down the San Joaquin Nuclear Project in the stunning referendum in very conservative Kern county (circa 100 miles north-east of Los Angeles). In New Hampshire, the Clamshell Alliance was formed to oppose the planned construction of the Seabrook plant, 40 miles north of Boston (Wellock "Stick It in L.A.!"; Daubert and Moran).

These movements proved capable of appealing across political, cultural, and social borders. "Wrapped … in a myth of autonomy" and "framed as an agrarian versus urban conflict," as Thomas Wellock put it, the battle against the San Joaquin Nuclear Project was waged by an unlikely alliance

of ultra-conservative agribusiness and progressive environmentalists pitted against Los Angeles, big business, and trade unions. At Seabrook, fishermen – concerned with thermal pollution and its impact on their jobs – sided with radical environmentalists (Bedford; Wellock "Stick It in L.A.!" 947; Scherpfer; Willis). Kern County is a conservative enclave, which in the last 90 years has consistently voted – often with very wide margins – for Republican presidential candidates. While less conservative, New Hampshire is not (and was not, in 1976) a liberal-progressive state: it had a conservative and very-pro nuclear Republican governor (Meldrim Thomson), and in 1976 Gerald Ford easily carried the state. Environmentalism, with its "cross-cultural character," and its simultaneous global and local concerns proved less divisive than other contemporary social movements and made – from time to time, issue to issue – for very strange bedfellows (Guha; McNeill, *Something New*).

Nuclear energy, however, still had strong and influential supporters. As the CRBR saga showed, pro-nuclear members of Congress found a receptive ear in Secretary of Energy James Schlesinger. While the "envirocrats" were pushing to pay more "attention to safety and security, to waste management, and to ensuring that adequate national resources" were "devoted to solar and soft path options," Schelsinger urged a compromise of sorts on the CRBR and a less rigid attitude towards nuclear energy in general. Nuclear power, he argued, had at least to be placed on "equal footing with coal. This would amount to a change" in Carter's "earlier position on nuclear power as 'last resort', which has created uncertainty and concern." Frank Moore, Carter's assistant for congressional liaison, concurred: it was vital to avoid giving the impression that the administration "was anti-nuclear" even because Carter risked losing support in the South "due in part to environmental issues."[13]

Schlesinger worked hard to achieve a compromise over the CRBR. He advised Carter and Congressional leaders to trade the termination of the program and the deferral of breeder commercialization for an aggressive program of Research and Development, and the abandonment of any prejudicial hostility towards the technology. He didn't succeed. Many members of Congress were willing "to trade 'mortar' for 'mortar'" and not a facility (CRBR) for a study of a larger facility, he sympathetically argued.

Carter was equally adamant: "I would rather go down swinging. A large breeder in the near future is a waste of money," the president wrote by hand on one of the many reports produced by the White House.[14]

Carter eventually failed to terminate the CRBR. He bitterly denounced the Congressional decision to proceed with the project but was powerless to go further. "Carter presented the decision as a "major, potential setback" and the Clinch River breeder reactor as "a technological dinosaur ... a waste of more than $1.5 billion of taxpayers' money … an assault on our attempts to control the spread of dangerous nuclear materials." He would soon be proved right. Left on hold for several years, the program was revived by Reagan in 1981 and finally terminated by Congress in 1983. The decision was supported even by conservative analysts and think tanks, which denounced its uncontrollable costs (originally estimated at $400 million, they ended up reaching $8 billion) (Lefevre; Carter, "News Conference"; "The Clinch River Folly"). However, the debate over the Clinch River Reactor contributed to shape the discussion on nuclear energy and to move Carter away from his original, more rigid views. In 1978-79, Carter oscillated, undecided about which way to go. He progressively toned down his anti-nuclear rhetoric and began to stress the need for further research in the new nuclear technology. "Envirocrats" were dismayed, environmental groups vehemently protested. Schelsinger and several political advisers, instead, presented this middle road as the only available and sensible option.

Many considered Carter's partial reversal as too little and too late, blaming him for the problems in the nuclear industry. Congressman John Wydler (R – New York) accused Carter of passively accepting an "Atomic Sputnik": Soviet activism even in the civilian nuclear sector was putting the U.S. in an unacceptable "second place in the nuclear league," he argued. The pro-nuclear lobbyist Sam Volpentest, an important fundraiser for Washington State Democratic Senators Henry Jackson and Warren Magnuson, accused Carter of having "sold the American people down the river with his lack of support for nuclear power in this country ... We are now second-rate citizens in relation to France, Japan, England – yes, even Russia when it comes to nuclear energy development … reducing me, my three children and my twelve grandchildren to sole dependency on other

nations for future energy resources. That's a sad commentary for this once proud and independent democracy." Annette Stevens, one of the driving forces behind the victory of pro-nuclear forces in the 1980 referendum on the closure of Maine Yankee Nuclear Power Plant on the Bailey Peninsula of Wiscasset, was even more blunt. Stevens objected to the decision by the NRC to shut down for ten weeks the only nuclear plant in Maine, presenting it as an "arrogant regulatory intrusion," further weakening the United States. "Japan," she continued, appealing to phobias that would only intensify in the following years, "intends to build 18 nuclear power plants in the next six years. Japan, who could not defeat us in a total war, threatens us with economic annihilation as we put roadblocks in the way of nuclear power plant construction and end depending on costly oil to power out factories."[15]

Stevens and Volpentest's harangues were not only directed at the wrong target, however, but also well outside the time limit. Nuclear energy had been oversold to the public, given its immense costs and the inability to find a solution for its intractable waste. Anti-nuclearism had become an integral part of mainstream environmentalism and a political force one had to reckon with. Civilian nuclear development and anti-proliferation appeared to be less and less compatible. The problems faced by the nuclear industry in the second half of the 1970s were therefore already immense. There was one thing it could not afford: a major accident. An absolutely remote possibility, nuclear supporters claimed. Much more remote than earthquakes, tornadoes, airplane accidents, and even "meteorites," a famous NRC 1974 study prepared under the direction of Professor Norman Rasmussen of MIT argued, comparing "nuclear risks" and "other societal risks" (U.S. Nuclear Regulatory Commission). Polls reveal that a majority of Americans still believed in these reassurances, in the essential safety of nuclear technology. Remote, implausible, impossible, the accident nevertheless came, in possibly the most unlikely location for a nuclear reactor: a small island in the bucolic valley of the Susquehanna River.

Three Mile Island

"The world has never known a day quite like today. It faced the considerable uncertainties and dangers of the worst nuclear power plant accident of the Atomic Age. And the horror tonight is that it could get much worse. It is not an atomic explosion that is feared; the experts say that is impossible. But the specter was raised that perhaps the next most serious kind of nuclear catastrophe: a massive release of radioactivity." With those words CBS anchor Walter Cronkite opened his broadcast on March 28, 1979.

The site of a nuclear accident, and not of a meteorite collision, was Three Mile Island, an island on the Susquehanna River, just a few miles south of Harrisburg, Pennsylvania. Three Mile Island had two units, TMI 1 and TMI 2. The first had gone into commercial operation in September 1974; the second had finally obtained an operating license in February 1978. Metropolitan Edison (Met Ed), the utility in charge of TMI, had originally planned to build the second unit on the site of the Oyster Creek Reactor in New Jersey. The weakness of Pennsylvania unions had, however, made transferring it to Three Mile Island more attractive. The year before the accident had been marked by many minor (and not so minor) accidents: pumps failures, problems with valves and cooling system, operators' negligence. The plant, which had cost about $700 million to build, had begun commercial operation at the end of 1978, but in the few weeks of operation it had often been offline due to technical problems. It was also in reaction to the problems at TMI 2 that local groups such as the Harrisburg Center for Peace and Justice – and later the very active Three Mile Island Alert – had been formed in a state were anti-nuclearism was yet very weak.[16]

On March 27, the Harrisburg Center for Peace and Justice had finally decided to appeal to the Pennsylvania department of health in order to obtain more information and data on TMI low-level radioactive emissions.[17] A few hours later, at 4 a.m. on March 28, the main feed-water system supplying water to the steam generators at TMI 2 malfunctioned and shut off. Alarms went on: the interruption in the flow of cooling water could cause the reactor to overheat and eventually melt. But there was no flow of water

from emergency auxiliary pumps: due to a maintenance error, two valves of those pumps had inadvertently been left closed. The situation precipitated when a pressure regulating valve, which had opened to reduce the pressure in the reactor, failed to close, thus allowing cooling water from the reactor through the valve to the basement's collecting tank (failures of these valves were a common problem, at TMI and other plants). Operators were simply untrained for this kind of emergency; they confused the mixed signals comings from hundreds of different alarm sounds, and did not promptly shut of the valve, thinking that the problem was a possible overfilling of the reactor system and not a loss of coolant. The highly contaminated water in the reactor's building basement was then pumped from the collecting tank into the auxiliary building; from there the radioactivity found its way "to the outside world" through its ventilation system (Osif et al. 25).[18]

Other mistakes by the operators followed. In response to the loss of coolant, high-pressure injection pumps automatically activated but they were again shut down, along with four other reactor coolant pumps, thinking they could provoke an overfilling, causing the reactor to "go solid." "As a consequence of mechanical failures and operator errors, what began as a series of minor malfunctions escalated into a major crisis," NRC historian J. Samuel Walker would later write in his masterful account of the accident (*Three Mile Island* 77). The consequence was the much-feared meltdown of the reactor's core and the possibility of uncontrolled release of radiation into the environment. The high level of radiation in the auxiliary building was in part released through the ventilation system. When operators finally understood what was happening, a site emergency was called and the cooling system was finally activated.

At that point the problem was assessing the damage and, obviously, the implications for the safety of the population. Alas, confusion, poor communication, and mismanagement persisted even in the subsequent hours. The owner and operator of the company, Met Ed, tried to minimize the accident and offered inconsistent explanations. The State government, for its part, was caught unprepared, while local radios and national media spread the news, with obvious – and sometimes misinformed – alarm. It would take several days, various contradictory announcements, another major crisis over a possible explosion caused by an hydrogen bubble in

the pressure vessel, the direct intervention of the federal government, and a spontaneous evacuation of around 150,000 people (instead of the 3,500 people who had been advised to leave their homes) before the crisis could be declared over.

It is not possible here to discuss the various phases of the Three Mile Island drama. What I would like to do is to highlight the political and public reaction to the accident and, finally, its impact on nuclear energy and anti-nuclearism.

Carter was at his best during the crisis. He showed unusual leadership and personal concern. The president reacted angrily to Met Ed's behavior (during a phone conversation with NRC Chairman, Joseph Hendrie, he accused Met Ed of trying to "to protect the power company and not the people"), criticized the lack of coordination and information at the plant, and did not hesitate to go to Three Mile Island, accompanied by his wife. Carter's would be the last visit of an American president to a nuclear plant for more than 25 years, until 2005, when President Bush visited the Calvert Cliffs reactor in Maryland, lauding a "completely domestic" energy source and declaring that it was finally time for "this country to start building nuclear power plants again."[19]

Although marked by an embarrassing accident (the dosimeters given to Carter and his wife had not been cleared before use, and they signaled a very high level of radioactivity so for a few, panicky minutes, it was thought that the President had been irradiated), Carter's visit succeeded in restoring confidence – both in the government and NRC – and partially placating anxieties among the local population. Middletown's mayor, Republican Robert G. Reid, described the visit as "a shot in the arm … people felt … he would not come here if things were really that bad." In retrospective interviews, many stressed the importance of Carter's visit and declared they were "impressed by the fact that Carter and his wife made the symbolic gesture to come up" (Walker, *Three Mile Island* 183).[20]

While he was able to demonstrate his technical and managerial competence on the issue, Carter proved unable to deal with the political implications of the "emotional fallout" caused by the Three Mile Island accident. The same was true of most pundits and commentators, who generally believed that Three Mile Island had not radically altered the

perspectives of nuclear energy in the United States. Some commentators resorted to the typical tropes of the "package progress." "What we ought to be thinking of is the Titanic disaster," wrote science and health policy expert Daniel S. Greenberg in the *Washington Post*. "The sinking of the unsinkable, it's worth recalling, had no long term effect on transoceanic passenger traffic … the determinants will be the porosity of public memory and the fact that while nuclear power might not be indispensable, it is very, very useful for a country that likes to live high." In the same newspaper, conservative pundits Rowland Evans and Michael Novak praised James Schlesinger's no-nonsense approach while criticizing Carter's propensity to "appease the Left" on nuclear issues. "The salient fact," proclaimed an editorial of the *Wall Street Journal, "*is that despite the high drama no one was hurt. It remains true that in 25 years of experience with nuclear power, no member of the general public – and very few utility workers – has suffered any injury from it." Nuclear power was of course a dangerous technology, another editorial of the *Journal* added: "yet it is far from clear that such technologies are intolerable. No one suggests abandoning air travel … very few people are willing to give up their automobiles, despite the statistical risk. For that matter, much of the public continues voluntarily to expose itself to cigarettes." Columnist Leonard Larsen and the *Denver Post* concurred. "Anti-Nuclear propagandists" had vainly hoped for the worse, Larsen argued: for them "the Three Mile Island accident would have been a much more satisfactory event if the thing had blown to smithereens or even the reactor meltdown had occurred." At end, however, "despite frenzied published and broadcast reports of the escape of radioactive gas … there has been no loss of life or injury. Not even a dead fish from the river nor a fallen sparrow have been listed as casualties of the 'disaster'," Larson proclaimed with remarkable confidence.

In *Commentary*, Samuel McCracken, later author of the very pro-nuclear *The War Against the Atom* (1982), was instead much more blunt: "the fact of the matter is that, taken as a whole, the accident at Three Mile Island generally confirms what we have been told about nuclear power. Where it does change our understanding, it not only suggests ways we can improve nuclear safety, but also that we have in some respects underestimated the degree of the safety we have already attained;" John Osborne in *The New*

Republic was only marginally less radical: "The anti-nuclear community's view, some of it asserted by crums who've been looking for a cause since the end of the Vietnam's war, that the Three Mile Island disaster justifies the end of all industrial nuclear power programs and endeavor, is callow nonsense." "The woes of the Three Mile Island nuclear power plant … have restored a carnival atmosphere to the Left that had been missing since the Vietnam War," *The National Review* maintained.

Two other themes frequently emerged in the commentaries on the accident. The first was the ambiguity of nuclear technology in a period when faith in technological solutions, in "techno-fixes," had drastically declined. The second was the striking contrast between the necessity to take brave decisions (i.e.: to continue invest in nuclear energy) on the one side and the awareness of the paralysis of the decision-making process, caused by political polarization and lack of Presidential leadership, on the other. "We want somebody to tell us that it will be all right. We are waiting for that … there is an unnamable fear to what is going on in Pennsylvania," Roger Simon of the *Chicago Sun Times* wrote. "We have an overpowering, awe-inspiring faith in technology in this country. Technology got us into this mess and – most of us believe – technology will get us out." Three Mile Island, the *Los Angeles Times* proclaimed, was the "end of technological innocence." Nuclear power had still many "mysteries" and "the plant at Three Mile Island has sent the country a powerful message … :think again. Think hard about how much more deeply you want to be committed to a technology about which you obviously have much to learn." "Nuclear risks are in the realm of witchcraft," pro-nuclear *Financial Times* correspondents David Buchan and David Laschelles wrote.

If the answers to further investment in nuclear technology had to be a yes, as most commentators believed to be the case, Carter had however to finally act as a leader and rise "above the technical and administrative quarrels that usually preoccupy him, and address the larger principles of policy here – those principles that, taken together, comprise the ethics of risk." Offering a bizarre historical analogy, *The New Republic* presented the accident as "the moral equivalent of Verdun." "Nuclear power" – the magazine argued in its first editorial on Three Mile Island – "is the classic illustration of our present political paralysis. It is an important social

decision that is not being made, while the costs of indecision are probably greater than the costs of a wrong decision either way" (why a wrong decision was better than indecision was left to the readers to understand).

Conclusions

Aside from the usual suspects – *The Nation*, *The Progressive*, and publications of environmental groups – one would struggle to find analyses that not only called for terminating any investment in nuclear energy but actually predicted it. In fact, Three Mile Island sanctioned the virtual freezing of the nuclear industry in the United States. According to Nixon's "Project Independence," by the year 2000 nuclear power would have provided 50% of U.S. electrical production. Today, it provides approximately 19% of the total electrical output. The 104 reactors currently in use were all licensed before 1974, although 16 license applications to build 24 new nuclear reactors have been submitted since mid-2007, and it is now expected that 4-6 new units will come on line by 2020. Comparing the BP spill in the Gulf of Mexico to Three Mile Island and denouncing Barack Obama's "fantasy of energy independence," James Schlesinger recently complained that "Three Mile Island" had "killed the nuclear industry for 30 years."

Candidly reflecting on the accident, NRC commissioner Victor Gilinsky offered a more sober assessment some years after the accident. "Can we live with nuclear energy?" he rhetorically asked. The answer was "yes, but only if we are willing to pay the price of living with dangerous high technologies. That price is extraordinary care, discipline and superior craftsmanship" (18-20). Those were the basic preconditions for continuing the expansion of nuclear power after the Three Mile Island accident: acceptance of risk; high discipline (in the form of strict regulations and monitoring); higher costs imposed by such discipline (and therefore heavy public subsidies); willingness of individuals and communities to subordinate their interests to a higher common good; and trust in technocrats and politicians. It is easy to see how these conditions were mostly lacking after 1979. Decreasing oil prices made investing, politically and economically, in nuclear technology even less attractive. Nuclear technology – with its

"mysteries" and contradictions – was inherently divisive and polarizing. As Samuel Walker underlined, "Like a religious controversy, the nuclear power issue was so emotional in part because it could not be resolved through available information. All the key questions surrounding the technology … were subjects of dispute among experts" (2004, 25). Yes, dangers were widespread and more people had died from plane crashes and coal pollution. But the mysterious and invisible nature of radiation posed it in a league of its own, practically and, even more, symbolically. The menace was perceived as eluding the body and the senses – of being ultimately beyond control (Erikson, Parr).

The effects of Three Mile Island – of the small doses of radiation released during the crisis and afterwards – are still impossible to assess. In the aftermath of the accident there were frequent claims about the dramatic after-effects; sensational stories about birth defects, malformations, and animals' abnormalities circulated widely. They proved to be unfounded. The vast majority of the studies undertaken in the past thirty years have minimized the impact on the health of local residents. Relying on earlier assessments, Carter's Health, Education and Welfare Secretary Joseph A. Califano Jr. estimated that there could be only one excess cancer in the area (Hatch et al., "Cancer Near"; Hatch et al., "Cancer Rates;" Talbott et al, "Mortality Among the Residents"; Talbott et al., "Long-Term Follow-Up of the Residents"). But more recent works have resuscitated the early controversy. Epidemiologist R. William Field has observed that the counties around TMI "have the highest regional radon potential in the United States." And in a highly controversial article in the September/October 2004 "Bulletin of the Atomic Scientists," Joseph Mangano, the National Coordinator for the Radiation and Public Health Project in New York, challenged early reassuring studies, using data on deaths (excluding accidents, suicides, and homicides) among those born near the site of the accident in the late 1970s. According to these numbers, the percentage is significantly (and consistently) higher than the Pennsylvania state average. Furthermore, prior to the accident, cancer death rates among children were 24% below the national rate, yet since the accident it has been 30% higher (31-35, Field 214-17).

Judgments are difficult. Mangano's samples have been criticized for being too small and selective. The controversy over the "real" effects of the

accident on population brings us back to the peculiarity of nuclear power – power-beyond-power/power too powerful to be controlled and used – and the impossibility to neatly separate its military and civilian dimensions. In the aftermath of the accident, the common analogical reference adopted in both commentaries and personal memoirs was not another natural catastrophe (such as the flood experienced in 1972 by Three Mile Island residents), but Hiroshima. In 1972 "I could see what I was fearing: the water," a local school teacher declared. "But with radiation, you couldn't see it. I think it's the unknown that makes it very hard to accept." It was frightening "in the sense that it's unknown. Radiation is invisible … if a flood comes, or a hurricane, you normally have warning …Camus's *The Plague* came to mind," added a Dickinson college teacher. According to a local police officer, "in a hurricane or flood you can see the damages … but here they say, 'this could happen, this could happen. There could be invisible radiation seeping out'. It's a different type of fear." "All I could think of was just the great big … cloud of Hiroshima and so forth and then total devastation and nothing," another interviewee affirmed. It was impossible not to picture an "explosion" of the plant: "Kind of like someone dropped a bomb on Hiroshima or something," an 18-year-old commented. "You think about what happened in Hiroshima … the talk of Hiroshima would come up," another interviewee emphasized. "I thought of the nuclear bombs exploding," a 25-year-old (born therefore in 1954) said. "Like in Hiroshima … it was frightening because you had so many unknown conditions." "Flood," another interviewed commented, "you can go someplace or there is always an answer for it. In a hurricane you can run to the basement at least. But something you can't see, that's what you don't have no control over" [sic].[21] Perhaps it was inevitable. Hiroshima was "the prototype of human experience with nuclear disaster prior to the Three Mile Island Emergency," wrote Lonna Malsmheimer, the coordinator of the TMI Oral History project at Dickinson College. (35)

Three Mile Island contributed to a simplified nuclear narrative in which radiation was "one," invisible and indivisible, whether it came from weapons or reactors. The peaceful and friendly atom, the luminous and progressive face of nuclear power, ceased practically to exist. After 1979 there was no space in the public discourse for nuclear fantasies and wonders. At most,

not abandoning nuclear power could be justified as a form of sacrifice to which people were called in the name of a superior good (independence, sovereignty, even consumption), not as an opportunity – a way to the future – but as an agonizing necessity. The indivisibility, in most people's perceptions, of military and civilian nuclear power helps to explain another element of Three Mile Island: the inevitable, global reverberations of all things nuclear. Following the accident, protestors took to the streets across the United States and Europe: "we are all Harrisburg" became the slogan of many of these protests. It was a crucial moment in the emergence of a powerful transnational anti-nuclear movement, where traditional pacifism (anti-nuclear weapons) now combined and merged with the new political environmentalism (anti-nuclear energy).

Successive choices on nuclear energy varied from country to country. The response to Three Mile Island showed, however, how NIMBY-like forms of activism and protests matched with global sensibilities and mobilizations. Not accidentally, the atom was able to catalyze this connection between the local and the global. Nuclear power and the fear (and possibility) of radiation, in weapons as well as reactors, came to embody the frightening face of interdependence: of a danger that, for its nature, could not be limited and contained; that could move – hidden and lethal – across borders and nations.

Finally, in the case of the United States as well as other countries, deep political and cultural trends were creating an environment even less favorable for nuclear power. The post-1970s age of confusion, fragmentation, and "fracture" could not be a propitious period for the resurrection of the battered nuclear industry. This resurrection would have required conditions that were simply missing: a strong state; national cohesion; sense of a collective destiny; readiness to sacrifice. Deindustrialization was not conducive to investments, subsidies, and research in a heavy industry such as the nuclear one. Once cheap oil from the Middle East began to flow again, and the U.S. President made clear that deficits and debt were not major concerns anymore, nuclear advocates found themselves even more isolated.

The loss of faith in experts, science, and politicians made nuclear technology even less appealing and defendable. New deregulatory dogmas clashed with an industry that needed to be hyper-regulated to become

again acceptable. The emphasis on choice and agency, instead of structure and power, inevitably damaged the nuclear industry. The "rediscovery of the market" (Rodgers 41) rocked an industry that – claims to the contrary notwithstanding – was simply not profitable (to the point that no attempts were ever made to quantify the costs of virtually perennial nuclear waste). The increasing emphasis on the "here and now" ran against the long-term investments and careful planning required by nuclear energy. "Populist market optimism," "Pessimism about possibilities of governance," collective disaggregation "into a field of microplayers" – all the different formulas recently used by Daniel Rodgers to describe the post-1970s fractured and pulverized United States – highlight conditions that a nuclear industry long complacent and unable to deal with its contradictions simply could not handle.

Notes

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[2] GPU Inter-Office Memorandum on Three Mile Island Unit 2, 27 Nov. 1978, Waidner-Spahr Library, Dickinson College, Carlisle, Pennsylvania (hereinafter WSLD), Morris K. Udall Papers (MKUP), Box 1. This minor accident happened when the second unit of Three Mile Island was about to go online.

[3] It was Lewis Strauss, the Chairman of the United States Atomic Energy Commission, who in 1954 claimed that thanks to nuclear power "children will enjoy in their homes electrical energy too cheap to meter." ("Abundant Power from Atom Seen.")

[4] In addition to "Our Friend, the Atom," various other nuclear-themed entertainment comic books were published: "Atomic Mouse" (1953-1956), "Atomic Rabbit" (1955-1958) and "Atom the Cat" (1957-1959).

[5] Despite the fallout controversy of the late 1950s, and the fear of radiation, polls showed a consistent support of the public for atomic energy.

[6] Richard Nixon, "Special Message to Congress on Energy Policy", and Gerald Ford, "Remarks About Proposed Legislation to Increase Enriched Uranium Production".

[7] Todd Gitlin, *Breaking the Dance of Death*, "Peace and Democracy News. Bulletin of the Campaign for Peace and Democracy, East and West," 1 (1985), The Tamiment Library and Robert F. Wagner Archives, New York (hereinafter TLRFWA), Campaign for Peace and Democracy/East and West (CFPD/EW), TAM 462, Box 1.

[8] "Excerpts from Carter's Speech on Nuclear Policy."

[9] John O.Pastore (Senator, Chairman Joint Committee on Atomic Energy) to Governor Carter, 16 June 1976, Jimmy Carter Presidential Library, Atlanta, Georgia (JCPL), White House Central File (WHCF), Box AT-1

[10] The most important was James Gustav ('Gus') Speth, a lawyer and co-founder of the Natural Resources Defense Council, who was appointed Chairman of the Council on Environmental Quality.

[11] Schlesinger to Carter, "Breeder Review Report," 7 Apr. 1977, JCPL, Staff Offices. Office of Staff Secretary. Handwriting File (SO-OSS-HF), Box 16.

[12] Stu Eisenstat to Carter, 7 Nov. 1977, JCPL, SO-OSS-HF, Box 58.

[13] Charles Warren, Gus Speth, Marion Edey, *Memorandum for the President, "Administration Policy on Domestic Nuclear Power,"* 31 Oct. 1977 and Jim Schlesinger, Stu Eizenstat and Frank Moore, *Memorandum for the President, "Proposed statement on Nuclear Policy,"* 3 March 1978 both in JCPL, WHCF, Box AT-1; Schlesinger to Carter, *Breeder Review Report*, 7 Apr. 1977, JCPL, SO-OSSHF, Box 16; Frank Moore to Carter, *Meeting with Rep. Walter Flowers*, 28 Feb. 1978, JCPL, SO-OSSHF, Box 74.

[14] Schlesinger to Carter, *Clinch River Breeder Reactor*, 17 March 1978; Stu Eizenstat to Carter, *Breeder Program – Decision Memo*, 26 March 1979.

[15] John Wydler to Carter, 4 Apr., JCPL, SO-OSS-HF, Box 79; Annette Stevens (Chairman "Citizens for Maine Yankee") to Carter, 21 June 1979 and Sam Volpentest (Executive VP of Tri-City Nuclear Industrial Council, Washington State) to Mike Berry (President of Seattle – First National Bank), May 1980, JCPL, WHCF, Box AT-3.

[16] Information on the activity past and present of Three Mile Island Alert can be found at http://www.tmia.com. Web. 2 July 2013.

[17] The Harrisburg Center for Peace and Justice to Pennsylvania Department of Health, 27 March 1979, WSLD, Three Miles Island Alert (TMIA), Box 1.

[18] This synopsis of the accident is based on the abovementioned volume and on Walker, *Three Mile Island.*

[19] Telephone conversation Hendrie – Carter, 30 March 1979, JCPL, SO-OSS-HF, Box 125. Matthew L. Wald and David D. Kirkpatrick, "On a Rare Visit, Bush Talks Up Atomic Power."

[20] Charles Seller, 46, Executive assistant to the President of Dickinson College, interviewed by Anna Herrmann, 17 Aug. 1979, WSLD, Malsmheimer Files, TMI Oral History Program (MF-TMIOHP), Box 1.

[21] Barbara Gordon, 56, Health and Physical Education Teacher, interviewed by Gail Robinson, 26 June 1979; Michael Kline, 39, College teacher, interviewed by Anna Herrmann, 3 Aug. 1979; Lyle Herr, 22, Campus Police Officer, born in Lebanon interviewed by Anna Herrmann, 18 Aug. 1979; Doug and Kim Strauss, 30 and 39, High School Teacher and Housewife, interviewed by Martha Thompson, 6 June 1979; Otis Saunders, 18, student, interviewed by Bob Hupp, 25 May 1979; Howard Baum, 52, Director of Auxillary Services, interviewed by Anna Herrmann, 29 Aug. 1979; Kay Flohr, 25, Telephone employee, interviewed by Tim Longwill, 19 July 1979, WSLD, MF-TMIOHP, Boxes 1-2.

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The Three Mile Island power station is near Harrisburg, Pennsylvania in USA. It had two pressurized water reactors. TMI-1, a PWR of 800 MWe (775 MWe net) entered service in 1974, and remains one of the best-performing units in the USA. TMI-2 was of 906 MWe (880 MWe net) and almost brand new at the time of the accident.Â The chain of events during the Three Mile Island accident. Within seconds of the shutdown, the pilot-operated relief valve (PORV) on the reactor cooling system opened, as it was supposed to. About 10 seconds later it should have closed.Â The court has searched the record for any and all evidence which construed in a light most favourable to Plaintiffs creates a genuine issue of material fact warranting submission of their claims to a jury. This effort has been in vain."