A nasty battle that led to the closing of a neutron-scattering facility at Brookhaven National Lab demonstrates what happens when researchers lose the fight for the hearts and minds of the public

Meltdown on Long Island

Any illusions scientists at Brookhaven National Laboratory had that they could continue their half-century of fundamental research in splendid isolation were shattered the night of 16 January 1996. More than 700 people—both lab employees and Long Island neighbors—crammed Brookhaven's Berkner auditorium that chilly winter night to hear about contaminated water found in some local drinking wells. Angry and worried residents wanted warm reassurances; instead, Brookhaven and Department of Energy (DOE) scientists spoke dispassionately about risk analysis, flow rates, and billions of parts per gallon and promised to hook neighbors up to public water.

"People went absolutely nuts," recalls local activist Jean Mannhaupt, who was at the tumultuous meeting. "People were shaking [with anger] as they came up to the mike," adds lab public affairs manager Mona Rowe. "It was pretty frightening," adds another witness. After a decade of concerns and complaints about the DOE lab's waste dumps and balky sewage plant, residents now feared direct and immediate harm from their scientific neighbor.

For those at the fateful 1996 meeting, it was no surprise that all hell broke loose exactly 1 year later, when DOE and lab managers announced that radioactive water from a spent-fuel storage pool under a silver-domed research facility called the High Flux Beam Reactor (HFBR) had been leaking into the ground unnoticed for more than a decade. Although the leak was small and posed no immediate threat to the public, its discovery began a fierce and sometimes bizarre drama starring movie actors, supermodels, lawmakers, Cabinet secretaries, antinuclear protesters, and petition-wielding scientists.

Energy Secretary Bill Richardson cut short the fracas last November when he ordered the reactor permanently closed, citing budget constraints. But for the hundreds of Brookhaven and outside researchers who depend on the HFBR's steady stream of neutrons, the decision was a victory of cynical politics over scientific truth. "It was completely out of our control from the beginning," says lab physicist John Tranquada. "Science was never an issue." Nicholas Samios, who led Brookhaven for 15 years until 1997, still can't believe the outcome. "The total leak was less than the tritium in an exit sign—it was not a problem."

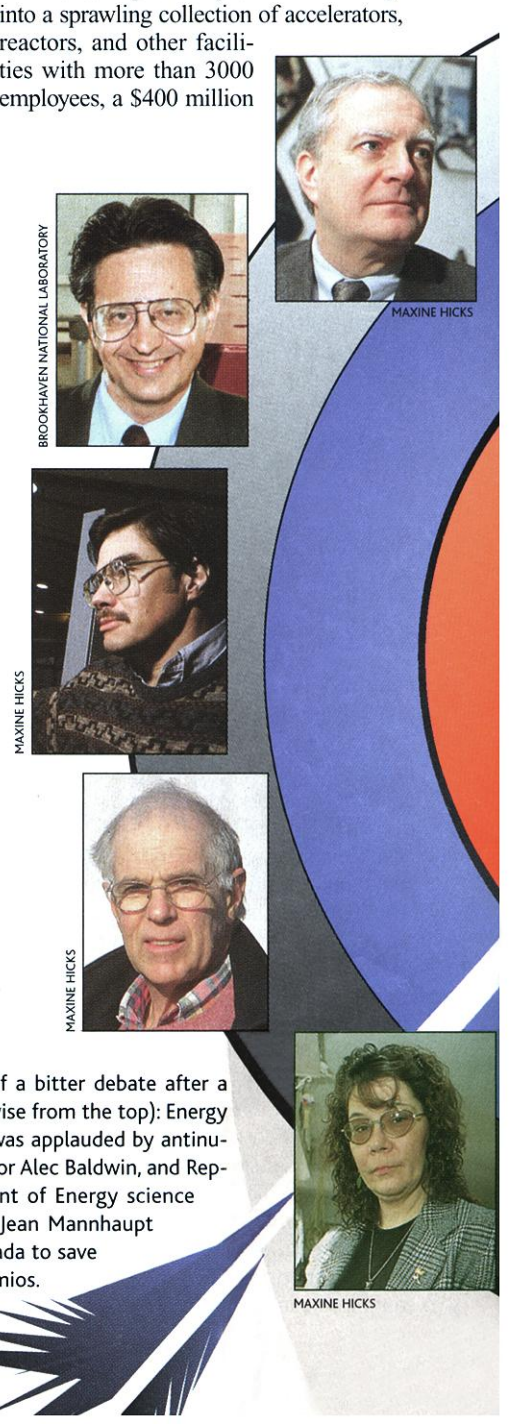
But others say that the problem had little to do with flow rates or picocuries. Instead, Brookhaven scientists and their managers were so intent on producing excellent research that they largely ignored the need to recruit allies among neighbors, local politicians, and federal officials. When the time came to defend the HFBR, says Robert Crease, a State University of New York (SUNY) philosopher who has written a history of the lab, "there was no one there." The demise of HFBR is also a warning to other researchers—whether manipulating plant genes, experimenting with animals, or using nuclear reactors—that ignoring community and political concerns can be hazardous to their professional health. "This is a terribly important lesson to learn," says Geraldine Richmond, a chemist at the University of Oregon, Eugene, and chair of DOE's Basic Energy Sciences Advisory Committee (BESAC). "We can't be isolated in our ivory towers." Adds Crease: "What can happen at Brookhaven can happen anywhere."

Twelve men and a phone booth

Ironically, Brookhaven is itself a child of politics. As the United States moved from a hot to a cold war, physicists from a handful of prestigious northeastern universities yearned for a nuclear research facility nearby that would be a scientific equal to Los Alamos in New Mexico and Oak Ridge in Tennessee. In 1946 the government awarded a contract to a consortium called Associated Universities Inc. (AUI), which chose an old Army base at the eastern end of Long Island as the lab's site.

In the early days, neighborhood issues were virtually nonexistent: Set deep in the pine barrens and downwind from New York City, the 13,000-hectare lab had few neighbors. A few small communities of potato farmers and fishers dotted the eastern half of Long Island, while the occasional beach resort clung to the southern coast. The facility sat at the muddy headwaters of the Peconic River and on top of the freshwater aquifer that extends the length of the sandy island.

The lab kept a low profile even as it grew into a sprawling collection of accelerators, reactors, and other facilities with more than 3000 employees, a $400 million

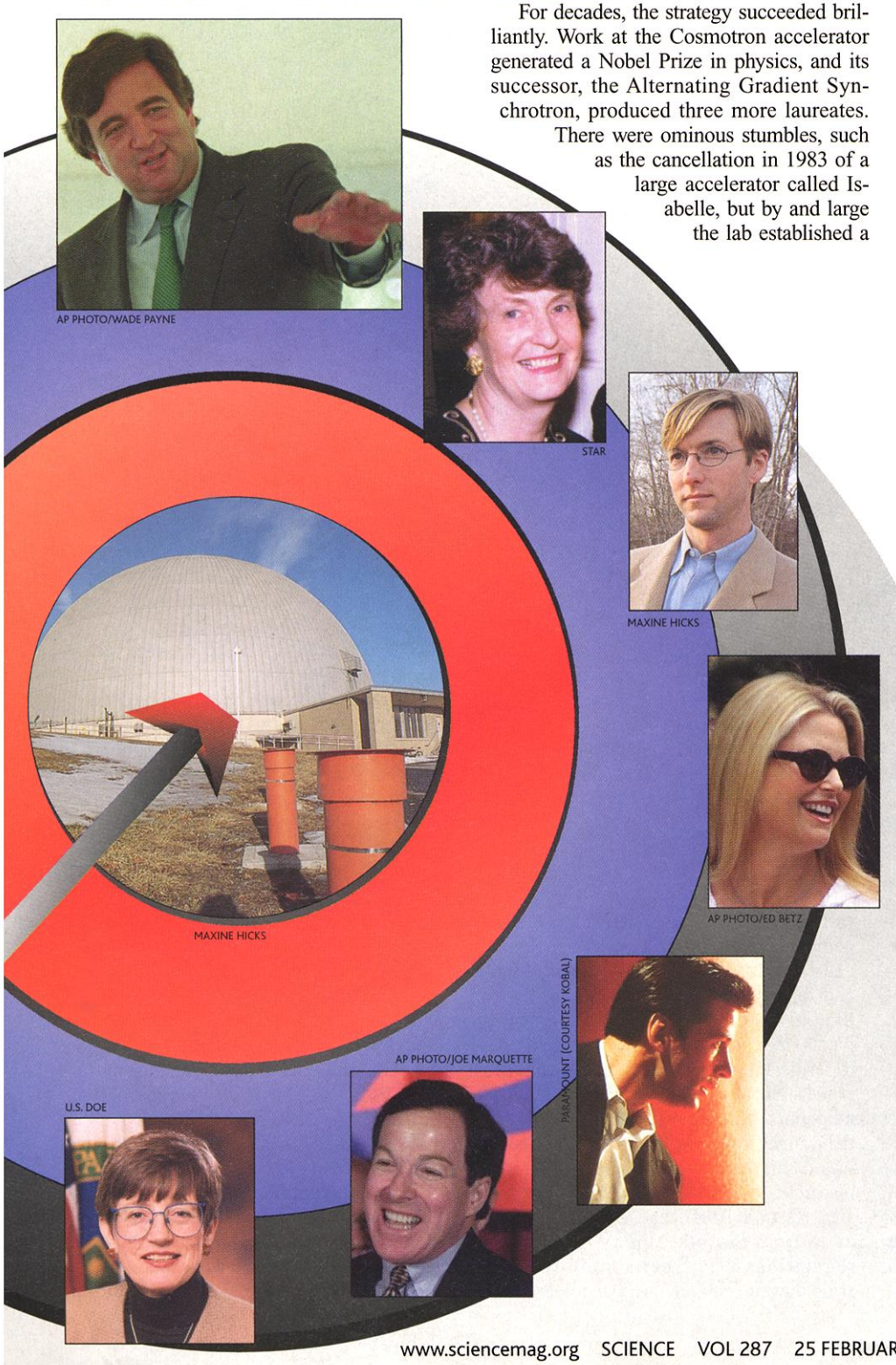


Targeted. Brookhaven's High Flux Beam Reactor became the center of a bitter debate after a leak was discovered in late 1996. The cast of characters includes (clockwise from the top): Energy Secretary Bill Richardson, whose decision last fall to close the reactor was applauded by antinuclear activists Helen Caldicott, Scott Cullen, model Christie Brinkley, actor Alec Baldwin, and Representative Michael Forbes (D–NY), and recommended by Department of Energy science chief Martha Krebs. Richardson's decision angered local activists like Jean Mannhaupt and frustrated attempts by scientists Stephen Shapiro and John Tranquada to save the reactor, which leaked during the tenure of lab director Nicholas Samios. His successor, John Marburger, kept a low profile during the fight.

annual budget, and a stream of out-of-state visitors. It lacked the heroic legacy of Los Alamos and the economic clout of Oak Ridge. Instead, Brookhaven scientists went about their business largely invisible to the outside world. "We just faded into the background," recalls one researcher.

AUI preferred it that way. Unlike the large and powerful University of California, which runs Los Alamos, AUI was "12 men and a phone booth," jokes lab physicist Stephen Shapiro. AUI's board, made up of distinguished academics, focused on the lab's scientific direction and left the details of administration to onsite employees. Nor did the organization court politicians and bureaucrats. Brookhaven never had an influential patron, like Los Alamos has in Senator Pete Domenici (R–NM), nor the staunch backing of an entire state political apparatus, as Oak Ridge does. "In Washington, a lot of people didn't know Brookhaven existed," says Peter Bond, a physicist who served as interim director in 1997–98.

For decades, the strategy succeeded brilliantly. Work at the Cosmotron accelerator generated a Nobel Prize in physics, and its successor, the Alternating Gradient Synchrotron, produced three more laureates. There were ominous stumbles, such as the cancellation in 1983 of a large accelerator called Isabelle, but by and large the lab established a reputation among researchers for serious science without the hype. "[Samios] told me to keep my head down, do my research, and leave the rest to him," recalls one scientist. Coming online in 1965 as the lab's third reactor, HFBR fit in well with the lab's low profile. It lacked the scientific sex appeal of the proton accelerator at the Fermi National Accelerator Laboratory in Batavia, Illinois, with its expansive promise of exploring conditions during the first moments of creation. However, the reactor's intense beams of neutrons, which can penetrate deeply into materials, gave physicists, biologists, and chemists a tool to probe the hidden structure of everything from crystals to ceramics to polymers to blood plasma. The potential applications drew a steady stream of researchers from companies and universities around the world.



Revenge of the C students

As the reactor aged, however, problems began piling up alongside its impressive research results. Designed for a 25-year life at a maximum power level of 40 megawatts, the reactor was upgraded to 60 megawatts in 1982 before safety concerns forced operators to scale back power to 30 megawatts. In March 1994, a fire in the casing surrounding a target of uranium-235 used in an experiment raised questions about the lab's safety procedures. About the same time, officials also began to worry about wear and tear on the aluminum beam tubes exposed to the neutron streams, and reactor operators were eager to replace the cylindrical vessel holding the fuel elements—an upgrade that would cost as much as $200 million.

The lab also faced a growing list of environmental problems. It had inherited chemical dumps from the site's days as an Army base, adding piles of low-level radioactive glass and discharges of heavy metals and plutonium into the Peconic River. In 1985, the well of an elementary school just outside the gates showed evidence of increased levels of tritium, although its source was unclear, and a handful of home wells tested positive for various chemical compounds. In 1988, a team of DOE environmental and safety inspectors —who dubbed themselves "the revenge of the C students" because of their tough stance on waste generated by scientific research—visited DOE labs and pinpointed Brookhaven as one of the hot spots. The following year, it was designated a Superfund site, which mandates increased scrutiny and cleanup of a badly polluted area. By 1996, five of six underground plumes containing concentrations of wastes that exceeded drinking water standards had migrated beyond the lab's gates.

None of these setbacks was as damaging

Grassroots Activist Earns Respect—and Learns Some Hard Lessons

Jean Mannhaupt was roller-skating with her young daughters when her neighbors walked up and asked her to sign a petition. Tests by the Suffolk County, New York, health department showed unacceptable levels of benzene in a neighbor's well water, and the group wanted the county to test their wells in the Mastic Beach community.

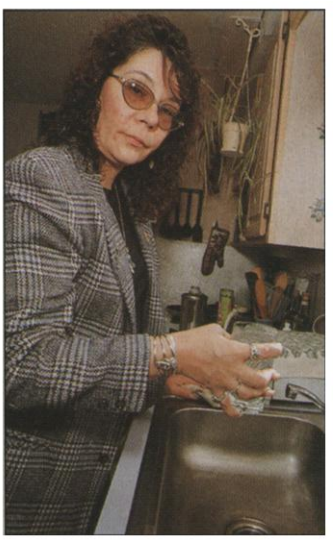
That moment nearly 20 years ago launched Mannhaupt, now 45, on a determined march to understand what pollutants threatened her and her family and how to stop them. She grew into a formidable and pragmatic critic of Brookhaven National Laboratory in nearby Upton, earning the support of her neighbors and the grudging respect of scientists. But she unexpectedly found herself fighting other environmental and antinuclear activists in the battle over the High Flux Beam Reactor (HFBR), and she was accused of selling out after accepting funds from Brookhaven and an office at the lab.

An unlikely activist—a high school graduate of a Catholic school in Queens with a blue-collar husband and three kids to raise—Mannhaupt needed help in understanding the benzene threat. And she was pleasantly surprised to discover lab scientists who were happy to explain how groundwater moves, the nature of volatile organics, and their health effects. Although she failed biology, math, and chemistry in high school, she says "the left side of my brain opened up when I was 26. ... Scientists couldn't come down to me, so I had to go up to them." Says Bill Gunther, Brookhaven's senior environmental adviser, "I'm much in awe of her. She started with limited technical understanding and she learned. She won't let go until she does."

She and her neighbors learned about politics too; they scored $11 million in government funding to hook up to public water. They also compared stories of children in their school district with learning disabilities and physical ailments. Mannhaupt, a woman with an imposing and energetic presence, proved a natural organizer who could also speak the scientists' language. "They'd be amazed you would point out a data gap in a soil or monitoring well screening," she recalls with her strong Long Island accent. "I don't think they really believed that anybody in the community could read them."

Although Mannhaupt was a harsh critic of Brookhaven's environmental record, she also valued its research activities and felt that HFBR could be fixed and reopened given sufficient public debate and input. That flexibility contrasted with the increasingly strident attacks on the lab and the reactor from antinuclear and other environmental groups. Those groups drew media coverage through their celebrity members and more confrontational tone, as well as criticism from Mannhaupt and others. "All of a sudden, from the left wing, come people like [the actor] Alec Baldwin," she says. "They are not schooled enough, technically or scientifically. You can't just stamp your feet and get what you want."

But the biggest blow to Mannhaupt's cause came in 1996 after she accepted $25,000, as well as office space, from the lab for the Community Working Group she headed, an umbrella organization that included more than 30 local groups. "I thought we'd reached the utopia of grassroots activism," she says. "The community finally had the opportunity to become a true partner at the table." But both her longtime supporters and opposing groups say that the perception of a conflict of interest destroyed the group's credibility as an independent voice. The loose alliance of Brookhaven skeptics was shattered, leaving room for groups like the Standing for Truth About Radiation (STAR) foundation. "I got trapped," concedes Mannhaupt.



Tapped. Jean Mannhaupt says she "is never happy with the lab."

She refuses to apologize, however, and says others have a lot more to be held accountable for. She accuses Energy Secretary Bill Richardson of selling out the lab's neighbors by denying the public a chance to comment on the reactor's environmental impact statement, and Representative Michael Forbes (D–NY) and groups like STAR of using the HFBR controversy to solicit money from wealthy and environmentally conscious Long Islanders. She also takes the lab to task for failing to connect with more citizens like herself and for polluting the area.

She also hasn't given up the fight. Parlaying her environmental knowledge into a job with a private water-testing company, Mannhaupt has formed a new nonprofit organization, Neighbors Expecting Accountability and Remediation, to tackle environmental problems at Brookhaven as well as at other nearby sites that pollute. "I'm never happy with the lab," she says. "If I were, I would go home." **–A.L.**

to the lab's image as the tritium leak, however. It was discovered in late 1996, when the reactor was closed for routine maintenance. To save money, designers had decided not to use a second liner in the storage pool underneath the reactor, a precaution taken at other DOE reactors built in that era. The result was a spreading plume of water, with tritium concentrations more than twice New York state's standards.

Both researchers and environmental activists agree that contamination at Brookhaven is far less severe than at weapons production areas such as South Carolina's Savannah River or Washington state's Hanford Reservation. But the environmental problems at Brookhaven are complicated by its location on the Peconic and above the aquifer in an area with a large and rapidly increasing population. It isn't the only source of pollution—industrial plants have sprung up in the area, and potato farmers are heavy users of powerful pesticides. But Brookhaven drew the wrath of neighbors who rely on well water. Part of their anger stemmed from fears that the lab was doing secret and potentially dangerous research, and part from the contractor's insistence until 1987 that it was legally exempt from Suffolk County water-purity regulations. "The perception was that Brookhaven thought itself above the law," says activist and social studies teacher Connie Kepert. "The lab operated like a foreign country," adds Adrienne Esposito, another community activist.

Samios and some other current and former Brookhaven officials reject the notion that Brookhaven was an irresponsible neighbor. And the DOE science office, which is ultimately responsible for the department's civilian labs, continued to give AUI high marks for its performance right up until the contractor was abruptly fired in 1997. But David Schweller, who headed the DOE office at the lab for most of the 1980s, says that lab managers were too focused on science at the expense of assuring

CREDIT: MAXINE HICKS

safety and protecting the environment. His memos on the growing environmental troubles at the lab were ignored by both AUI and the DOE hierarchy. "I was told we're here to do science and to peddle my papers elsewhere," he says.

Waste not. Barrels with tested water from tritium leak.

Contact sport

Brookhaven's neighbors were more than willing to take on the lab, however. "Activism is a contact sport here," says Mannhaupt, a community leader who focused attention on Brookhaven's problems (see facing page). In the 1980s, for example, a powerful coalition of antinuclear, environmental, and community groups successfully blocked the planned start-up of the Shoreham nuclear power plant, several kilometers from Brookhaven. "Long Island is a hotbed for all environmental, safety, and health issues," says Schweller. It is also a hotbed for rumors of government coverups, such as in the recent mysterious crash of a commercial jet offshore or wilder talk of dead aliens kept in Brookhaven tunnels.

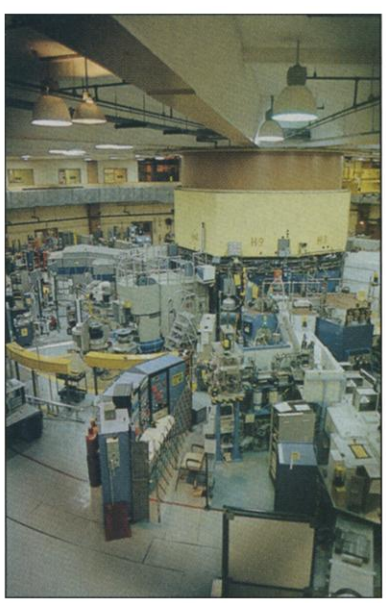
The January 1997 announcement of the reactor leak only confirmed the suspicions of county officials, activists, and neighbors. After receiving complaints for many years, the lab promised in 1994 to dig test wells near the reactor. But DOE and the lab did not allocate money for them until 1996. In retrospect, that was a mistake, says Bill Gunther, the lab's senior environmental adviser. So when DOE and lab managers tried to explain that the plume was confined well within the lab grounds and posed no obvious threat to public health, their words were greeted with deep suspicion. "People felt like they had been lied to again," says Mannhaupt.

The lab's precious isolation, while helpful in conducting its research, now proved a tremendous handicap. There had been efforts to connect with the community through open houses and a speakers' bureau, but the outreach, according to lab biologist Dieter Schneider, "was geared to the high school level —a little on the trivial side." Samios says AUI lacked the expertise to carry out a strong public relations campaign before or during the HFBR crisis, and he doubts that such a campaign would have made a difference. "The public is only interested if someone says there's a big danger," he argues. But Esposito, who lives in nearby Patchogue, says the problem was not PR, but scientific arrogance. "The attitude toward the public was that it was ignorant and stupid and could not understand," she says.

Cleaning house

News of the leak put Brookhaven in an unaccustomed spotlight. DOE's oversight office quickly launched an investigation and concluded that the lab "has not kept pace with contemporary expectations for protection of the public, the workers, and the environment." The report also strongly criticized DOE for its confusing hierarchy, ineffective oversight, and poor management of the lab.

Energy Secretary Federico Peña, fresh from Senate confirmation, flew to Brookhaven on 1 May and fired AUI—an unprecedented move in the department's history and one that rocked the DOE complex. Some lab officials say Peña's decision was a cynical attempt to assert his power. They see it as an effort to blame the lab for the troubles and shield DOE from criticism. But DOE managers maintain it was the only way to deal with a contractor that had been lax in dealing with both the environment and the public.



Silence. The reactor's experiment floor now stands empty.

Paul Martin, the Harvard physicist who chairs the AUI board, declined to discuss the ouster. And AUI hasn't gone out of business—it still operates the National Radio Astronomy Observatory for the National Science Foundation. But Brookhaven's Shapiro says that the organization "failed on the operations end" of overseeing the lab. DOE's Schweller agrees. "Just because you're a great scientist doesn't mean you're a great administrator." Even Samios, who was appointed by AUI, says that the consortium had fossilized into "a self-perpetuating board" heading "a powerless organization."

The removal of AUI stoked the controversy. The congressional General Accounting Office investigated, local media like *Newsday* kept up a drumbeat of coverage, and demonstrators outside the main gate soon were carrying skull-and-crossbones signs recalling Chernobyl and Three Mile Island. Protesters in white jumpsuits and

The Life and Death of a Research Reactor

1965	
	High Flux Beam Reactor starts operation
1985	
	Tritium contamination found in local wells
1988	
	Shoreham reactor loses NRC license
1989	
	Lab named Superfund site
1990	
	Chemical contamination found in local wells
1994	
	HFBR experiment fire; lab promises test wells
1996	
JANUARY	DOE offers public water hookups
FEBRUARY	Class-action suit filed by neighbors
NOVEMBER	Test wells sunk
DECEMBER	HFBR closed for maintenance
1997	
JANUARY	Lab announces tritium leak
APRIL	DOE report faults lab and DOE management
MAY	Lab contractor fired
JULY	Rep. Forbes calls reactor safe
	STAR foundation created
SEPTEMBER	Forbes and Sen. D'Amato oppose reopening
NOVEMBER	Panel sets three conditions for HFBR reopening
	Forbes blocks funds for restart
	New contractor selected
1999	
JANUARY	Baldwin meets with Richardson
APRIL	Scientists meet with Richardson
SUMMER	DOE science managers recommend closing reactor
OCTOBER	Brinkley meets with Richardson
	Forbes blocks restart funding for third time
NOVEMBER	Richardson orders HFBR permanently shut

CREDITS: (TOP TO BOTTOM) AP PHOTO/RICHARD DREW; MAXINE HICKS

Antinuke Leader Uses STAR Power in Fight to Close Reactor

Worth Austin spent his days dumping barrels of radioactive waste in the ocean. It was the 1950s, and ocean dumping was the preferred way to get rid of some wastes generated by the Graphite Research Reactor at Brookhaven National Laboratory. Today, his great-grandson, Scott Cullen, is involved in dumping something even larger—Brookhaven's High Flux Beam Reactor (HFBR). As counsel for the Standing for Truth About Radiation (STAR) foundation, the 29-year-old Cullen played a key role in blocking the reopening of the HFBR, the successor to Austin's graphite reactor.

It's an unusual role for a local boy who grew up in nearby Bellport, who spent summers at the Brookhaven pool, whose grandmother worked at computer processing for the physics department, and whose grandfather was a sergeant on the security force. Whereas Brookhaven was a black box to many of his friends, his exposure to the lab gave him what he calls "a deep appreciation for science—I was fascinated with it as a child." But it was another reactor a few kilometers down the road that ignited his interest in environmental causes.

Activated. Scott Cullen came home to fight restart of reactor.

The fight to prevent the opening of the Shoreham commercial nuclear plant, which Cullen followed as a teenager, convinced him that nuclear power was "a failed experiment" and that "radiation in the environment is [naturally] decreasing—and we shouldn't be creating more." Cullen, a lean man with a serious air, returned home in the summer of 1996 while in law school at the University of Vermont and fell into the orbit of Bill Smith, an environmental activist on the eastern end of Long Island. Smith had founded a group called Fish Unlimited, which has long complained about Brookhaven's pollution. He convinced Cullen to get involved in fighting the lab's environmental legacy.

Cullen played a central role the following summer in creating the foundation, which seeks "objective medical and scientific" data on the extent of that pollution, according to STAR literature. Funded primarily by wealthy individuals, the group has held a symposium on the health effects of radiation, paid for a public opinion poll on the reactor, and agitated for government funds to conduct independent testing of Brookhaven's toxic plumes. "Our organization thinks there shouldn't be reactors on Long Island," says Cullen, noting the high density of population and the common aquifer from which residents get their water. "I don't think the HFBR leak was a huge health risk," he admits, but it was "a symptom of a larger problem"—the lab's history of failure to protect the environment.

The eastern end of Long Island is home to a host of celebrities and wealthy New Yorkers, and STAR's star-studded board includes actors Spalding Grey and Alec Baldwin, plus model Christie Brinkley and her architect husband Peter Cook. Antinuclear activist and pediatrician Helen Caldicott was its founding president. Local activists and lab scientists rail against the group's glamorous cast and its no-compromise approach, saying that STAR has exaggerated the real dangers and ignores the work done over the years by neighbors. "I don't think they listen," says Brookhaven's senior environmental adviser, Bill Gunther. "I'm not sure they care, or if they want a meaningful dialogue."

In the modest single-room office walk-up he shares with other staff members in East Hampton, Cullen bridles at the suggestion that his group is an idle hobby of rich environmentalists, noting that STAR's supporters include women across Long Island who worry about the rising breast cancer rates. He adds that lab neighbors were ineffective in dealing with the lab before STAR came on the scene and says that Baldwin and Brinkley enhance the hands-on work that he does daily, from attending meetings to making phone calls. HFBR supporters, he maintains, are loath to admit the real reason behind the reactor's demise. It wasn't money or glamour, he says: "It was closed because people on Long Island didn't want it."

–A.L.

surgical masks rallied against the HFBR, one man went on a hunger strike, and an auxiliary Catholic bishop from Detroit warned that the lab's polluting ways ran counter to God's wishes. "It became a circus," says Samios with undisguised disgust. Although DOE promised to appoint a new contractor, conduct a full study of the environmental impact of restarting the reactor, and maintain frequent contact with citizens' groups, it and the lab were losing ground. "Why on Earth would we trust that institution after Hanford and Rocky Flats?" says Alec Baldwin, who grew up on Long Island. "They've never been forthcoming. They lied and lied and lied and covered up for decades. The whole lab is corrupt."

In the summer of 1997, Baldwin and others formed Standing for Truth About Radiation (STAR), an organization based in fashionable East Hampton with an impressive board of wealthy New Yorkers and well-known activists (see above). Their goal was to prevent a restart of what they believed was a dangerous and dirty reactor. "You don't put a reactor in the middle of a crowded island with a sole-source aquifer," says Helen Caldicott, STAR's founding president. "And Brookhaven has made a terrible toxic cocktail."

Brookhaven scientists were infuriated by what they felt was a gross exaggeration of the dangers. "The word 'nuclear' wiped out all sense of reason," says physicist Tranquada. "You don't yell radiation on a crowded island," says another researcher. Even local activists were offended by what they viewed as the arrival of Johnny-come-latelies more interested in combat than cooperation. "Environmental carpetbaggers," snorts Mannhaupt, who was open to the idea of restarting the reactor if it could be done safely. "We disagreed with the environmentalists, who said there is no solution," adds Kepert.

The increasingly cantankerous fight was a political powder keg for local Representative Michael Forbes, a rookie Republican in the midst of switching parties. After expressing concern about the reactor, Forbes apologized to lab employees in July 1997 for his earlier doubts and said "it is a safe reactor." Then he flipped again. At a hastily scheduled press conference in September 1997 in nearby Mineola, Forbes and Senator Alphonse D'Amato (R–NY) shocked and surprised lab managers by announcing that they opposed restarting the reactor. "That was the death knell of the HFBR," says one Brookhaven manager. Washington and Long Island sources cite Forbes's desire to attract contributions from wealthy Democrats on the island's east end by aligning himself with environmental causes.

Forbes, who declined repeated requests

CREDIT: MAXINE HICKS

by *Science* to discuss the issue, also used Congress's power of the purse by inserting language into DOE spending bills forbidding the lab from spending money toward the reactor's restart. Some lawmakers such as Domenici disliked the language. But faced with the unusual circumstance of a lawmaker denying funds to his own district, they supported their colleague 3 years running. In the meantime, lab officials hoped that an environmental impact statement supporting restart would convince Forbes to lift the funding ban.

Celebrity politics

Feeling under the gun, Brookhaven scientists adopted some of the tactics of their opponents. They gathered more than 18,000 names on a petition urging the reactor's restart, held rallies, sent heaps of letters to Richardson, and spent innumerable hours at community meetings. But time was running out. The outside researchers that make up BESAC had supported restart of the reactor under three conditions—if it could be put online in a timely fashion, ultimately double its power, and not impose a budget strain—and it soon became clear that none of those conditions could be met.

"We were clearly getting out of range of a prompt restart," says Martha Krebs, who at the time was DOE science office chief. The proposal to double the power evoked fierce opposition from the community, the estimated costs of restarting HFBR began to climb, and the environmental impact statement was mired in DOE bureaucracy.

The controversy heated up further in January 1999, when Baldwin, Caldicott, and STAR counsel Scott Cullen met with new Energy Secretary Richardson. The STAR officials proposed an environmental assessment to be overseen by the community rather than DOE. "We didn't say shut down the HFBR," says Baldwin. Cullen believes Richardson was sympathetic to the idea of a separate study but unwilling to pay for it. Caldicott says that STAR officials reminded Richardson that "he has political aspirations with [Vice President Al] Gore, and if he didn't shut [the HFBR] down, there would be political ramifications."

In April, the scientists had their turn. Meeting in the secretary's office overlooking the Smithsonian castle, Robert Birgeneau, dean of science at the Massachusetts Institute of Technology, and Frank Bates, a chemical engineer at the University of Minnesota, Minneapolis, and head of the Neutron Scattering Society, argued vehemently for a $200 million upgrade as well as a restart, according to sources familiar with the meeting. They said other facilities could not match the HFBR's capabilities.

But managers of the department's science programs sang a different tune at the 45-minute meeting, the sources add. Krebs and DOE basic energy sciences chief Pat Dehmer told Richardson that BESAC's conditions would be hard to meet. A restart likely could not happen before 2002, they said, and would add $10 million to the annual outlay of more than $20 million that DOE already was spending on the downed reactor. The extra cost, worried BESAC chair Richmond, could wipe out funds set aside for hundreds of graduate student stipends. And then there was the threat of lawsuits from antinuclear and environmental groups, which could lead to further delays and political headaches.

Richardson held a third meeting in October, with model Christie Brinkley, a newly named STAR board member, and her husband, architect Peter Cook, shortly after the couple met with President Bill Clinton during a visit to Washington. Cullen, who also attended, said Brinkley expressed her concerns about the HFBR, including the potential exposure by workers to cancer-causing substances and local groundwater contamination. Although Mannhaupt complains about the Administration's willingness to meet with celebrities but not local activists, DOE officials insist that the meetings were not pivotal moments in the fight over the reactor. "I see no evidence STAR had an impact on the decision or the process," says Krebs,

Neighbors of the Reactor Pursue a Not-So-Civil Action

Residents suspect that their well water is making their children sick. The alleged culprit, a big local company, says not to worry. The residents find a lawyer and sue, triggering a long and bitter legal fight. Those events are depicted in the recent movie, *A Civil Action*, starring John Travolta, based on a true story. A counterpart may be playing soon in a Long Island court, with Brookhaven National Laboratory as the defendant.

Legal stream. Residents blame Brookhaven for polluting their wells.

More than a dozen neighbors are seeking damages stemming from the lab's alleged negligence in handling dangerous chemical and radioactive wastes. The $1 billion complaint was filed in February 1996, 1 month after the lab admitted that some pollutants had migrated beyond its fences. This spring the plaintiffs will ask Justice Howard Berler of the Suffolk County Supreme Court to certify them as a class, allowing them to sue Brookhaven as a group rather than as individuals. If Berler agrees, then what is already a protracted and expensive judicial battle will move into high gear.

The residents hope to include anyone living within a 16-kilometer radius of the lab who believes they were exposed to its hazardous materials and that their health has suffered as a result, along with anyone who has had to pay to monitor their health to detect potential injuries and any property owners who have suffered economically as a result of the wastes. The suit charges that the contaminants caused illnesses ranging from cancer to headaches, and that "a real perceived fear of contracting health problems" led to emotional and psychological problems and a decline in property values. The suit blames the lab for its failure to "properly construct, maintain, repair, inspect, and update its scientific facilities and to take reasonable measures to minimize toxic discharges."

"There is no justification for this suit," replies Brookhaven counsel Michael Goldman, who leads the defense. Although former lab contractor Associated Universities Inc. is named as a defendant in the suit, the Department of Energy is ultimately responsible for paying the legal bills of its contractors. The current contractor, Brookhaven Science Associates, is overseeing the case.

Berler has so far refused Brookhaven's initial requests to have the suit dismissed. But even the plaintiffs' lawyer, Richard Lippes, a partner with the Buffalo firm of Allen, Lippes & Shonn, admits that it is extremely difficult to establish clear links between specific contaminants—assuming their origins can be identified—and specific ailments. And although a jury trial would be a disturbing prospect for Brookhaven, officials can take some comfort in the outcome of the movie: Travolta lost the case, at least on his first try.

–A.L.

CREDIT: MAXINE HICKS

who did not attend either meeting.

Krebs had her own worries, which included costly upgrades under way or planned for two other DOE neutron sources and an increasingly difficult struggle to fund a $1.3 billion Spallation Neutron Source at Oak Ridge. She and BESAC members say they grew convinced that closing the HFBR, although it would pose short-term problems for the neutron-scattering community, was for the long-term benefit of researchers given the pressing need for the Oak Ridge facility.

> "[Scientists] need a kick-ass logo, they need a hip-hop song."
>
> —Jean Mannhaupt

On 16 November, Richardson announced that the reactor would be shut down. Emphasizing that the HFBR posed no health threat, he declared that "we need to focus our limited resources on productive research."

Blame game

The decision—and its timing—infuriated lab officials as well as many activists. Both sides were gearing up for a public debate over the environmental impact statement, the draft version of which stated that there was no pressing reason to keep the reactor closed. "Washington took public participation out of our hands," says Mannhaupt angrily. "It's a hell of a way to run science policy, and a hell of a way to work with a community," adds local civic activist and former Brookhaven employee Don Garber.

Even STAR officials complained. Baldwin and Cullen say that Richardson deliberately defused public outrage over the leaks and waste dumps at the lab by abruptly ending the debate. In a meeting with reporters, Richardson insisted that budgetary reasons, not politics, were behind his decision: "I don't like to close scientific facilities, but it made no sense to restart it." He added that "my scientists unanimously said 6 months ago that we should shut it down." Both Dehmer and Krebs confirm that they recommended closing the facility prior to Richardson's decision. "It's never easy to make a decision like this, but sometimes you have to," says Dehmer.

Now DOE and Brookhaven must decide whether to mothball or decommission the reactor—the latter would cost hundreds of millions of dollars. Meanwhile, the lab's new contractor, Brookhaven Science Associates, gets good marks from all sides, and director John Marburger has been successful in establishing a basic level of trust between activists and the lab. Even Caldicott gives him grudging praise. "I respect him," she says, while insisting that all radiation-related activities at the lab should cease.

The emotional aftermath is harder to calculate. Lab scientist Tranquada remains deeply upset about the decision. "I'm still overcoming the loss," he says, his voice breaking in frustration. "There's a facility with 15 instruments and no place to put them." Longtime Brookhaven materials scientist James Hurst retired in December, complaining that DOE "should have drawn the line in the sand" to prevent antinuclear groups from thinking they could shut down other facilities as well. "Maybe I'm naïve, but I think this should have been about science," he says.

Beyond the blame game, however, some researchers and managers say they've learned a hard lesson about an axiom—perception is reality—that is taken for granted by politicians. "As a scientist, you believe in marshaling the facts and proceeding in a logical fashion," says Shapiro, "but politics adds so many variables." Adds SUNY's Crease, "People don't take in facts nakedly, and it is naïve to say that facts speak for themselves."

What happened at Brookhaven, say Crease and others, should be a stark warning to scientists about the growing public fears over everything from research involving fetal tissue to genetically modified crops. "It's very sobering," says Bates. "There are thousands of labs around the country doing work that may not be in vogue, and I hate to think they will become cannon fodder for local politicians." To win over such critics, says Mannhaupt, scientists need to fight fire with fire. "They need a kick-ass logo, they need a hip-hop song," she says.

But the battle over HFBR also demonstrates that researchers who ignore those who fund and regulate them can't expect help when the going gets tough. "Scientists have to look beyond their own self-interest to the neighborhood in which they work," says Richmond. "If we want to be part of a community," she warns, "we can't act like prima donnas." —ANDREW LAWLER

ECOLOGY

The Unbearable Capriciousness of Bering

Scientists have labored hard to untangle the web of life in the Bering Sea; some strange new kinks have them wondering just what the web ought to look like

The short-tailed shearwater flies a long way for a good meal, migrating some 15,000 kilometers every summer from the seas south of Australia to prime feeding grounds in the Bering Sea, off the coast of Alaska. In July 1997, however, something went terribly wrong. Scientists estimate that about a half-million carcasses of this brownish-gray relative of the albatross were bobbing lifelessly in the water and washing up on shore. The scale of the die-off was "unlike any we had ever seen," says marine ecologist George Hunt of the University of California, Irvine, a 25-year veteran of Bering Sea research. The birds, it turned out, had starved to death.

The death toll was the latest sign of an ecosystem under siege. From unprecedented algal blooms to fewer salmon returning to spawn in Alaskan rivers and declines in fur seal and sea lion populations, the Bering Sea's ecological balance is shifting before researchers' eyes. The data now point to an assault on the food web from top and bottom: Fishing and hunting are taking out predators, while climate changes are reshaping the community of tiny marine plants and animals that sustain higher life-forms. It's an "ecosystem sandwich," says Robert Francis, a fisheries oceanographer at the University of Washington, Seattle, and chair of a 1996 National Research Council study of the Bering Sea.

Scientists want to understand this sandwich better, because the Bering Sea is such a remarkable crucible of life. Nearly half of its 2.3 million square kilometers is a shallow shelf, less than 180 meters deep. In winter, when waters of varying depths mix well, the shallows are fed by a rich load of nitrogen, phosphorus, and silica nutrients dredged by currents from the sea's deep basin. Each spring and summer, these enriched shelf waters nourish microscopic green plants—phytoplankton—that are consumed by zooplankton including tiny