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The Closing of the Yankee Rowe Nuclear Power Plant: The Impact on a New England Community

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THE CLOSING OF THE YANKEE ROWE NUCLEAR POWER PLANT

The Impact on a New England Community

America's nuclear power companies for the first time, face reduced demand and a resulting decline in generating capacity that will affect not only the industry, but also the communities that have become dependent on the "nuclear economy." Across the United States there are 111 nuclear plants; approximately twenty are expected to close by the year 2012 (Pasqualetti 1991a, Allen 1996.) While many Americans applaud this trend, the fact remains that the closings will bring extensive economic hardships to the communities and regions where the plants are located. This paper is a case study of the local effect from the closing of Yankee Atomic Electric Company's nuclear power plant in Rowe, Massachusetts. The authors conclude that decisions to close nuclear power plant are highly unlikely to consider the local impacts that may occur. The paper is intended as a start toward understanding how the closing of nuclear power plants affect local and regional economies, and considers the role that the federal and state governments can have in helping communities shift to a non-nuclear economic base.

Until recently, the literature on decommissioning nuclear power plants has consisted almost exclusively of technical reports in trade journals with little interest to the general public. There is little public awareness of the approaching age of decommissioning and even less recognition that the process has already begun. Approximately 50 research (nongenerating) reactors have been dismantled, and 24 government and commercial power plants have been decommissioned. It is estimated that 72 reactors, totaling thousands of megawatts of generating capacity, will come due for decommissioning between 1992 and 2012. This process will, undeniably, need a trained workforce, waste depositories, funds, and careful local planning—little of which now exists (Pasqualetti 1991a; Allen 1996a).

Nuclear policy has recently become more responsive to public attitudes and pressure. Special interest groups have often succeeded in influencing the siting and operations of nuclear power plants and dump sites. Notable examples of public influence include the injunction to shut down the Saxton Reactor, in Saxton, Pennsylvania, until 1997; making permanent the temporary shutdown at the Humboldt Plant, in Eureka, California; and achieving the dismantling of the Shoreham Plant, in New York, without its ever having operated at full power or generated the funds to pay for its own decommissioning. Other communities affected to varying degrees by public pressure concerning nuclear power plants include Three Mile Island, Pennsylvania; Indian Point, New York; Rancho Seco, California; Dresden, Illinois; Nine Mile Point, New York; and the locations of several Yankee Plants in New England (Pasqualetti 1990; Ballard et al. 1991; Pasqualetti and Pijawka 1996). It is also interesting to note that nuclear power plants are becoming pawns in local development strategies. For example, town officials in historic Plymouth, Massachusetts expect Boston Edison's Plymouth Nuclear Plant to close in the next decade; the closing will mean a loss of live to seven million dollars in property tax revenue, approximately 25 percent of the town's property tax base (Allen 1996b). A local developer has used the prospect of revenue loss as a key argument for being granted a permit to build a proposed mega development on a nearby site (Curran 199s).

The thesis of this paper is that decisions to close nuclear power plants are likely to ignore the effects on their local communities. It is clear that, without assistance from government or the utility companies, such communities will then struggle economically for years and possibly decades. The paper contributes to the growing body of planning literature that addresses the responsibility large institutions or companies have toward their local communities when they close major installations. In many ways, communities where nuclear power plants close face the same kinds of issues as do those that lose military bases, mental hospitals, or tuberculosis hospitals. They are left with buildings and grounds that usually are aged, difficult to revitalize, failing to meet current standards for production layouts, and poorly located. In one way, however, the problems of reusing nuclear sites are uniquely difficult, for along with the aforementioned obstacles, a seemingly ineradicable stigma is attached to them. Simply stated, the site of a closed nuclear power plant, whether encased or dismantled, is unlikely to be selected for any active economic use. Other questions that arise concerning nuclear power plant closings and that have no clear cut answers are also examined here: the appropriate role for planners at various levels of government, and the issue of equity.

The paper has three main sections. The first sets the theoretical framework for the case study; the second is a case study of the local effects from the closing of the Yankee Atomic Electric Company's (YAEC's) nuclear power plant in Rowe, Massachusetts. The final section explores the implications of the case study, with the hope that it will stimulate discussions of how the federal and state governments can or should assist communities who are struggling with the transition to a non-nuclear economic base.

The Theoretical Framework

The nuclear power industry is undergoing extensive changes. Reduced demand and changed attitudes toward nuclear energy are resulting in plant closings. Because of the changed attitudes concomitant with local economic conditions, institutional imperatives, and the local politics of plant closings, the local consequences of plant closings are being ignored. Three separate bodies of theory may shed some light on the politics of decommissioning; they are the theory of attitude formation (Ajzen and Fishbein 1980; Dear and Taylor 1982), the political dynamics of plant closings (Staudohar and Brown, eds. 1987; Portz 1988), and theories about the collapse of nuclear energy (Campbell 1988; Morone and Woodhouse 1989; Pasqualetti 1990). This section briefly discusses these theories and highlights the lessons that are significant for the case study that follows.

Theory of Attitude Formation

The theory of attitude formation provides a framework for analyzing how community attitudes toward certain unwanted uses develop. The theory of reasoned action proposed by Ajzen and Fishbein (1980) assumes that social behavior is the product of a rational thought process. Attitudes are based on an individual's salient beliefs, which may have either personal or societal origins. The factors that shape beliefs are external to an individual's mental processes. They include variables of social and demographic status and also contextual factors.

One outcome of attitudes is the degree of acceptance or rejection of a facility, which certainly played a role in the YAEC case history. Anxiety about nuclear disasters rose as community groups raised questions about the consequences of the nuclear facility's presence. Those attitudes led to the formation of a local action group in Franklin County who expressed their clear belief that the region should not have to bear the responsibilities and risks that the nuclear facility brought.

Ajzen and Fishbein (1980) argue that, with respect to a particular social behavior, an individual holds two types of beliefs: behavioral beliefs, which are generated by one's personal perceptions of the consequences of the behavior; and normative beliefs, which are shaped by social influences. Behavioral beliefs may arise from perceptions of, for example, the effects on personal safety, property values, noise levels, traffic volumes, or neighborhood character. Normative beliefs could originate as responses to authority and to societal concerns such as environmental safety.

As nuclear technology comes to seem more complex and less accessible to the average person, normative beliefs take on an important role; people depend on the experts. Until the 1960s, the public perceptions of nuclear power tended to be positive: there was consensus among the experts, which reassured the public. In the 1970s, consensus began to break down. It became apparent from regulatory debates that the experts did not agree. When people couldn't understand the issues and the debates, and the experts disagreed, people sided with the experts who shared their views on those issues they did understand (Morone and Woodhouse 1989).

The Political Dynamics of Plant Closings

The dynamics in a plant closing are comparable to those in the decommissioning of a nuclear power plant, in that they involve government officials, regulatory agencies, special interest groups, and private business, as well as the other members of the community. Yet, although the process of adjustment remains similar, the politics of plant closings differ from those of nuclear decommissioning. Government interventions at the local, state, and national levels can shape the outcomes of plant closures and the subsequent adjustment. However, unlike traditional plant closings, nuclear decommissioning often entails contradictory public responses and requirements. In traditional plant

closings, government interventions typically first try to avert the plant closing by providing financial assistance, infrastructure improvements, or other support, and then to alleviate the problems caused by the closing, through re-employment centers, retraining programs, and other assistance (Portz 1990). But in the case of nuclear decommissioning, the politics of local government intervention are polarized, nondirective, and often superficial. In either case, furthermore, the degree of government involvement varies from minimal to active. Minimal adjustment aid is that dictated by the private sector with little or no input from the government or the community. Moderate government intervention is to act as a facilitator and provide resources to the private sector with the aim of bringing about a successful, mutually acceptable adjustment. Active government intervention shapes or imposes an adjustment process (Portz 1990).

Although the literature and laws on plant closings deal mainly with whether and to what extent laws should protect affected workers and communities, several arguments for and against government involvement may apply to nuclear decommissioning as well. To date, federal legislation has simply required advance notice of plant closures and also worker adjustment and retraining efforts. When it comes to nuclear decommissioning, these requirements pose an interesting dilemma. Although the reasoning behind the advance notice requirement-averting economic and psychological distress and honoring corporations' social obligations-holds true as well for nuclear power plants, meeting this requirement is often unfeasible. Decommissioning decisions are rarely made by the company in a vacuum.

Theories About the Collapse of Nuclear Energy

The collapse of the nuclear energy industry is a classic example of the fate of socially unacceptable technology. The history of nuclear power can be attributed to technological inertia and to the blend of democratic debate and decision strategy necessary to shape and reshape technologies to match evolving social preferences (Morone and Woodhouse 1989). Civilian nuclear power in the United States has triggered widespread fear and disillusionment about its benefits. Some of this disenchantment can be explained by the ongoing lack of public involvement and information.

In a process that Charles Lindblom defines as the "intelligence of democracy," policy achieves acceptability gradually as it undergoes a series of adjustments. The original policy is revised in small, reversible steps in response to feedback about errors, interpretations, and changing perceptions about needs and opportunities. The original decisions about nuclear energy and policy were made by a relatively small group without the widespread consultation and debate that often accompanies major decisions. Thus, by denying the public the right to question their plans, the proponents of nuclear power in industry and government damaged their credibility and enhanced the legitimacy and power of their critics (Bupp and Derian 1981). Furthermore, as the policy was formed, the structure of the regulatory apparatus on safety issues was closed to citizen input, but not to corporate input, so that the public saw the government to be favoring corporate interests over their own. The public's distrust and suspicion then led to deliberate confrontations at sites of nuclear power plants. (Campbell 1988).

The policy favoring nuclear energy use has had both advocates and antagonists. Advocates point to France and Japan, which rely extensively on nuclear power. They assert that even accepted technologies such as pesticides, coal as fuel, and chemical plants are not fully compatible with environmental values, and that most have hurt more people every year than American nuclear power has done so far in its history. Antagonists, on the other hand, point to a long list of poorly managed plants, construction flaws, huge cost overruns, and a thoroughly muddled and biased regulatory system (Motone and Woodhouse 1989).

Nuclear technology, however, seems more complex than other technologies, and less accessible to the average person. Well-publicized accidents and crises at operating reactors, coupled with revelations of shoddy construction, questionable operator training, and poor maintenance at some plants, clearly have moved the public toward increasing skepticism.

Lessons Significant to the Case Study

All three theories outlined here present lessons. One is that a continued effort to improve public awareness and information about nuclear safety and to recognize and accommodate legitimate community fears about nuclear facilities would help to create more positive attitudes among citizens. Another is that, in the simplest terms, nuclear decommissioning is akin to an industrial plant closing. However, the scale, expense, and time for a nuclear power plant decommissioning far exceed any ordinary plant closing's: the process is both extremely complex and seemingly endless. That is why it must be carried out with sensitivity and extra diligence.

Case Study of the Decommissioning of the Yankee Atomic Electric Company Plant, Rowe, Massachusetts

This plant began operating in 1960 and was closed in 1992. It is now undergoing the time-consuming process of decommissioning. The plant was one of the largest employers and taxpayers in Franklin County, the poorest county in Massachusetts. Today, although crews are still intermittently dismantling the facility, it sits quietly as a reminder of an increasingly questioned technology. Robert Weissman (1992) called the plant a "Nuclear Tombstone." This case study, it is hoped, will be a starting point for understanding how closing a nuclear power plant profoundly affects the regional economies.

The Regional and Local Setting

Most people consider Massachusetts to be a highly urbanized state. The mind's eye envisions the economically vibrant, highly populated, culturally rich, and historic cities of Boston, Lowell, or Worcester, or the high technology belt along Route 128. Fewer people are familiar with Western Massachusetts (around 100 miles west of Boston), with its rolling hills, blue-collar mill towns, strong agricultural base, and small, rural communities. The town of Rowe (population 357) is situated in this "Other Massachusetts" (Tree 1987) (map 1).

Rowe is surrounded by the equally small towns of Charlemont, Heath, and Monroe, which form the western section of Franklin County, and the town of Florida, in eastern Berkshire County. Franklin County, rich in history, was renowned for its nineteenth century cutlery, tool making, and tap and die companies. Throughout the twentieth century, however, as settlers moved west, as tastes changed, and as world competition increased, the county slowly glided into a genteel poverty that still continues. Over the past decade, for example, large plants—the Bendix Corporation (electrical components), the Greenfield Tap and Die Company (tool making), the Deerfield Glycine Paper Company (glazed papers for mail envelopes), and the Merrilat Company (wood cabinets), among others—have closed or dramatically curtailed operations. The industrial base of Franklin County, though showing some signs of rebirth, is a shadow of its former self.

The nearest major highway, State Route 2 (the Mohawk Trail), is eleven miles south of Rowe. From the Rowe exit, a driver would move along a narrow road with sharp turns, through the village of Zoar and the town of Charlemont. They are among the poorest communities in Massachusetts, and look it: scattered mobile homes, rural shacks, untilled farms, and abandoned automobiles can be seen from the road. But the town of Rowe presents an entirely different landscape. Well paved roads, first-class institutional buildings, carefully maintained housing units and municipal signs reflecting New England's historic character abound (Werth 1991). The civic amenities include even the town dump, which is a "landscaped refuse garden." Elizabeth Kolbert (1991) has labeled YAEC itself as "perhaps the most picturesque nuclear power plant in America" (illustration 1). Approximately seven percent of the adult residents of Rowe worked at the YAEC plant.

Rowe has no town water or sewer facilities, one grade school, and three stores. As a relatively prosperous town, its roads, parks, town hall, and town garage are the envy of its neighbors. It is a quiet town with virtually no crime, no night life, and few formal activities for its young people. Indeed, the YAEC plant is located in such a sparsely populated area that of the 111 nuclear plants in the nation, the company would have had to evacuate the least number of residents in the case of a nuclear accident (Roche 1991a). As a nuclear scientist, Frank Wicks, noted, "YAEC has to be about the most obscure nuclear power plant in the United States" (Ackerman 1985).

YAEC and the Nuclear Regulatory Commission

The main offices of the Yankee Atomic Electric Company are in Bolton, Massachusetts, one of Boston's outermost suburbs. This highly successful company, like many other nuclear power companies in the United States, has been a target for antinuclear activists. The protests increased dramatically in the early 1990s after the company had applied for an extension to its license to operate the Rowe plant, and appeared to be reinforced by the spillover from the highly effective Clam Shell Alliance protests against the Seabrook Nuclear Plant in New Hampshire. Local protesters' signs said "Death Rowe," "Hell no, we won't glow," and "Guinea Pigs Unite" (Wald 1991a). (See illustration 2.) Sophisticated protests by the Union of Concerned Scientists, a powerful advocacy group, against the continued use of the plant were frequent (Roche 1991b; Wald 1991c). Finally, with the exception of former United States Representative Silvio Conte, nuclear power rarely met with any degree of enthusiasm from the Commonwealth's various governors, its senators, or members of its congressional delegation. At best, the politicians simply wished the plant would quietly go away (Nyhan 1988; Blixt 1991).

YAEC, despite the protests and the lack of political support, was proud of its Rowe plant as the nation's oldest commercial nuclear plant and one that was frequently cited as among the safest (Nuclear Power 1988; Dismantling of A Plant 1992). It was also one of the nation's smallest (200 megawatts, one-fourth the size of the huge Shoreham nuclear facility) and most profitable facilities. It produced power 74 percent of the time, well above the industry average of 66 percent (Tye 1988). Then-President Bush called Rowe a "model for the future of nuclear power" (Wilke 1991a); I. C. Bupp, an energy consultant with the highly respected Cambridge Energy Research Associates, stated: "For all practical purposes, YAEC has been a perfect machine" (Kriz 1991). YAEC executives believed the plant could be modernized and operated safely for years to come. The company's official policy was that every meaningful inquiry about the safety and efficiency of the plant should be responded to as rationally as possible; its stated position was that public and political support were important to its goal of providing power as efficiently, cleanly, safely, and profitably as humanly possible (Strategic Planning 1991).

During the spring of 1991, the Nuclear Regulatory Commission (NRC) began hearings in Washington, DC on the future of aging nuclear power plants. A major purpose of these sessions was to upgrade the NRC standards for safe operation. The Commission used YAEC as the test case in the deliberations because of its age and its reliability record, and because it was the first of many plants to seek twenty-year extensions of their expiring forty-year operating licenses (Wilke 1991a). When the NRC adopted new standards for safe operation, however, they were more exacting than YAEC could meet and still make a profit (Gelbspan 1992). The company appealed to the NRC for less stringent controls. The NRC not only refused, but recommended that YAEC be closed in the near future (Wald 1991b). Faced with virtually no options, the company chose to comply immediately: On February 26, 1992, the plant was permanently closed. The immediate response to the closing was quite mixed. The local antinuclear activists were jubilant, but a little stunned at having their battle over. The local nuclear energy supporters were angry-with the government, the company, and the activists. They had never thought that the plant would close permanently.[1]

YAEC's Economic Contributions to the Community[2]

The image of most utilities is one of a corporate monolith staffed by faceless bureaucrats in three-piece suits working in some distant city. YAEC achieved quite the opposite image. The company was well integrated into Franklin County and its communities. It operated on the premise that its workers, white- and blue-collar alike, should be involved citizens, that the company should take a leading role in public service, and that its success would be helped by creating a strong public-private partnership with surrounding communities. A skeptic might point out the advantage to the company of ingratiating itself with the community. After all, it is extremely difficult for citizens to become upset with or to protest against a company that is the leading contributor to local charities, that pays for a new town fire truck, and that funds extracurricular school activities. On the other hand, one could praise YAEC for following an enlightened set of corporate policies about its community responsibilities. It is our conclusion that Yankee was operating in both its own interest and that of the region and its communities.

During the last full year of plant operations (1991), YAEC's payroll was approximately \$12.5 million. In addition, it spent approximately \$3.8 million on goods, services, and municipal taxes in Western

Massachusetts, a region consisting of Berkshire, Franklin, Hampden, and Hampshire Counties (table 1). Its employees, residing in twenty-one different cities and towns in the county, were relatively well paid. The executives, with an average annual salary of \$55,000, were in the top 10 percent of all salaries in the county. The blue-collar, union work force of highly skilled technicians were paid an average of \$33,690 annually, placing this group among the county's top salaries for blue-collar employees. The office staff, with an average annual wage of \$25,900, earned approximately 25 percent more than the average for this group in the county. These figures depict a relatively prosperous work force that was spending a significant share of its income on goods and services in Franklin County and the Western Massachusetts Region. With such salaries and wages, it is understandable that YAEC's annual turnover was less than 2 percent. The work force appeared stable, secure, and confident of its future.

The company followed a policy of purchasing as much as it could in Franklin County. The range of purchases was quite broad. At one end, the company purchased high-cost consulting, marketing, medical, security, testing, and travel services. At the other end, retail "hard goods" were purchased from local building supply, department, furniture, and paper stores. In 1991, these purchases were spread among 125 small businesses in 12 communities across the county. A comparison of YAEC's purchasing policies with those of the small companies in the Western Massachusetts Region is revealing. While YAEC was buying its goods and services from small regional companies, these small firms tended to buy their goods from larger companies outside the region. In short, the larger company "bought local," but the small firms did not (Armstrong and Mullin 1987).

The company rarely turned down requests for assistance from charities and public service organizations. At times its participation was minimal (e.g., a \$25 donation to the local ballet company). At other times, YAEC's participation ensured that the United Way met its goals. In 1991, the company itself donated \$17,000 to nonprofit service organizations, beyond the contributions of its workers. It was regularly among the largest single donors to charitable causes in Franklin County.

The company's tax payments were substantial\$696,000 in property taxes for 1991 in Rowe, and \$14,000 in taxes to six other towns. The payment to Rowe was about 33 percent of all tax revenues. The town's ability to raise taxes is severely limited by the Commonwealth of Massachusetts' tax cap restriction, Proposition 2 1/2; moreover, the late 1980s and early 1990s brought severe recession and falling residential property values in the county. Thus, Yankee Rowe's taxes were critical to maintaining the town's superior services.

To further explore the nuclear power plant's economic role in Rowe, we applied the United States Department of Commerce National Input/Output model to measure the flow of dollars resulting from and stimulated by YAEC. Adjusted for inflation, the results show that every \$1.362 million of electric power sales contributed to creating 9.1317 jobs in the local economy. With \$70 million of electric power produced in 1991, YAEC directly contributed to the creation of 469 jobs in Franklin County and nearby Hampshire County. To put it another way, every 1.8 jobs in the Yankee plant created another job in the local economy. For personal income the results are equally strong. Every \$1.362 million of YAEC's electric power sales brought \$193,600 into the economy of the two counties. With all factors combined, the company's annual contribution to total personal income for 1991 in two counties was \$9,950,073 (table 2).

In fall, 1991, YAEC made public all the economic contributions from YAEC described in this section, through a series of press releases and conferences.

Five Years Later

At the writing of this paper more than five years had passed since the closing of the plant was announced. This section examines the effects of that decision.

Generally, there was a somewhat wistful feeling in Rowe that life just wasn't the same any more (Keller 1992; Kelly and Valette 1992). This was not simply a dollars-and-cents matter of jobs, taxes, and the economic base, but rather a loss of the community's strong sense of purpose. It was as if its identity as

a productive unit of society had blurred: it was no longer the home of the first, safest, highly productive American nuclear plant. Now it was the site of the first on-line nuclear plant in America to be closed under the NRC's new safety standards (Blixt 1993; Davis 1993c). A dubious honor! The former workers, who were professional, well paid, and loyal in their belief in nuclear power, the Yankee plant, and YAEC, clearly regretted no longer being affiliated with the challenging production of the "fuel of the future."

As of January, 1994, 120 workers (46 percent of the work force) had left the plant. Many had moved to other nuclear power plants in distant states: Michigan, Arizona, Texas, Washington. Some had retired. Ten had found jobs at Yankee's Bolton headquarters. Others had opted to stay in the area and take their chances for employment. YAEC clearly had a policy of holding on to workers as long as it could. Nonetheless, all the workers who still worked at the plant knew there was no future for them with the company. Out of approximately 250 workers, 31 were laid off in September, 1996, to lessen Yankee Rowe's financial burden from having the decommissioning process held up by litigation (Yankee Atomic Announces Layoffs 1996). Nothing signified YAEC's end as dramatically as the loading of two of the company's four generators for shipment to the area in Barnwell, South Carolina for disposal of nuclear wastes. After being carried slowly through Rowe's winding hills, the generators were placed on flatbeds to go by rail to their final site (illustration 3). With lights blinking and klaxons piercing the hills, it was indeed a funeral procession marking the fact that life in Rowe would never be the same (Feinstein 1993).

The departure of many YAEC employees changed the everyday life of the community. YAEC had strongly supported civic activities by its employees, who by all accounts had been leaders in local affairs. They had judged science fairs, supervised playgrounds, coached Little League teams, and led Scout troops. They had been volunteer fire fighters, town selectpersons, and members of many local boards. Their talents, willingness to help, and "can do" attitude were now sorely missed.

The town's retail businesses had suffered. The supermarket most used by Rowe residents had closed. A major undertaking in nearby Shelburne had failed to receive credit approval because the borrower's employment at YAEC was uncertain; a local resident had withdrawn his proposal to build a new restaurant (Valette 1992; Gordon 1993; Maloney 1993).

The serious financial effects for the region from the plant closing were apparent. In 1994, YAEC paid about \$200,000 in property taxes, which approximated 28 percent of what it had paid in 1991, and it expected to regularly request further abatements as the value of the plant declined. The revenue loss had directly affected town services. For example, the Town of Rowe and three neighboring towns had often consolidated funds to purchase an ambulance, and Rowe, by far the most affluent, had always paid the major part of the cost. In 1994, Rowe balked at paying 25 percent. YAEC had always contributed to such capital purchases as fire trucks, sanders, modular buildings, and civil defense equipment. Funding for these expenses now had to come from municipal tax revenues (Valette 1993a).

The effects of the plant closing can be most vividly seen in terms of schools. YAEC had been somewhat involved for years with the finances of the town of Monroe, whose town line lay just outside the site. In 1987, when Monroe lost its only major employer and was nearly bankrupt (Armstrong and Mullin 1989), YAEC had agreed to rent the town's former school, providing enough revenue to stabilize the town's tax base. In 1994, the loss of Yankee's revenues placed Monroe once more at the edge of bankruptcy, barely able to pay the tuition for its children to nearby schools (Mathews 1989). YAEC cut its contributions to a local fund that enabled all students in nearby communities to have a free lunch and a late bus; the parents and/or communities had to absorb those costs. Rowe's neighbor to the north, the small, impoverished town of Heath, faced an especially devastating change. For more than twenty-five years, Heath had sent its school children (K-6) to Rowe schools, with Rowe absorbing 80 percent of the cost. Heath paid only \$2,300 of the \$4,600 actual per-pupil cost (1993 rates). In 1993, however, Rowe voted to cap the number of students it would accept and to increase tuition until, in 1996, all Heath students would be paying full tuition (Maloney 1993; Valette 1993a). In response, Heath built an elementary school that was scheduled to open in September of 1996 (Raybuck 1995). Rowe voted not to allow Rowe students to pay tuition to attend the Heath school, but instead to open the Rowe school to students from other communities under the state's "school choice" law (Raybuck

1993; Valette 1995). It is questionable whether Rowe's decision to cap enrollment from Heath while opening enrollment to other communities, with an unofficial cap on the number of tuitioned students at no more than the number of Rowe students (Raybuck 1995), is financially sound.

With the dust yet to settle, it was clear in 1994 that Rowe and all the surrounding communities had to make dramatic changes in their municipal operations. Rowe had not yet reassessed its properties for tax purposes, but the consensus was that they would have depreciated in value. Heath had undergone reappraisal; local assessors estimated a six-million-dollar decline in property values, with the closing of YAEF as the major reason. Rowe had raised property taxes from \$4.86 per thousand of assessed value in 1993 to \$5.50 per thousand for 1996 (Metzbach 1996). Heath had raised its tax rates from \$16.43 per thousand in 1993 to \$20.04 in 1994 (Maloney 1993). Monroe was expected to request a bailout from the Commonwealth.

The antinuclear activists had not gone away, but continued to question YAEF about each phase of the decommissioning process. They voiced two major concerns. First, they believed that the YAEF process for removing all radioactive material was improperly rushed (Chandler 1995). For example, the company's transport of two generators from the plant to Barnwell, viewed in a citation earlier in this paper as a funeral procession, was accompanied by activists who labeled the train a "train of death" (Davis 1992; Feinstein 1993).

Second, the plant's critics pursued the issue of medical problems in the area. There were unsubstantiated reports of abnormally high county rates (\$0 percent above the national average) of four types of cancer, and of an extremely high number (700 percent of the norm) of children born with Downs Syndrome. The local representative in the state legislature had called for an exhaustive health study of area residents and plant workers, to be funded as part of decommissioning costs (Davis 1993a; Parker 1993; Howe 1997). Citizens Awareness Network (CAN), an environmental watchdog group, appealed to the NRC for public hearings on the levels of worker and public radiation exposure during decommissioning. Yankee Rowe officials said the levels were well below limits (Davis 1996b), but CAN members contend that the study's calculations were flawed (Burton 1996). Activists have filed complaints with the NRC about the lack of public hearings on Yankee Rowe's decommissioning and on the levels of worker radiation exposure during deconstruction and the transportation of radioactive waste (Decommissioning Halted at Rowe 1995; Gordon 1996). In short, as YAEF closed the plant, it continued to be scrutinized.

The decommissioning process did continue to provide jobs. Through the year 2003 the \$368.8 million project will employ up to 300 contractors or YAEF employees (Gordon 1995). Some are local and almost all will spend money locally, so the economic decline is likely to be a gradual process. Ironically, since YAEF is the first of many plants to go through the formal decommissioning process, the NRC has invited scientists and researchers from all over the world to study the aged reactor, and the visitors are contributing to the local economy (Moriarty 1993; Davis 1993b).

To summarize: closing the nuclear plant has affected all the residents of the area: where they work, the civic services they use, the charities they turn to and the businesses where they spend their money all changed. The basic economic effect of the closing will ultimately be the loss of 260 permanent jobs and of a payroll greater than \$12.5 million. Our calculation of the employment and personal income multipliers shows that the local economy will eventually have lost the means of producing 225 additional jobs and \$9,950,073 in additional personal income. In the total context of the local economy, this is not a devastating loss. However, jobs at similar wages with similar multipliers are not likely to come to the county. In other words, the county has lost a "flagship" company: YAEF had provided unusually well-paid white- and blue-collar jobs for its region. Residents will now have to settle for less.

Finally, there is the long-term effect of the plant's skeleton.[3] Although the area of the plant will be reconfigured to its pre-1958 state: a beautiful field at the edge of a crystal lake (illustration 4; compare with illustration 1), that will not occur until well into the next century. About sixty percent of the dismantling has occurred to date (Davis 1996a). However, its completion depends on plans being approved for interim and permanent storage facilities for high-level radioactive waste-an issue that has been mired in controversy at the federal level. A federal appeals court ruled in July 1996 that the government must live up to the 1982 law that set January 31, 1998 as the date to begin disposal of the

nuclear industry's spent fuel (Court Rules Against Government 1996). Current projections for acceptance dates at possible storage facilities range from 2002-2004 for an interim site on the Mescalero Apache Reservation, New Mexico (Tribe Agrees to Store Radioactive Wastes 1995), to 2010-2015 for the Yucca Mountain permanent repository (Court Rules Against Government 1996; Whipple 1996). Projections for the shipment date of Yankee Rowe's 533 radioactive, spent fuel assemblies range from the promised 1998 to the Energy Department's schedule of 2033 (Chandler 1995). In the interim, the company will have to build a storage facility and keep its spent radioactive fuel assemblies on site. This situation may keep the site in a "nuclear condition" for years to come. In the meantime, Rowe will be a town with an eroding tax base, a nuclear plant that is being ripped apart, and possibly a depository of radioactive rods.

Implications of the Case Study

The YAEAC case study brings to light concerns that may have national significance for communities where nuclear power plants are closed. The first concern is whether closing a nuclear power plant is any different from closing a simple factory or a military base. Our opinion is that there is a major difference. As discussed in the theoretical review section on the political dynamics of plant closings, the magnitude of the scale, expense, and time for nuclear decommissioning far exceeds that for industrial plant closings. The conditions that necessitate the closing and the remedial action needed thereafter are very different for nuclear and for manufacturing plants. Furthermore, a nuclear plant's decommissioning process is long: in the case of YAEAC, it will take at least ten years. In contrast, for example, the Digital Equipment Corporation closed several plants in less than a year, and Fort Devens, New England's largest military post, was vacated in less than three years. In both cases, new uses were being proposed and explored well before the facilities had been emptied.

The second concern is the fact that adaptive re-use for a decommissioned nuclear plant is uniquely problematic. What organization would be willing to take on the risk of revitalization and the concomitant liability for the plant's and the site's health consequences in the region? In the short-to-moderate time frame, economic re-uses for the site are virtually impossible. The problem can be compared in principle, though not in scale, to the impediments to re-use of contaminated Superfund industrial sites. Some antinuclear activists have proposed that the Rowe facility be left intact for decades to come, to permit the core's radioactivity to decline. Others have proposed that the site be restored to the pristine natural area that existed before the nuclear plant was built (Holdsmith 1991). The second option seems the most feasible.[4]

The third concern is the prevailing negative attitudes and stigma associated with the site of a nuclear power facility, as with other unwanted uses. As discussed in the theoretical section on attitude formation, peoples' perceptions of certain unwanted uses influence the siting, presence, and operations of certain facilities and their closing as well. Do these perceptions subside once the facility is closed? Is the stigma magnified because the facility was forced to close, raising the possibility of the closing signifying the failure of a plant that was suspect to begin with? It is uncertain whether the town of Rowe will carry a stigma that makes it impossible to attract new investment. Franklin County is already losing jobs and becoming a home of commuters. In fact, the county already has tens of acres of open land zoned for industry and hundreds of thousands of square feet of vacant mill space. Given the isolation of Rowe and the fact that better sites are available for economic uses, the chances of Rowe attracting development there under any rational circumstances are slim. Conversations with local realtors suggest that there is every likelihood that residential property values will continue to fall during the decommissioning, because of the lack of jobs as well as the plant being dismantled. While they do not believe that the community will have the stigma attached, for example, to Love Canal through environmental disaster, realtors do not believe that the vicinity of a decommissioned nuclear plant is a positive selling point, particularly if radioactive rods are stored there.

A fourth issue is what obligation of the owners arises from decommissioning the facility. As noted previously, the process is not expected to be completed until at least 2004. In the meantime, it is expected that the value of the site will decline, housing values will fall, and the tax base will erode. Furthermore, the likelihood of attracting new investment is virtually nil. Given these circumstances, it would appear that aid from some source is in order. But which should it be? YAEAC could argue rationally that the company is no different from any other business and that market conditions dictate the profitability of the site. They could also argue that they have paid their share of taxes for the past

forty years and that the property is theirs to do as they wish with, within the limits of law. Yet, if we accept the assumptions that the effects of decommissioning are so comprehensive and will last so long, such YAEK arguments can be countered by pointing out that through decommissioning, the company is hindering the possibility of the community's recovery. It therefore may have the same obligation to help as any company that has, for example, created a Superfund site. Nonetheless, there are no legal requirements for the company to help the community. YAEK is now acting well within the legal guidelines for its responsibilities to the community; its ethical stance is the same as that adopted by most large companies that are downsizing. We fear that these guidelines and positions are too meager.

Finally, a major concern when examining this case history is the role of the municipal and regional planners. The town of Rowe has no professional planner, and the county has a staff of five for a 26-town area. That staff is overwhelmingly oriented toward transportation and environmental issues. In fact, only one of the five planners provides technical assistance to communities. The former county planner had been strongly opposed to the operating and then the decommissioning of YAEK. Her view was that the county would benefit more if the facility closed sooner. At public hearings and through contributions to environmental impact review hearings, she regularly questioned company practices. Yet, once YAEK closed, no vision or plan was in place for dealing with the site. No thought had been given to the question of tomorrow. Even today, five years after the closing was announced, there is still no post-YAEK plan in place. The county planners have concentrated on ensuring that the region's public health, its safety, and the environment are protected as the decommissioning process continues. The longer view is more complex and will depend on decisions made by the NRC (the plant regulators), the company (the land owners) and the town (in town by-laws). Above all, what ensues will depend upon how well the site is cleansed of any nuclear residue, and whether the liability of future owners can be limited. It is only in the last year that the community and county planners have begun a post-Yankee Rowe plan. In the summer of 1996, county planners surveyed one hundred townspeople on issues surrounding Yankee Rowe's closing and the town of Rowe (Taylor and Quinn 1996; Quinn 1996).

What do we expect to happen? Our opinion is that Rowe and other communities with closing nuclear facilities will continue to decline. They are scattered and located mostly in remote areas with small populations; thus the scale of their problem in aggregate is minute as compared to the problems of inner cities or of military base closings. Finally, this is really a problem that no one owns: according to current arrangements it is neither the company's nor the federal government's. The communities will be lost in the shuffle.

Key Issues Evaluated

There is a strong similarity between companies' short-term activities as described in the literature on other plant closing cases and YAEK's short-term activities-typically, outplacement and job retraining programs. However, with regard to the long-term effects of plant closings, dissimilarities between previous findings and what is emerging at the YAEK site are apparent.

YAEK's Responsibilities

Peter Drucker and Malcolm Baldrige, among others, have strongly promoted the concept that management is responsible for its effect on employees and the community (Carroll 1987). How, then, is Yankee performing? With cold correctness. It informed the workers and the community as soon as the decision to close had been made, provided an extraordinary benefits package, and kept on as many employees as it could, as long as it could. From the time of the announcement of the closing to when this paper was written, layoffs and separations had occurred far more by attrition than by direct firings. At the same time, the company steadily divested itself of community involvements. It contributed less to local charities, asked for tax abatements, and asked to no longer be responsible for the early warning system; and it moved as rapidly as possible to fully decommission the plant. YAEK was not ignoring its responsibilities, but was merely living up to its obligations. Clearly, the company could have been doing more. After all, it would be in the community for at least another decade, and the stakes were the long-term economic health of the community and its county. On the other hand, as a profit-making company it had a responsibility to provide the maximum return on investment to its stockholders.[5]

If there is a problem here, it may be that Yankee had been too closely intertwined with its nearby communities. As Drucker (1974) has written, "The fewer impacts an institution has outside of its specific purpose and mission, the better does it conduct itself, the more responsibly does it act and the more acceptable a citizen, neighbor and contributor it is." The company did not have to "buy local," did not have to contribute to community needs, and did not have to have a policy of encouraging its employees to participate in local government. However, it did choose those policies, with the result that it was totally enmeshed in the lives of these communities. Extracting the company from its involvement, whether with financial commitments or human ones, would not be easy.

Is this a case, then, of ignoring the social contract and the payment of a social wage to the YAEC employees? After all, Yankee was closing because of slack demand and the high cost of reconstruction, so we think not. This has not been a case when the company has requested employee give-backs or threatened that unless even greater efficiencies were achieved they would lose their jobs to another plant. Nor is it a question of a union wage versus a nonunion wage. The entire Yankee system is unionized. Further, the company continues to enjoy a begrudging respect from its union employees. If anything, the union members were angry at the antinuclear activists and the media, not the company. In sum, the company wanted to stay in Rowe just as much as the unions wanted it to.

Future Prospects for Dismissed Employees

What will happen to the Yankee Rowe employees? Over the short term, some will continue to work at the plant while it is decommissioned. Part of the white-collar force will be absorbed into the parent company. Over time, however, all of the work force in Rowe will be dismissed. If they stay in the area they will almost certainly, as Bluestone and Harrison (1982) have noted about other plant closings, suffer a loss of pay and status. There are simply no jobs in Rowe that match their skills, nor any local plants where pride of work is so high. Further, the region, at present, is suffering from an unemployment rate of approximately five percent. Some new employment growth is expected, but these jobs will either require a strong scientific background or be in the low-paying service sector. The options, as in many other areas of the nation, are: move, or accept a job at less pay and a loss of status.

What is especially different at Rowe, however, is the degree of alienation likely for those who stay. Rowe and its neighboring communities were dominated by YAEC, and most employees seemed to think the plant would last forever. From this lofty situation to "just a job" is a real comedown. The decline in status will be particularly difficult because for years the Yankee employees often were regarded with some jealousy. Furthermore, it was the company that made the civic contributions and encouraged its employees to participate in community life. Now, each former employee has been left to his/her own devices; there is no other "enlightened" company quite like YAEC in the region. Thus, we expect that the transition for the YAEC employees will be difficult.

For two years the town and the county were quiet about the decline of the area, simply knowing that the plant had closed and that decommissioning was occurring. In early 1994, however, the county planners began to prepare economic stimulus plans for all of the communities affected by the plant closing. This step, the first of many to come, was intended to provide grants and tax incentives to attract new investment to the area. The state was giving little attention to the future of the plant. The company's plans called for restoring the area to its condition before the plant was built. Interestingly, Rowe will then have a second "ghost" area added to the abandoned nineteenth-century Davis Village, whose 150 structures were ultimately demolished (Federal Writers Project 1983). Might there be a third?

The Possibilities in Regulatory Action

Would comprehensive plant-closing legislation have influenced YAEC's decision? Probably, yes. A look at federal and state plant-closing legislation shows that the laws, at least in part, are intended to slow capital flight, require companies to help employees and host communities, and promote reinvestment at the existing site (Perucci et al. 1988). In YAEC's case the capital flight was due not to company practices but to new and stricter federal safety standards. Moreover, the state government

gave the idea of keeping an aged nuclear power plant, at best, a mixed reaction. Many governmental officials viewed the good of the Commonwealth in terms of safety as offsetting the pain to the region and the company. Thus government did not clamor to stop this capital flight.

Economic Restructuring Exemplified

Where does this case fit in terms of the concept of economic restructuring? Beauregard, among others, has stated that economic restructuring must be positioned along functional, temporal, and structural aspects. The functional aspect consists of the mix of goods and services that are produced within the economy; the temporal aspect concerns whether the changes are part of a discontinuity, or of a gradual shift in the economy; and the structural element refers to the order of social, economic, and political life (Beauregard 1989). All three aspects appear in the case of YAEC. From the functional aspect, the mix of goods and services is changing, with less overall demand for energy alternative "goods" available at a lower price. From the temporal aspect, the YAEC case exemplifies the concepts of both discontinuity and gradualism as defined by the Fainsteins (1989). It represents a discontinuity in the sense that it is the first "on-line" nuclear plant to close as a result of capital flight. On the other hand, the YAEC closing marks the beginning of a slow process that we expect will ultimately include the closing of all of our nuclear facilities. In short, this case is a straightforward example of the key elements of economic restructuring at work.

Planners' Role

What is the role of the local planner in coping with the future of nuclear plants? There are no easy answers. However, four basic strategies appear to have merit. 1) Local and regional planners from areas where nuclear plants are located should form an alliance to bring their concerns to the NRC and to the industry itself. The merit of such an approach would be to establish working protocols involving all three players. The procedures established for the planning process for closing military bases could serve as a model. It is our opinion that without a consolidated effort by the local communities, the power companies, and the regulators, the decommissioning process will be developed incrementally, influenced largely by vocal, special interest groups. Furthermore, if the power companies work on their own without coherent community input, they will be less likely to contribute more than the minimums required by law when closings occur.

- 2) Localities should establish task forces well ahead of the expected closing. Such a task force, consisting of government officials, citizens, and company representatives, would have a mandate to prepare a contingency decommissioning plan. Arguing over the failure of the plant at a public hearing is often futile, as legalistic rules preclude compromise. But working arrangements with the owners that are reached outside the legal arena can produce plans that are mutually beneficial. We are not being naive here. We realize that often there are deep divisions between a community and a company that may never be mended outside of court. However, many issues can be worked out in an amiable way if company representatives are carefully included in the local planning process.
- 3) Planners should draw on the experiences of other communities. There are now a significant number of communities where plants have closed. Examining how they have reacted could be valuable for planning in communities awaiting closure. One way to achieve this might be to establish a clearing house for information on the successful efforts by which individual communities have achieved revitalization after plant closings. The National Trust for Historic Preservation, the Department of Defense, and the International City Managers Association frequently offer "success stories" to communities that are recovering from problems caused by major change. Unfortunately, no such clearing house exists to help communities facing nuclear plant closings.

Finally, planners must bring the case for planning assistance to the attention of their state political officials. When, for decades, nuclear plants have served as the major suppliers of the state's energy and have been located in the midst of other commercial and industrial uses, a strong case exists for state planning assistance. A combination of community, company, and state assistance is in order.

A Closing Statement

Whether through lack of faith in technology, anxiety about waste disposal, resistance to rate increases, fear of socioeconomic change, recognition of risks to health and safety, worry about land use impacts, objections to various inequities, or some combination of these reservations, the public will someday reshape decommissioning policy. In anticipation, a research program should examine these issues, at least in those communities where power plants are earmarked for the first wave of commercial decommissioning. Such studies will not only provide the empirical data needed to assist decision making, but will help to include a broader segment of the population in decisions about decommissioning policy.

NOTES

1. *This interpretation is based on a series of interviews in fall 1993, between researchers at the University of Massachusetts Center for Economic Development and local citizens and public officials (Maloney 1993). Also see Roche 1991c; Coakley and Roche 1988.*

2. *The data and the analysis of Yankee (Rowe)'s economic ties to the community in this section were taken from a report the authors prepared for YAEAC in 1991 (Center for Economic Development 1991).*

3. *For a discussion of the range of decommissioning options, see Surrey 1992.*

4. *There is a touch of irony here: Even if restored to its natural beauty, the site will still fall within what Jakle and Wilson (1992) have defined as the "fifth order of dereliction."*

5. *In many ways, YAEAC's behavior matches that of the industrial corporations in Southwestern Pennsylvania as described by Roger Ahlbrandt (1991).*

TABLE 1. YAEAC's contribution to Western Massachusetts

Source	Amount
YAEAC Payroll	\$12,580,687
Goods, Services and Municipal Costs in Western Massachusetts	\$ 3,847,906
Civic/Public Service Contributions in Western Massachusetts	\$ 17,295
Municipal Taxes and Contributions	\$ 710,216
Source: University of Massachusetts, Center for Economic Development (1991)	

TABLE 2. YAEAC employment and personal income multipliers for every million dollars of electricity produced

Multiplier Type	Direct	Indirect	Induced	Total
Employment	4.8735	1.7607	2.4975	9.1317
Personal Income (million \$s)	0.1329	0.0303	0.0305	0.1936

Source: University of Massachusetts, Center for Economic Development (1991)

MAP: MAP 1. The location of the YAEAC nuclear power plant, Yankee Rowe. YAEAC is located eleven miles north of State Route 2 and five miles south of the Vermont line. The nearest large community is Greenfield, the county seat, 27 miles east of the plant.

PHOTO (BLACK & WHITE): ILLUSTRATION 1. The YAEAC nuclear power plant. Source: Yankee Atomic

PHOTO (BLACK & WHITE): ILLUSTRATION 2. Pleasant Dreams--a cartoon representative of the opposition to the NRC's renewing Yankee Rowe's operating license. Source: Valley Comics

PHOTO (BLACK & WHITE): ILLUSTRATION 3. The departure of a YAEC nuclear generator. The transportation of this generator, with lights blinking and klaxons piercing the hills, resembled a funeral procession marking the end of the YAEC plant. Source: Yankee Atomic

PHOTO (BLACK & WHITE): ILLUSTRATION 4. The future site of YAEC, in a simulation. Source: Yankee Atomic

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