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- GdP—Gewerkschaft der Polizei, Union of Police  
GDR—German Democratic Republic (East Germany)  
GRS—Gesellschaft für Reaktorsicherheit, Society for Reactor Safety (a West German organization)  
HICOG—High Commissioner for Germany (of the US military occupation)  
IAEA—International Atomic Energy Agency  
ICBM—intercontinental ballistic missile  
INES—International Nuclear and Radiological Event Scale  
IPCC—Intergovernmental Panel on Climate Change  
IRS—Institut für Reaktorsicherheit, Institute for Reactor Safety (a West German institute)  
ITER—International Thermonuclear Experimental Reactor  
KB—Kommunistischer Bund, Communist League  
KBW—Kommunistischer Bund Westdeutschland, Communist League of West Germany  
KPD—Kommunistische Partei Deutschlands, Communist Party of Germany  
KTA—Kerntechnischer Ausschuss, Nuclear Technology Committee  
NATO—North Atlantic Treaty Organization  
NBI—*Neue Berliner Illustrierte* (East German illustrated magazine)  
NGO—nongovernmental organization  
NDR—Norddeutscher Rundfunk, Northern German Broadcasting (a West German public broadcasting network)  
NUKEM—Nuklear-Chemie und –Metallurgie GmbH (a West German corporation specializing in nuclear technologies)  
RAF—Rote Armee Fraktion, Red Army Faction  
Rem—roentgen equivalent in man (measurement of radiation exposure)  
RERF—US Radiation Effects Research Foundation  
RWE—Rheinisch-Westfälisches Elektrizitätswerk AG, Rhenish-Westphalian Power Corporation  
SAAS—Staatliches Amt für Atomsicherheit und Strahlenschutz, State Office for Nuclear Safety and Radiation Protection (of the GDR)  
SDI—US Strategic Defense Initiative, or Star Wars  
SDR—Süddeutscher Rundfunk, Southern German Broadcasting  
SED—Sozialistische Einheitspartei Deutschlands, Socialist Unity Party of Germany (East German Communist Party)  
SEK—*Spezialeinsatzkommandos*, special response units (of the West German police)  
SPD—Sozialdemokratische Partei Deutschlands, Social Democratic Party of Germany

- SWF—Südwestfunk, Southwest Broadcasting  
*Tageszeitung-taz* (Berlin daily newspaper associated with the Green Party)
- SZS—Staatliche Zentrale für Strahlenschutz, Central State Office for Radiation Protection
- Tennet TSO—Tennet transmission system operator (German subsidiary of a Netherlands energy corporation)
- TEPCO—Tokyo Electric Power Company
- THTR-300—*Thorium-Hoch-Temperatur-Reaktor*, high-temperature thorium reactor
- Tokomak—toroidal chamber with magnetic coils (experimental fusion reactor)
- TÜV—Technischer Überwachungsverein, Technical Inspection Association
- UCS—Union of Concerned Scientists
- Veba—Vereinigte Elektrizitäts- und Bergwerks AG, United Electricity and Mining Works (a West German energy company)
- WDR—Westdeutscher Rundfunk, West German Broadcasting
- WHO—World Health Organization
- WWER—*Wasser-Wasser-Energie-Reaktor*, water-cooled, water-moderated energy reactor (a Soviet nuclear reactor line)
- ZDF—Zweites Deutsches Fernsehen, Second German Television Network





Republic of Germany (West Germany). The younger generation viewed the alliance between the political authorities, nuclear industry, and technical-scientific experts as rooted in the power structures and authoritarian thinking that had made National Socialism possible. West German activists strove to surmount Germany's pariah status by becoming part of the vanguard of transnational, progressive movements. Even in the GDR (the German Democratic Republic, or East Germany), the atomic consensus came to be questioned by a brave few.

Activists across West Germany rose up in what was nothing less than a popular rebellion against the rule of experts. The anti-nuclear power movement was rooted in a breakdown of popular trust in the state, elites, and the scientific establishment.<sup>2</sup> Faced with an almost monolithic nuclear power consensus, very diverse segments of West German society, ranging from Marxist radicals to conservative farmers, banded together to resist government policies. They vehemently rejected plans to turn idyllic regions of southwest and northern Germany into nuclear-powered industrial centers. Public intellectuals provided the foundations for a systemic critique of the West German nuclear power program and the elites that had produced it. In his 1977 book, *Der Atomstaat* (The Atomic State), Austrian journalist Robert Jungk put forth the thesis that reliance on nuclear weapons and nuclear power necessitated security measures that would lead to the reemergence of dictatorship. His biography as a Jew who escaped Austria in the wake of the *Anschluss* (the German takeover of Austria in 1938) lent him particular authority.<sup>3</sup>

Also very influential was sociologist Ulrich Beck's 1986 study, *Risk Society: Towards a New Modernity*. He argued that nuclear power represented a new kind of risk because the occurrence of catastrophic failure was so hard to predict and because its consequences were potentially so great. The government and scientific institutions could not protect the public, he insisted, and in fact resisted public scrutiny. Beck called for a democratization of the decision-making process regarding risky technologies and the application of ethical, philosophical, cultural, and political ways of reasoning to science and technology.<sup>4</sup> Criticism of elites was much more circumscribed in the GDR, yet one East German scientist wrote, "Scientists, doctors, engineers, politicians and military men are, in spite of their expertise, not immune to error, deceit, corruption, carelessness, hunger for power, and vanity."<sup>5</sup>

Ultimately, though, it was not the intellectuals, but the citizenry that forced a fundamental rethinking of the relationship between citizens and the state. The anti-atomic power movement was an unqualified success. Steve Milder has shown in a recent study that anti-nuclear power activism



forged a powerful movement out of disparate groups and brought about a deepening of democracy in West Germany.<sup>6</sup> Andrew Tompkins explores the synergy between the West German and French anti-nuclear power movements in another important work.<sup>7</sup> Carol Hager establishes the importance of grassroots mobilization in German environmentalism.<sup>8</sup> The present study places the movement in the larger context of the evolution of the nuclear power issue in Germany, East and West, asking why these activists ultimately triumphed. There is no doubt that the major nuclear power plant accidents in Three Mile Island in 1979, in Chernobyl in 1986, and in Fukushima in 2011 helped turn skepticism into outright opposition. However, Germany was and is a pioneer in attempts to completely phase out nuclear power.

Five factors help explain this German peculiarity: the association in Germans' minds of nuclear war and nuclear power; changes in the media landscape that helped to expand civil society in West Germany; the important role of scientific arguments and counterarguments in the debates concerning atomic energy; a learning process among West German activists that led to an evolution in thinking concerning violence; and the rise of the Green Party and the growing receptiveness of the major political parties to environmentalism. Of these five factors, the role of science in debates proved to be the most surprising, and in some ways the most compelling. In the words of historian Cathryn Carson, "Science is all over the history of the Federal Republic of Germany."<sup>9</sup> However, this dimension of West German history has often been overlooked or underestimated.<sup>10</sup>

Can average citizens weigh in on scientific and technological policies in a meaningful way? This question has gained increasing importance with the tremendous upsurge in scientifically and technologically complex issues since World War II. The nuclear power debate in Germany represents a case in which citizens did, in fact, prove themselves able to grapple with such issues. This is not to say that their interventions were in every case well founded, yet the breadth and depth of popular attempts to understand the ins and outs of nuclear power are impressive. Eventually, public opinion was able to sway Chancellor Angela Merkel, a former physicist.

Recent spectacular examples of popular rejection of science—such as global warming denial and the antivaccination movement—seem to suggest that the public is too irrational, misinformed, or poorly educated to weigh in on scientific issues. However, scholarly research presents a far more complex understanding of the popularization of science than these examples seem to suggest and has pointed to the importance of lay knowledge in the scientific process.<sup>11</sup> Furthermore, the emotional, ideological, and religious commitments of average citizens are not necessarily incompatible with science. Historians have shown that scientific inspiration and competence

can be found in what has long been thought to be unlikely places—in medieval Christianity, the Islamic world, astrology, and orthodox Marxist thought.<sup>12</sup>

Marxist and Christian anti-nuclear power activists in West Germany discovered that arguments about nuclear power based on their respective belief systems left them open to criticism. Historian Michael Schüring rightly views Protestant activists' use of a biblical frame of reference as unscientific in nature. However, as he points out, they went on to embrace scientific arguments, drawing on the expertise of pastors with a scientific background, as well as scientific and technical experts who became involved in Church activism.<sup>13</sup> Leftist activists also made serious attempts to understand the technical and scientific fundamentals of nuclear power, as publications from the 1970s and 1980s reveal. This turn to science was crucial to the movement's quest for legitimacy in the eyes of the public, government officials, the courts, and the international community.

While accepting science as a cognitive system, activists were highly critical of scientific institutions, science as a profession, and what they saw as an alliance between science, the state, and the nuclear industry. Activists in West Germany asserted that the supposedly "scientific" consensus behind the atomic power program was in fact highly ideological, politicized, and corrupted by ties to industry. In Communist East Germany, a small group of dissident scientists and their friends agreed in private that "science is a good deal more subjective, corrupt, subservient, and intentionally false than the average citizen might imagine. And in scientific fields related to ecology and nuclear technologies, there is far more science for sale than science that is honest and accurate."<sup>14</sup>

This critical stance emerges out of much older debates and discussions concerning the interpenetration of science, politics, society, the economy, and culture. In the nineteenth and early twentieth centuries, proponents of technocracy claimed that only experts were capable of scientific reasoning or participating in decision making connected with the running of modern societies.<sup>15</sup> The technocracy movement of the 1930s even sought to replace democracy with rule by engineers and scientists.<sup>16</sup> A soft technocratic approach emerged after World War II across the industrialized capitalist world, as many political leaders sought to rationalize and legitimize policymaking through a mutually beneficial alliance with experts. US president Dwight D. Eisenhower warned both of the influence of politics and big money on science and "the equal and opposite danger that public policy could itself become the captive of a scientific-technological elite."<sup>17</sup> Public intellectuals ranging from C.P. Snow to Jürgen Habermas were concerned that such collaboration could undermine democracy.

Scholars disagreed over whether this was likely in the technocracy debate of the 1960s and 1970s. West German antinuclear activists were influenced by these exchanges. According to sociologist Peter Weingart, the nuclear power controversy made the West German public aware for the first time that experts could disagree among themselves concerning major scientific and technological issues and that the political leadership specifically recruited and promoted those experts who supported their political agenda. Weingart asserts that the authority of science was eroded, not only by the “scientification of politics” and the “politicization of science” but also by the “mediatization of science,” meaning scientists’ efforts to reach and influence the public through the media. In his view, these developments reduced science to the status of one actor among many.<sup>18</sup>

My research confirms that anti-nuclear power activists contested the authority of scientists who entered the fray as experts supporting government nuclear power policies, and in fact they entered into very public and very loud debates with them. However, one of the most important findings of my study is that the anti-nuclear movement was not at all averse to science as a cognitive system and in fact made extensive use of scientific arguments and promoted the popularization of scientific and technical knowledge about nuclear power. They struggled to educate themselves and others, studying the workings of the atom, the health consequences of exposure to radioactivity, technical vulnerabilities of conventional atomic reactors, problems with newer technologies, and the inability of authorities and industry to find safe and acceptable ways of disposing with nuclear waste. They learned a great deal from *Gegenexperten* (counterexperts), the term used in Germany for experts critical of the scientific establishment and its coalition with the state.

What effect did environmentalism have on Germans’ approach to public policy and nuclear power in particular? German romanticism and back-to-nature movements of the late nineteenth and early twentieth centuries would seem to suggest that Germans were greater lovers of nature than other peoples. However, David Blackbourn’s work on waterways shows that in fact Germans’ relationship with the environment was characterized by tremendous tensions between attempts to preserve nature on the one hand and to subjugate nature in the pursuit of progress on the other.<sup>19</sup> The state played a major role in both endeavors. Even the Nazis promoted certain environmentalist policies.<sup>20</sup> During the “Economic Miracle” after World War II, neither policymakers nor the public viewed environmentalist policies such as antipollution measures as undermining the pursuit of prosperity, but rather as a part of the rising standard of living.<sup>21</sup> What changed after 1970 was that environmentalists no longer saw the state and the elites as defenders of the environment. Only then did environmentalism become a protest movement.

New attitudes toward emotions helped legitimize the West German public's participation in debates on nuclear power and other ecological issues. Here, the history of emotions is helpful, providing ways of understanding emotions as a constituent part of human existence and history, rather than merely a disruptive factor in political life and decision making in modern societies.<sup>22</sup> In 1975, supporters of nuclear power asserted that they were representatives of rationality, while tarring opponents of nuclear power as emotional and therefore not competent to weigh in on this issue. Referring to emotional anti-nuclear power demonstrators, television journalist Hans-Gerd Wiegand replied, "It is completely legitimate to show emotions."<sup>23</sup>

Historian Frank Biess argues that the outward-directed emotional regime of the late 1940s and 1950s was supplanted in the 1960s by a greater acceptance of interior emotional life.<sup>24</sup> The rise of environmentalism and the anti-atomic power movement provide good examples of how emotions forced elites to confront scientific and technological problems in new ways and to allow the public to participate in debates and negotiations. In the 1970s and 1980s, many West Germans felt they were living in a world filled with threats. The New Cold War of the 1980s only partially explains the sense of dread so pervasive among the younger generations in that period. Environmentalism grew in tandem with fears of toxic contamination, resource depletion, and forest die-offs. New attitudes toward emotions valorized fears and made it possible to articulate them in public and to turn them into political demands. At the same time, the West German public debate on atomic power in this period gives lie to the notion that science and emotion are intrinsically incompatible.<sup>25</sup>

The West German nuclear power controversy was fueled by the clash of two starkly differing visions of West Germany's future. The major political parties, the state bureaucracies, and the business community advocated joining the capitalist-democratic West through economic modernization, full employment, prosperity, and technological achievement. These priorities became all the more important in their eyes during the energy crises and recession of the 1970s. In addition, West German provinces, called *Länder* (states), provided considerable subsidies and participated in the running of nuclear power plants owned by public utility companies. Thus, the West German political leadership was deeply committed to atomic energy on both ideological and material levels, making retreat almost unthinkable.

Scientists and engineers were among the first advocates of nuclear power, and there were few dissenting voices among them in either Germany. They had long subscribed to an apolitical ethos that made them loyal servants of a state conceived as above politics. This orientation grew out of the

struggles of the nineteenth and early twentieth centuries to professionalize, to bolster their status, and in many cases simply to secure employment in their professions.<sup>26</sup> German scientists and engineers displayed little inclination to criticize the state, and they embraced the professional opportunities as well as the ideological benefits of a strategy of economic and technological modernization. Werner Heisenberg, who had played a major role in the Nazi atomic bomb project, became a major spokesman for science as a foundation of modern identity, as Cathryn Carson has shown.<sup>27</sup> West Germans, casting around for a usable past and new foundations for a sense of national identity, were very receptive to Heisenberg's message in the 1950s and 1960s.

Activists of various stripes challenged these values. In the 1960s, young people across the globe led the charge against authority, conformity, and the belief that technological and economic progress should be society's main goal. Intellectuals such as Herbert Marcuse and Antonio Negri spread Marxist thought and inspired a generation of radical students to take up the revolutionary cause. The latter were highly critical of what they saw as Western imperialism in the Third World, and they organized the movement against the Vietnam War. Young West Germans confronted their country's Nazi past. They sought to break down authoritarian structures still in existence in Germany.<sup>28</sup> The state reacted with harsh countermeasures, supported by a large swath of the electorate.

Political and cultural polarization tore at the social fabric. In the long run, however, "1968" contributed to the democratization of West German society. In the short run, West German society was roiled by conflicts regarding the meaning of democracy and citizenship. Conservative professors accused students of behaving like the Hitler Youth. Students responded that the real Nazis were professors who did not want to allow protests. Activists profoundly challenged political authority and law enforcement, disputing the idea that democracy was merely a matter of voting in elections and obeying elected officials.

The anti-atomic power movement emerged as one of the most important "new social movements" of the 1970s. New social movements are generally considered to be popular movements that focus, not on issues revolving around class or socioeconomic status but on quality of life, sometimes described as "postmaterialist values." Competing schools have variously viewed new social movements as irrational reactions to social breakdown; rational attempts to attain concrete goals or political objectives; creators of countercultural milieus that defy social norms and authority, such as Marxist or anarchist groups; or subcultural movements, which have a strong in-group orientation, as in the case of the women's movement and the "alternative" scene. In fact, the anti-nuclear power movement encompassed

all these different strands, but sociologists have been reluctant to accept an all-inclusive explanation for the success of new social movements.<sup>29</sup> As Steve Milder has pointed out, new social movement theory fails to recognize the unifying force of the anti-atomic power movement, as well as its profound contribution to the democratization of West Germany.<sup>30</sup>

Diversity gave the movement broad appeal. Not all participants in the anti-nuclear power movement had ties to sixties radicalism. The rural population in particular tended to be wary of outsiders, particularly those leftists whom they perceived as ideologically rigid.<sup>31</sup> Nonetheless, these more conservative elements participated in a mobilization of society from below that challenged the institutions, ethos, and practices of the West Germany system. Local activist and vintner Annemarie Sacherer protested before television cameras against the police handling of demonstrations in Wyhl in 1975, shouting, “This is no longer a democracy!”<sup>32</sup> A viewer who saw a television program about this demonstration wrote in to the TV station, arguing, “The pictures show more clearly than any commentary could, how people trying to exercise their constitutional rights were denounced and treated like heretics and criminals.”<sup>33</sup>

The archival records from that period make clear that many who went to demonstrations were not part of any organization. They were motivated by local concerns or felt that as good citizens they should speak up—out of concern for the environment or out of anger against what they saw as an out-of-touch government and elite. To shoehorn all who participated in the movement or who were swayed by it into one category or the other is to miss the great diversity of this mobilization and the deep and broad impact it had on the general population. Gradually, it won over people who simply read a leaflet or watched a television program about opposition to nuclear power. Over time, opinions shifted, creating a fundamental distrust of atomic power that became activated by the Three Mile Island, Chernobyl, and Fukushima disasters.

More enlightening than new social movement theory in trying to explain the successes of the West German anti-nuclear power movement are a body of sociological writings on four dynamics that help make social movements effective: cultural power, organization, negotiation, and disruption. First, movements need to be able to sway public opinion through the dissemination of convincing new ideas. Second, organizational infrastructure is key to mobilizing supporters, providing leadership, and securing resources. The third factor, negotiation, involves politics, engagement with the state, legal action, and bargaining within and outside the activist community.<sup>34</sup> The “strongest weapon of social movements” is the power to physically disrupt through demonstrations, blockades, and occupations.<sup>35</sup> Generally,

these involve protesters placing their bodies in harm's way for the purpose of physically impeding the maintenance of the status quo.<sup>36</sup> The West German anti-nuclear power movement was strong in all four areas. But did it have an actual impact on society and the political system?

Activists struggled to win over public support. Initially, nuclear power polarized society. The first major wave of antinuclear activism, in 1975–1977, coincided with a wave of terrorism, spearheaded by the Red Army Faction (RAF, popularly known in the English-speaking world as the “Baader-Meinhof Gang”). Caught up in this fight, state governments countered anti-atomic power protests by building up and deploying massive police and security forces. A significant portion of the West German population thought of opponents of nuclear power as dangerous radicals. This negative image was reinforced by the clashes between demonstrators and police near the planned nuclear power plant construction site in Brokdorf, a small town in the north of West Germany, in 1976–1977.

The anti-nuclear power movement was divided over the advisability of violent confrontations with police during demonstrations. During the campaign to prevent the construction of a nuclear power plant in Brokdorf, demonstrators attempting to enter the construction site engaged in pitched battles with police, while other activists peacefully demonstrated elsewhere. However, as Andrew Tompkins has argued, such distinctions were often not so clear-cut. Some forms of passive resistance and civil disobedience involved physical contact. And many demonstrators who would never have gone on the offensive felt they, along with other protesters, had the right to defend themselves against police.<sup>37</sup> Nonetheless, a turn toward more peaceful methods took place between the mid-1970s and the mid-1980s, accompanied by the rise of the environmentalist Green Party and the increased participation of feminists in the movement. Activists became more tolerant of violence in the wake of Chernobyl but soon turned to blockades and other forms of passive resistance in the fight to stop the delivery of radioactive waste to Gorleben from the 1980s to the early twenty-first century.

The rise of the West German nuclear power movement would not have been possible without the tremendous expansion and transformation of civil society and mass media that took place from the 1960s to the 1980s. The Green Party began as an “anti-party,” avoiding the norms of conventional politics and resisting commitment to parliamentary democracy. By the 1990s, it evolved into a conventional party, increasing its electoral support and joining coalition governments, most notably the “red-green” coalition with the Social Democratic Party, which governed Germany from 1998 to 2005.

Profound shifts in the West German media world enabled the anti-nuclear power movement to bring its case before the court of public opinion. In the decades after World War II, the media's ability to mobilize popular opinion against the government was severely constrained. The Federal Republic's first chancellor, Christian Democrat Konrad Adenauer (in office 1949–1963) saw state domination of the media as a means to democratize West Germany, but also to tamp down opposition. He gave access to friendly journalists, fed the media official versions of events, bullied editors and heads of broadcasting networks, and even considered censorship laws. State governments exercised considerable control over public television and radio networks, which monopolized the airwaves until the introduction of commercial television stations in 1981. During the 1950s, politicians largely succeeded in silencing critical radio commentary.<sup>38</sup>

Fundamental changes and explosive growth in the 1960s transformed the media landscape, opening it up to points of view not sanctioned by the federal or state governments. Journalists participated in the seismic cultural and political shifts of that period. They sought to promote democratization, help overcome authoritarian cultural patterns, and decisively break with the Nazi past, as historian Christina von Hodenberg has shown. An ideal of “engaged journalism” emerged that proposed that journalists could take sides politically, engage in investigative journalism and social critique, and defend the downtrodden but that it was not their job to help create and preserve some sort of cultural or political consensus.

The defenders of this model took on the hierarchies and centers of authority in the media. Journalists working for *Stern*, a very popular weekly magazine, were assured that they did not have to write anything that violated their convictions. On the other hand, Rudolf Augstein, editor in chief of *Der Spiegel*, a major news magazine, fired “engaged journalists.”<sup>39</sup> As the example of the Nazi rise to power illustrates, expanded media presence in the political realm does not always bring about liberalization and democratization.<sup>40</sup> In this particular case, however, it did. Television journalists were no longer content to allow government and industry spokesmen to drown out other viewpoints. Over state objections, they gave common citizens the opportunity to speak on TV about why they opposed the building of nuclear power plants. These journalists were trying to expand both media presence and the realm of free speech.

Less idealistic forces were at work as well, as historian Bernd Weisbrod has argued. The tremendous growth of journalism as a profession in the 1960s created fierce competition among journalists. The rise of television added to the competitive atmosphere, as magazines struggled to maintain their readership. The struggle for market shares and professional advancement spurred



an expansion of investigative reporting.<sup>41</sup> The *Spiegel* scandal of 1962 made the media into political participants. Defense Minister Franz Josef Strauß accused the news magazine *Der Spiegel* of having published state secrets in compiling investigative reports on the West German military and caused journalists to be arrested. Strauß lost his job as a result. This run-in with the government gave journalists a deeper sense of autonomy and valorized their work as never before. At the same time, the public began to expect the media to take on a more confrontational role vis-à-vis the state.

In the GDR, the SED (the Socialist Unity Party, as the ruling Communist Party was called) put the full force of its power and influence behind the defense of nuclear power. Criticism of atomic energy was long kept in check through state censorship. Suppression of non-Communist organizations precluded the emergence of a mass nuclear power movement. The SED did, however, treat society as an important actor in the quest for “technical–scientific progress.” A central aspect of citizenship was mobilization—in factories, schools, and universities—for the technology-driven advancement of socialist society.<sup>42</sup> Moreover, key aspects of professionalism were left intact. Even in an era in which the Soviet Union was supposedly in charge of ensuring the safety of nuclear power plants, East German engineers were at work on obscure but important projects to improve nuclear safety.

In the 1980s, as East Germany’s economic and technological problems mounted, so too did political dissent. Emerging peace, human rights, and ecology activism began to create tentative and vulnerable beginnings of a civil society. This enabled a few activists to disseminate criticism of uranium mining and nuclear power.

Although East German media operated under dictatorial conditions, they were not the lifeless tool of the SED. Certainly, the SED did everything in its power to prevent the emergence of a public realm separate from the state and the SED. The SED viewed the unity of state and society as central to the success of socialism and did not like to be contradicted or undermined. However, the GDR was much more than just the SED. Earlier German traditions, institutions, and ways of thinking lived on until at least the late 1960s. By that time, Western youth culture began intruding on what was called “really existing socialism,” meaning the imperfect form of socialism then actually in existence. Something like a public sphere was beginning to emerge by the late 1980s, mostly under the stewardship of the Protestant Church. However, I avoid the term “public opinion” because some might object that it implies the existence of a public realm independent of the state. The term “*popular* opinion” is more open-ended in this regard and is more appropriate for nondemocratic societies.<sup>43</sup>

The SED tried to mold popular opinion, but nonapproved views sometimes made their way into popular culture.<sup>44</sup> As cultural theorist John Fiske has pointed out, the producers of popular culture must respond to viewer preferences or lose their audience.<sup>45</sup> Popular tastes helped mold East German television programming,<sup>46</sup> as well as the content of illustrated magazines and other down-market publications. Visual culture was not monitored as closely by censors as texts. Under some circumstances, popular opinion came bursting through the usual reserve and conformity, for example after the Chernobyl nuclear power plant explosion in 1986, when citizens inundated the authorities with their concerns.

Additional factors make a comparison between East and West Germany fruitful, starting with their common history and language. During the Cold War, the two countries saw each other as rivals in many realms, including technology, scientific research, culture, and social development. Emulating and reviling each other, both pursued social, economic, and technological modernization. *Détente* very much promoted East–West contacts.<sup>47</sup>

At the same time, the GDR's ties to the Soviet Union and the Federal Republic's to the United States made them part of different, although not entirely separate, transnational networks. After World War II, the United States tried to induce West German politicians and citizens to follow the American lead in developing nuclear power but not nuclear weapons.<sup>48</sup> Criticism of nuclear power safety came out of the US science community. Disquieting research on radiation and human health was conducted in many countries, but US scientists were the most likely to take the issue to the popular press. West German and US antinuclear activists learned from each other. The occupation of the nuclear power plant construction site in Wyhl, West Germany set an example for the Clamshell Alliance, an activist organization that was fighting the building of an atomic plant in Seabrook, Massachusetts.

The East German leadership relied on the Soviet Union for most of its nuclear energy hardware, but also for expert advice and safety monitoring. Soviet reluctance to fulfill this role, as well as accidents in GDR nuclear power plants, caused the GDR to seek greater technological self-reliance by the 1970s. East German nuclear authorities increasingly adopted Western standards and imitated Western technologies. The GDR also embraced the Soviet glorification of nuclear power as a powerful motor of socialist progress. This dream of socialist technological superiority faded by the 1980s. Mikhail Gorbachev's reformism encouraged expression of discontent over the country's nuclear power regime. The harsh suppression of such dissent—modeled on older Soviet practices—prevented East Germans from mounting a serious challenge to technocratic patterns of decision making.

My first chapter looks at the popular culture of nuclear power from the end of World War II until the early 1970s, focusing on the rallying of public support for nuclear power. The Soviet Union tried to match the American Atoms for Peace program with its own claims to be the biggest proponent of “peaceful uses of the atom” and staunchest opponent of atomic war. Consensus regarding the desirability of nuclear power existed among political, economic, and scientific elites in both Germanys. However, despite bursts of euphoria concerning the cornucopia that nuclear energy ostensibly offered, there were some signs of popular unease regarding radiation and atomic power, particularly in the wake of the Bikini nuclear bomb test of 1954. Nuclear power could not shake its association with “the bomb” in the popular mind. This chapter asks whether West German culture was atypical in this regard, comparing analyses of popular depictions of nuclear power in illustrated magazines across cultures. Television programs relating to nuclear energy and accounts of an “Atoms for Peace” exhibition also provide interesting insights into the place of nuclear power in the popular imagination.

Chapters 2 and 3 turn to science and technology. Chapter 2 compares approaches to safety, risk, human error, and nuclear power accidents in East and West Germany from the 1960s to the 1980s. The engineering community, in tandem with industrial leaders and state regulators, developed “engineering philosophies” that guided fundamental approaches to safety. Initially, there were striking East–West differences. As a result of conflicts within and between institutions involved in nuclear power production and oversight, the GDR eventually adapted itself to Western standards, particularly in the wake of the Chernobyl disaster. This chapter also asks how much the public knew about safety problems. Security concerns kept accidents in the GDR secret, while West German nuclear power plant owners attempted to avoid bad publicity by covering up safety problems. However, the West German public demanded and received better information as time went on.

Chapter 3 looks at the origins and diffusion of the scientific and technological arguments that became central to opposition to atomic power in West Germany and, later, the GDR. US scientists made key contributions to research on the health consequences of radiation exposure as well as to criticism of nuclear reactor safety. Maverick scientists and other “counter-experts” in West Germany took up these arguments against nuclear energy, just as the anti–nuclear power movement was moving onto a national and international stage, giving it a crucial boost. This turn toward science was embraced by West German popularizers, who disseminated and modified these arguments.

The spectacular emergence of the West German anti–atomic power movement is the topic of Chapter 4. The government of Baden-Württemberg,

headed by Christian Democrat Hans Filbinger, made the planned nuclear power plant in Wyhl a cornerstone of a technocratic policy of development of Baden, a rural region of West Germany, as well as a step toward overcoming the 1970s oil crisis. Protests ensued, culminating in the occupation of the nuclear power plant construction site in 1975. What began as a regional protest of wine growers and villagers concerned about the impact of the proposed plant on the local economy and on the microclimate grew into a national movement. This movement questioned the equating of nuclear power and progress; the close alliance of the state and nuclear industry; the objectivity of technical and scientific “experts” friendly to the government; and the top-down model of decision making that had prevailed up until that time in West Germany.

Television and the press helped shift power relations between opponents of nuclear power and the state. The Filbinger government engaged in a heated media campaign against the Wyhl protesters and against WDR, a major public broadcasting network. The immediate result was a deeply divided, polarized public realm. Scientific findings played a significant role in these debates. The debates problematized the role of emotion, which was variously interpreted as an impediment to rational, scientific discourse or, conversely, as a gateway to greater public participation.

Conflicts over nuclear power grew into what was nearly a civil war in Brokdorf, the topic of Chapter 5. The government of Gerhard Stoltenberg wanted to construct a nuclear power plant there that would serve both Schleswig-Holstein and Hamburg, in the north of the Federal Republic. Many of the same phenomena observable in the Wyhl case were also present in the Brokdorf conflict: determination on the part of the government to defend this project both as an important component of a modernization program and as a profit-making public utility; government attempts to intimidate the media (in this case, the NDR—Norddeutscher Rundfunk, or Northern German Broadcasting, a public broadcasting network) and discredit the protesters as dangerous radicals; involvement of political activists, some quite radical, in the protests; and polarization of the public. Each side tried to deploy science to defend its case.

While the Wyhl plant was never built, Stoltenberg carried out his plans for Brokdorf with iron determination. More police were deployed than ever before in the history of the Federal Republic. The activists engaged in an intense debate regarding politically motivated violence, leading to a slow but steady decline in violence among anti-nuclear power protesters, lasting until 1986.

The 1986 Chernobyl disaster unleashed a wave of violence among anti-atomic power protesters, the subject of Chapter 6. However, state

mishandling of the upsurge of unrest discredited state actions. In Hamburg, hundreds of anti-Brokdorf demonstrators were held for eighteen hours, tightly packed and largely without access to food, water, or bathrooms. This incident was treated as a national scandal. Many people who had never before participated in a demonstration joined in protests after Chernobyl. Ulrich Beck's *Risk Society* spoke to the national mood. The Greens served to consolidate opposition to atomic power, although infighting slowed the rise of the more conciliatory and pacifistic wing of the party.

I return to the GDR in Chapter 7, which traces the rise of anti-nuclear power activism there. It originated with scientists, unlike in the Federal Republic. Sebastian Pflugbeil (a physicist and biomedical researcher at the Academy of Sciences) was one of perhaps five scientists who became interested in nuclear power, its risks, and its possible impact on human health. They quietly conducted their studies for years, reading and analyzing scientific publications. Through these scientists, atomic power became one of the topics of interest to the ecological movement that enjoyed the Protestant Church's protection.

In the 1980s, particularly after the Chernobyl disaster, they began to write samizdat publications (photocopied "publications" not sanctioned for general circulation by the state) and give talks within the framework of the Protestant Church. Chernobyl unleashed an unprecedented wave of appeals to the state for information, assistance, and advice. In Church circles, Chernobyl became the touchstone of a wave of environmentalist activism. This chapter examines the outlooks, politics, and habits of GDR activists. State oppression of the fledgling movement fostered a sense of solidarity among its members. Some of these activists later became involved in the New Forum, which negotiated the transition to a multi-party system.

The book's final chapter discusses debates about atomic power since reunification and asks why Angela Merkel's government decided in 2011 to phase it out. Two quite contradictory tendencies contributed to this "energy turn." The first is professionalization of the Green Party and of environmentalist research as well as the emergence of a vibrant alternative energy sector and its incorporation into the capitalist economy. The second is the continued militancy of the anti-atomic power movement, which was focused on the disposal of nuclear waste in Gorleben. The Fukushima disaster sounded the death knell of atomic energy in Germany. Or did it? In light of climate change, the parameters of the debate concerning nuclear power have shifted considerably, and the future remains uncertain. I agree with historian Frank Uekötter's view that the rise of environmentalism has been historically contingent and is reversible.<sup>49</sup>

## Notes

1. In German, the term *Atomkraft* (atomic power) came to be used by its opponents, while *Kernkraft* (nuclear power) or *Kernenergie* (nuclear energy) were used by its proponents. This distinction dwindled by the mid-1980s. Matthias Jung, *Öffentlichkeit und Sprachwandel: Zur Geschichte des Diskurses um die Atomenergie* (Wiesbaden: Springer Fachmedien, 1994), 43–46, 60–62, 82–89, 134–36, 194–95. The difference between atomic power, atomic energy, nuclear power, and nuclear energy is not as pronounced in English. To avoid tedium, I use them interchangeably throughout this study.
2. Albrecht Weisker, “Expertenvertrauen gegen Zukunftsangst: Zur Risikowahrnehmung der Kernenergie,” in *Vertrauen: Historische Annäherungen*, ed. Ute Frevert (Göttingen: Vandenhoeck & Ruprecht, 2003), 394–421.
3. Robert Jungk, *Der Atom-Staat: Vom Fortschritt in die Unmenschlichkeit* (Munich: Kindler, 1977). English translation: Robert Jungk, *The New Tyranny: How Nuclear Power Enslaves Us*, trans. Christopher Trump (New York: F. Jordan Books/Grosset & Dunlap, 1979).
4. Ulrich Beck, *Risikogesellschaft: Auf dem Weg in eine andere Moderne* (Frankfurt am Main: Suhrkamp Verlag, 1986), 37 (on the last point). First English edition: Ulrich Beck, *Risk Society: Towards a New Modernity*, trans. Mark Ritter (London and Newbury Park, CA: Sage, 1992). The democratization theme comes out more clearly in Ulrich Beck, *Gegengifte: Die organisierte Unverantwortlichkeit* (Frankfurt am Main: Suhrkamp Verlag, 1988), 277, 288.
5. Sebastian Pflugbeil, preface to Michael Beleites, “Pechblende: Der Uranbergbau in der DDR und seine Folgen,” Samizdat publication, unnumbered pages, BStU, HA XVIII, Nr. 18237, 84.
6. Stephen Milder, *Greening Democracy: The Anti-Nuclear Movement and Political Environmentalism in West Germany and Beyond, 1968–1983* (Cambridge, UK and New York: Cambridge University Press, 2017).
7. Andrew Tompkins, *Better Active Than Radioactive! Anti-Nuclear Protest in 1970s France and West Germany* (Oxford: Oxford University Press, 2016).
8. Carol Hager, *Technological Democracy: Bureaucracy and Citizenry in the German Energy Debate* (Ann Arbor, MI: University of Michigan Press, 1995).
9. Cathryn Carson, *Heisenberg in the Atomic Age: Science and the Public Sphere* (Cambridge, UK and New York: Cambridge University Press, 2010), 3.
10. The main problem is the divide between historians of technology and science on the one hand and those who study society, culture, and politics on the other.
11. Brian Wynne argues that while lay knowledge is socially constructed, so too is science in “May the Sheep Safely Graze? A Reflexive View of the Expert-Lay Knowledge Divide,” in *Risk, Environment and Modernity: Towards a New Ecology*, ed. Scott Lash, Bronislaw Szerszynski, and Brian Wynne (London: Sage, 1996), 44–83. By contrast, Steven Shapin takes a realist stance, positing in *Never Pure: Historical Studies of Science* (Baltimore, MD: Johns Hopkins Press, 2010) that science is an imperfect, human enterprise, influenced by social and historical context, yet universalistic and fundamental to the technological foundations of the modern world. Roger Cooter

- and Stephen Pumfrey also emphasize this relationship between the scientific community and the public in the making of science in “Separate Spheres and Public Places: Reflections on the History of Science Popularization and Science in Popular Culture,” *History of Science* 32, no. 3 (1994): 237–67.
12. Edward Grant, *The Foundations of Modern Science in the Middle Ages: Their Religious, Institutional and Intellectual Contexts* (Cambridge, UK and New York: Cambridge University Press, 1996); George Saliba, *A History of Arabic Astronomy: Planetary Theories during the Golden Age of Islam* (New York: New York University Press, 1994); Lawrence Principe, “Alchemy Restored,” *Isis* 102, no. 2 (2011): 305–12; Loren Graham, *Science in Russia and the Soviet Union* (Cambridge, UK and New York: Cambridge University Press, 1993), 112–16.
  13. Michael Schüring, *‘Bekennen gegen den Atomstaat’: Die evangelischen Kirchen in der Bundesrepublik Deutschland und die Konflikte um die Atomenergie 1970–1990* (Göttingen: Wallstein Verlag, 2015), esp. 181–97.
  14. Email from Sebastian Pflugbeil to Dolores Augustine, 31 March 2015.
  15. These include the utopian socialist Henri de Saint-Simon, sociologist and economist Thorstein Veblen, and engineer Frederick W. Taylor, the founder of “scientific management,” or Taylorism.
  16. Edwin Layton, *The Revolt of the Engineers: Social Responsibility and the American Engineering Profession* (Cleveland, OH and London: Press of Case Western Reserve University, 1971).
  17. Dwight D. Eisenhower, “Farewell Radio and Television Address to the American People, January 17th, 1961,” Eisenhower Archives, retrieved 20 October 2017 from [https://www.eisenhower.archives.gov/all\\_about\\_ike/speeches/farewell\\_address.pdf](https://www.eisenhower.archives.gov/all_about_ike/speeches/farewell_address.pdf). See also Jeff Hughes, *The Manhattan Project: Big Science and the Atom Bomb* (Cambridge, UK: Icon Books, 2002), 128–29.
  18. Peter Weingart, *Die Stunde der Wahrheit? Zum Verhältnis der Wissenschaft zu Politik, Wirtschaft und Medien in der Wissensgesellschaft* (Weilerswist, Germany: Velbrück, 2001), 133–39, 143; Peter Weingart, “Verwissenschaftlichung der Gesellschaft—Politisierung der Wissenschaft,” *Zeitschrift für Soziologie* 12 no. 3 (1983): 225–41.
  19. David Blackburn, *The Conquest of Nature: Water, Landscape, and the Making of Modern Germany* (New York: Norton, 2006).
  20. Joachim Radkau and Frank Uekötter, eds., *Naturschutz und Nationalsozialismus* (Frankfurt and New York: Campus Verlag, 2003).
  21. Frank Uekötter, *Deutschland in Grün: Eine zwiespältige Erfolgsgeschichte* (Göttingen: Vandenhoeck & Ruprecht, 2015), chs. 2–4.
  22. For a useful approach to emotions on the radical left, see Joachim Häberlen and Jake Smith, “Struggling for Feelings: The Politics of Emotions in the Radical New Left in West Germany, c.1968–84,” *Contemporary European History* 23, no. 4 (2014): 615–37. On “fear” and the quest for “security” in the German debates over nuclear disarmament, see Holger Nehring and Benjamin Ziemann, “Führen alle Wege nach Moskau? Der NATO-Doppelbeschluss und die Friedensbewegung—eine Kritik,” *Vierteljahrshefte für Zeitgeschichte* 59, no. 1 (2011): 81–100. For an overview of the history of emotions, see Jan Plamper, *The History of Emotions: An Introduction*, trans. Keith Tribe (New York: Oxford University Press, 2015).

23. WDR Historisches Archiv, Signatur 12523, transcript of “Glashaus—TV Intern,” dated 1 April 1975. My translations throughout.
24. Frank Biess, “Feelings in the Aftermath: Toward a History of Postwar Emotions,” in *Histories of the Aftermath: The Legacies of the Second World War in Europe*, ed. Frank Biess and Robert Moeller (New York: Berghahn Books, 2010), 30–48. Also Frank Biess, *German Angst? Fear and Democracy in Postwar West Germany* (New York: Oxford University Press, forthcoming).
25. For example Spencer Weart, *Nuclear Fear: A History of Images* (Cambridge, MA: Harvard University Press, 1989). He sees popular fears regarding nuclear power as emotional and therefore a rejection of science.
26. Dolores Augustine, *Red Prometheus: Engineering and Dictatorship in East Germany, 1945–1990* (Cambridge, MA: MIT Press, 2007), 22–27.
27. Carson, Heisenberg, chs. 5 and 6.
28. Timothy Brown, *West Germany and the Global Sixties: The Anti-Authoritarian Revolt, 1962–1978* (Cambridge, UK and New York: Cambridge University Press, 2013), esp. 4–12, 81–84.
29. Ruud Koopmans, *Democracy from Below: New Social Movements and the Political System in West Germany* (Boulder, CO: Westview Press, 1995), 7–37 and 229–36, and literature cited therein. On the “alternative scene,” see Sven Reichardt, *Authentizität und Gemeinschaft: Linksalternatives Leben in den siebziger und frühen achtziger Jahren* (Berlin: Suhrkamp Verlag, 2014).
30. Milder, *Greening Democracy*.
31. Tompkins, *Better Active*, 25, 41–50.
32. WDR Historisches Archiv, Archive number 0165239. Ulrich Eith, “Nai hämmer gsait! Stilbildender ziviler Widerstand in Wyhl am Kaiserstuhl,” in *Aufbruch, Protest und Provokation: Die bewegten 70er- und 80er-Jahre in Baden-Württemberg*, ed. Reinhold Weber (Darmstadt: Theiss Verlag, 2013), 52; article on 35–54.
33. WDR Historisches Archiv, 7210, letter dated 26 February 1975.
34. Kenneth Andrews, *Freedom Is a Constant Struggle: The Mississippi Civil Rights Movement and Its Legacy* (Chicago, IL: University of Chicago Press, 2004), 2–6, 198–200.
35. Sidney Tarrow, *Power in Movement: Social Movements and Contentious Politics*, 3rd rev. ed. (Cambridge, UK and New York: Cambridge University Press, 2011), 103–4; see 25, 124–29, 231.
36. Tiya Miles, “Fighting Racism Is Not Just a War of Words,” *New York Times* (21 October 2017). The roots of physical resistance are many, ranging from Mahatma Gandhi’s conception of passive resistance to long-standing practices of rebellion and revolution.
37. Tompkins, *Better Active*, ch. 5; Michael Sturm, “Polizei und Friedensbewegung,” in *“Entrüstet Euch!” Nuklearkrise, NATO-Doppelbeschluss und Friedensbewegung*, ed. Christoph Becker-Schaum, Philipp Gassert, Martin Klimke, Wilfried Mausbach, and Marianne Zepp (Paderborn: Ferdinand Schöningh, 2012), 277–93.
38. Matthias Weiss, “Öffentlichkeit als Therapie: Die Medien- und Informationspolitik der Regierung Adenauer zwischen Propaganda und kritischer Aufklärung,” in *Medialisierung und Demokratie im 20. Jahrhundert*, ed. Frank Bösch und Norbert Frei (Göttingen: Wallstein Verlag, 2006), 73–120; Christina von Hodenberg,



- Konsens und Krise: Eine Geschichte der westdeutschen Medienöffentlichkeit, 1945–1973* (Göttingen: Wallstein Verlag, 2006), 152–215.
39. Von Hodenberg, *Konsens und Krise*, 245–439, esp. 420–33.
  40. Frank Bösch and Norbert Frei, “Die Ambivalenz der Medialisierung: Eine Einführung,” in *Medialisierung und Demokratie im 20. Jahrhundert*, ed. Frank Bösch and Norbert Frei (Göttingen: Wallstein Verlag, 2006), 7–23.
  41. Bernd Weisbrod, ed., *Die Politik der Öffentlichkeit—die Öffentlichkeit der Politik: Politische Medialisierung in der Geschichte der Bundesrepublik* (Göttingen: Wallstein Verlag, 2003), esp. the introduction and articles by Frank Bösch and Willibald Steinmetz.
  42. Andrew Port, *Conflict and Stability in the German Democratic Republic* (Cambridge, UK and New York: Cambridge University Press, 2007); Jörg Roesler, “Die Produktionsbrigaden in der Industrie der DDR. Zentrum der Arbeitswelt?” in *Sozialgeschichte der DDR*, ed. Hartmut Kaelble, Jürgen Kocka, and Hartmut Zwahr (Stuttgart: Klett-Cotta Verlag, 1994), 144–70. On state citizenship, see Jan Palmowski, “Citizenship, Identity and Community in the German Democratic Republic,” in *Citizenship and National Identity in Twentieth-Century Germany*, ed. Geoff Eley and Jan Palmowski (Stanford, CA: Stanford University Press, 2008), 73–93. He interprets the GDR conception of citizenship as encompassing economic, social, and cultural participation in the socialist community, although he does not focus on the workplace.
  43. Usage in Ian Kershaw, *Popular Opinion and Political Dissent in the Third Reich, Bavaria 1933–1945* (Oxford: Oxford University Press, 1983), 4.
  44. An example is the glorification of (East) German technology and the downplaying of Soviet technological achievements in a book handed out to eighth graders who completed their *Jugendweihe*. See Alfred Kosing, Diedrich Wattenberg, and Rolf Dörge, *Weltall Erde Mensch: Ein Sammelwerk zur Entwicklungsgeschichte von Natur und Gesellschaft*, 13th ed. (Berlin: Verlag Neues Leben, 1965), unnumbered pages 336–37, 352–53, 393, 400–401, 404, and 415–49. See also my analysis in Augustine, *Red Prometheus*, 223–24.
  45. John Fiske, “The Popular Economy,” in *Cultural Theory and Popular Culture: A Reader*, ed. John Storey, 3rd ed. (Harlow, UK: Pearson Education Ltd., 2006), 537–53. Also see comments and application of Fiske in Thomas Lindenberger, “Einleitung,” in *Massenmedien im Kalten Krieg: Akteure, Bilder, Resonanzen* (Cologne: Böhlau Verlag, 2006), 16–17 and introduction on 9–23.
  46. Heather Gumbert, *Envisioning Socialism: Television and the Cold War in the German Democratic Republic* (Ann Arbor, MI: University of Michigan Press, 2014), 13. For a broad and deep analysis of popular entertainment programs, see Rüdiger Steinmetz and Reinhold Viehoff, eds., *Deutsches Fernsehen Ost: Eine Programmgeschichte des DDR-Fernsehens* (Berlin: Verlag für Berlin-Brandenburg, 2008). For East–West German comparative studies on television, see Lindenberger, *Massenmedien im Kalten Krieg*, esp. Uta Schwarz, “Der blockübergreifende Charme dokumentarischer Filme,” 203–34 and Thomas Heimann, “Television in Zeiten des Kalten Krieges: Zum Programmaustausch des DDR-Fernsehens in den sechziger Jahren,” 235–61. Schwarz finds parallels in developments in East and West Germany.

47. Frank Bösch, “Geteilt und verbunden: Perspektiven auf die deutsche Geschichte seit den 1970er Jahren,” in *Geteilte Geschichte: Ost- und Westdeutschland 1970–2000* (Göttingen: Vandenhoeck & Ruprecht, 2015), 7–38.
48. On American attempts to mold science policies in postwar Europe, see John Krige, *American Hegemony and the Postwar Reconstruction of Science in Europe* (Cambridge, MA: MIT Press, 2006).
49. Uekötter, *Deutschland in Grün*, 137.



the idea that radiation either could provide huge amounts of energy, thus providing prosperity for all, or, if used in a bomb, could spell the destruction of humanity. Wells invented both the concepts and the terms “atomic bomb” and “Atomic Age.”<sup>4</sup>

According to historian David Nye, the destructive power of the bomb evoked religious feelings, a sense of awe and profound fear among Americans, giving way to “a somber feeling” and a new sense of the vulnerability of life on earth. Paul Boyer shows that Americans were initially gripped with an overwhelming sense of terror. However, he argues that within a couple of years, government, the media, and corporate America succeeded in convincing the US public that the “peaceful atom” somehow outweighed and even cancelled out the threat of destruction through nuclear war.<sup>5</sup>

The American and Soviet military administrations in Germany and, later, German authorities made major attempts to mold popular perceptions of the unfolding Atomic Age. Germans were receptive because, to them, nuclear technologies represented a modern world that would help them escape from the past.<sup>6</sup> The theme of redemption through the turn away from war and the building of peace and prosperity was fundamental to the American Atoms for Peace policy, as well as its Soviet equivalent. West and East Germans sought security, defined in three ways: peace and protection as allies of the United States and the Soviet Union, economic security, and progress through science. Nuclear power was widely held to be compatible with and even essential to all three. More importantly, by being welcomed into the new nuclear regime of their respective blocs, East and West Germany gained new respectability that might allow them to shed their Nazi past.

However, the association of atomic power with the atom bomb never wore off. In the decades after World War II, political leaders and elites who promoted nuclear power certainly viewed these misgivings as irrational and attempted to build a nuclear consensus from the bottom up by educating the public, promoting technical safety, and providing a legal framework for the safe use of nuclear power. However, an undercurrent of fear lived on. This chapter looks at conflicting tendencies in depictions of nuclear power and at the relationship between science and emotion in East and West German popular culture from the 1940s to the 1960s, placing this analysis in the context of wartime experiences, the Cold War, and the development of a dictatorial socialist system in the GDR and a capitalist–democratic system in the Federal Republic. The media did not just filter and transmit attitudes and ideas about nuclear power but also helped to mold them.

## Media and Popular Opinion in the Atomic Age

Shattered and subjugated during the Nazi period, West German media rapidly recovered in the postwar period, in many cases returning to Weimar era patterns. The elite upheld the idea of Germany as a *Kulturnation* (cultured nation) and disdained popular entertainment. The educated classes held certain newspapers and newsmagazines to be the most dependable purveyors of political news. These included the Center-Right daily *Frankfurter Allgemeine Zeitung* (founded in 1949), the Center-Left daily *Süddeutsche Zeitung*, and the Center-Left weekly news magazine *Der Spiegel* (founded in 1947). However, tabloids and illustrated magazines far surpassed the “serious” press in terms of circulation.<sup>7</sup>

Public opinion polls carried out by or commissioned by the US occupation authorities provided a corrective to overly elitist views of the West German press.<sup>8</sup> Illustrated magazines such as *Stern* regained their pre-1933 popularity after the war. In 1950, about 16.3 percent of the adult population in West Germany read *Stern*, according to a US survey. This translates into a readership of about eight million.<sup>9</sup> *Stern* had a circulation of 1.2 million in 1960, but *Stern* estimates that it had over ten million readers at that time. Thus, about one in five West Germans read it, making it as popular a magazine in West Germany as *Life* was in the United States.<sup>10</sup> Many read the magazine in a beauty salon, a barbershop, or a waiting room, or they read a friend’s, relative’s or colleague’s copy. The readership of magazines cut across class lines. Professionals, businessmen, and office workers were the most avid readers of magazines and illustrated magazines, according to a US survey of 1955.<sup>11</sup>

Gradually, television became the dominant popular medium. Most Germans did not watch television in the 1950s. Only 24 percent of West German households and 17 percent of East German households owned a television set in 1960.<sup>12</sup> By contrast, 60 percent of West Germans surveyed in 1955 read magazines.<sup>13</sup> By 1966, however, over half of all households in the Federal Republic and the GDR had a TV.<sup>14</sup>

The driving force behind popular media was the desire to appeal to the broad masses. In the early days, *Stern* published a good many articles about scandals, stars, and members of royal families, but by the mid-1950s, it was doing a good deal of investigative journalism and featuring pointedly critical articles on world affairs. Its editors saw it as part of the “fourth power” or “fourth estate,” that is, a watchdog overseeing the three branches of government. Its Center-Right leanings up into the mid-1960s gave way to a more Center-Left orientation by the 1970s.<sup>15</sup>

The East German press was state or party owned and was subject to strict censorship. The SED's party newspaper, *Neues Deutschland*, closely hewed to the party line. Journalists were carefully monitored by the authorities and were expected to adhere to guidelines issued by the "agitation/propaganda" division of the SED and by bodies such as the German Peace Council, a GDR affiliate of the Soviet-dominated World Peace Council.<sup>16</sup>

Although never criticizing the Communist system, some publications sought to appeal to a popular audience. One example is *Neue Berliner Illustrierte*, an illustrated magazine published since 1945 in the Soviet sector of Berlin and later the GDR. With a circulation of 700,000 in a country with a population of about seventeen million, NBI was the most popular magazine in the country around 1970, although the authorities restricted the number of copies printed, and it was sold from "under the counter."<sup>17</sup> From its inception, it was a lively magazine that sought, not just to promote a socialist consciousness but also to draw in readers with arresting images, drama, and teaser headlines. Its articles, although never critical of the SED or the Soviet Union, were sometimes illustrated with photos rich in ambiguity and Westernized imagery, particularly after Joseph Stalin's death in 1953.

Internal documents from the Berliner Verlag (Berlin Publishing House), the publisher of NBI and the tabloid BZA (*Berliner Zeitung am Abend*, the evening edition of the *Berliner Zeitung*, or Berlin News), make clear that journalists were under great pressure to fulfill SED mandates. It was evidently rare for a journalist to push back, yet I was able to find one such instance. At a 1962 meeting behind closed doors, an SED party official objected to the headline, "He Does Not Want to Commit Suicide," placed above a photo of a Western demonstrator carrying a banner that read, "War is our greatest enemy." This item, published in BZA, "contains pacifist tendencies," he contended. (This was problematic because it might call into question Soviet "self-defense.") A journalist countered that such scruples stood in the way of making BZA *massenwirksam*, meaning "appealing to the masses."<sup>18</sup> This desire to connect with the reader opened mass media in the GDR to currents in popular culture that did not align perfectly with official goals.

The first part of this chapter places the popular culture of the Atomic Age in the context of German history and the Cold War, drawing on my quantitative content analysis of all issues of *Stern* and NBI published between 1945 and 1965 (about 2,000 in number—none digitized). This study was compiled as part of a larger project on popular culture depictions of nuclear technologies in eight countries.<sup>19</sup> In keeping with Germany's position on the potential front lines of any nuclear war, military technologies overshadowed civilian technologies in articles on the Atomic Age from the late 1940s to 1965. Of 270 articles on nuclear technologies published in

*Stern* between 1948 and 1965, only thirty-five discussed atomic power or other nonmilitary technologies (such as medical uses). NBI published forty-seven articles about civilian nuclear technologies out of a total of 186 articles with nuclear themes in the same period.<sup>20</sup> The following sections discuss some of the most important tropes, beginning with one whose significance is sometimes overlooked.

## Scientists as Heroes, 1945–1953

Popular attitudes were molded, not just by the peaceful atom/destructive atom narrative but also by the stature of science and scientists. Across the globe, science was presented as an objective anchor in an uncertain world and a return to rationality after the irrationality of the ideological extremism of wartime. In Germany, whose scientific tradition was the source of considerable pride, journalists, authorities, and the people could construe science as representing a “better Germany.” Such retrospection invoked a redeemable German past that ostensibly stood above politics, making it useful in both the Soviet and Western zones of occupation. The first article about nuclear technology published after the war by NBI focused on Wilhelm Röntgen (1845–1923), a German scientist responsible for the discoveries that led to the development of modern radiology. It extolled not only his scientific contribution but also his ethos: “In a selfless manner, he made his beneficial discovery available to all of humankind.”<sup>21</sup> Similarly, a 1947 article in *Der Spiegel* about the death of Max Planck recounted that the physicist, who was pushed out as head of the Kaiser-Wilhelm Society in 1936, had asked in vain to speak to Hitler to protest against the persecution of Jews.<sup>22</sup>

In reality, the place of scientists in German society, both during and after the Nazi era, was rather different. According to historian Dieter Hoffmann, Planck had in fact displayed a marked lack of solidarity with Jewish physicists such as Albert Einstein.<sup>23</sup> Physicist Erwin Schrödinger was one of the rare non-Jewish scientists who fled Nazi Germany.<sup>24</sup> Most scientists were only too happy to work on projects with military applications during the war.<sup>25</sup> They included a project to build an atomic bomb. The reasons for its failure have been the subject of a good deal of academic debate. German scientists ended up working on a wartime project to build an atomic reactor that used heavy water as a moderator.<sup>26</sup> Few scholars believe Werner Heisenberg’s claim that as head of an important research team working on the bomb, he deliberately sabotaged the project.<sup>27</sup> Forced to flee from Germany, Albert Einstein and Leo Szilard induced President Franklin D. Roosevelt to initiate the Manhattan Project.

In a mad rush in 1945–1946, the United States, Great Britain, and the Soviet Union seized scientists and technical specialists that they feared might go to work for the other side. Those captured by American forces under the ALSOS Mission and Operation Paperclip were quickly released and found they had good professional prospects in the United States or the Western zones of occupation. German atomic scientists in Soviet custody, many of whom worked on the Soviet atomic bomb program, were not released until the mid-1950s.<sup>28</sup> East and West Germany competed to recruit these and other scientists, especially recipients of the Nobel Prize, not only because of their potential contribution to science but also because of their prestige value. Each side was anxious to burnish its reputation as heir to the German tradition of excellent in science.<sup>29</sup>

Worldwide trends helped German scientists leave their tainted past behind. Science and scientists enjoyed great prestige across the globe after the war. Atomic physicists such as Albert Einstein and Niels Bohr emerged from the war as ambassadors of international understanding and world peace. Albert Schweitzer and Leo Szilard gained a reputation for “speaking truth to power.” Scientists “were seen as a kind of international brotherhood, hampered in their exchange of views by the barriers of the Cold War, which therefore impeded progress.”<sup>30</sup> Werner Heisenberg was able to take advantage of the moral stature of leading members of the international scientific community. Quickly rehabilitated and in 1946 named director of what became the Max Planck Institute for Physics, he became an advocate of state funding for nuclear power.<sup>31</sup> According to historian Cathryn Carson, he was anxious to head off public concerns regarding nuclear research. In the late 1940s, he became a respected public figure. In public speeches, he addressed the modern sense of alienation and the struggle to find meaning, suggesting that science provided orientation in a disorienting world.<sup>32</sup>

Journalists, scientists, policymakers, and occupational authorities took advantage of the prestige of science and scientists when they developed the narrative of the peaceful atom to promote agendas of various sorts.

## “Atoms for Peace” in a Warlike Era, 1954–1957

Nuclear power was developed in the shadow of the Cold War and the arms race. The US nuclear monopoly ended when the Soviet Union detonated an atomic bomb on 29 August 1949. The United States tested its first hydrogen bomb—a far more powerful weapon that was not, yet, a deliverable weapon—on 1 November 1952. The Soviet Union shocked the world in



August 1953 by exploding an H-bomb that, although smaller, could be dropped from an airplane. Germany, straddling the East–West divide, felt acutely exposed. Soviet forces tried to force Western Allied forces out of Berlin during the Blockade of 1948–1949, but the Western Allies were able to keep the city supplied in the Berlin Airlift, and West Berlin became part of the Federal Republic of Germany, which was founded 23 May 1949. On 7 October 1949, the GDR was established in the East.

Anticipating the H-bomb, whose development had just been announced by US president Harry Truman, a 1950 *Stern* article featured an artist's rendition of an H-bomb explosion over a map of Essen, a large city in West Germany. It explained the levels of destruction in zones around the ground zero of such an attack. Only six such bombs were needed to completely destroy Germany, the article asserted.<sup>33</sup> Similar articles ran in illustrated magazines in the United States, Great Britain, and the Netherlands around this time. However, *Stern* and NBI ran articles on the threat of nuclear war more consistently and in greater number, at least up until 1965 (when my quantitative data series ends).<sup>34</sup>

Combating a popular sense of dread, political leaders, opinion makers, and scientists tried to spread a message of optimism regarding the possibilities for peace and prosperity in a world where “the atom” was put to use to better humanity rather than to destroy it. That was the main message of President Dwight D. Eisenhower’s “Atoms for Peace” speech, delivered before the United Nations General Assembly on 8 December 1953. In addition, he called for the creation of a U.N. atomic energy agency that would give nations across the globe access to the fissionable materials and technology needed to start up nuclear power programs. Some historians have argued that this speech and the worldwide campaign that followed were primarily propaganda aimed at concealing or justifying the growing US nuclear arsenal and mitigating the aggressive impression it made.<sup>35</sup> However, historians John Krige and Mara Drogan have demonstrated that the spread of nuclear power was a major aim of the Atoms for Peace program.

Access to the technologies and materials needed to initiate atomic energy programs had been severely restricted up to that point by Allied agreement. Krige emphasizes that the US Atoms for Peace program was crucial to the founding of Euratom, which US policymakers saw as the lynchpin of nuclear nonproliferation policy in Western Europe. The timing of Eisenhower’s launching of this policy initiative also had to do with international events. The death of Stalin and the end of the Korean War opened the prospect of greater cooperation with the Soviet Union. On the other hand, Soviet proposals for total nuclear disarmament and pledges never to launch a “first-strike” nuclear offensive put the United States, which did not want

to renounce either, on the defensive. Eisenhower hoped to mobilize world public opinion in favor of US leadership in the Cold War.<sup>36</sup>

The Soviet Union had long been trying to promote its own leadership role with its own version of the peaceful atom narrative. Science was central to the self-understanding of leaders and loyal citizens in the Soviet Union and the GDR.<sup>37</sup> Following the example of Soviet publications, NBI proclaimed that nuclear technologies in the hands of capitalist nations led to the development of weapons and the spread of aggression, imperialism, and, eventually, war. Socialism, by contrast, was said to promote peaceful uses of the atom, not only for power production but also for medicine, transportation, and food production.

An NBI article from the late 1940s featured an atomic-powered spacecraft that could reach the moon in “3 hours, 27 minutes.” The caption of a fantastical drawing of the dramatic nighttime launch, the creation of the great German press illustrator Helmuth Ellgaard (1913–1980),<sup>38</sup> read:

It is a few minutes before midnight. All eyes on earth are turned to this first United Nations airport for inter-planetary travel. The elegant, shiny, metallic body of the spacecraft lies on a mighty, rotating launching pad ... A pull on a lever unleashes the subdued atomic power ... For the first time, a spacecraft leaves our planet.<sup>39</sup>

An imitative article ran in *Stern* three years later, although the nuclear-powered craft was a freight and mail rocket, and the name stamped on its side—RAK—made it clear that it was inspired by stunt vehicles manufactured by the Opel Automobile Company in the 1920s.<sup>40</sup>

Futuristic daydreaming had a purpose, as can be seen in the 1947 NBI article “Bomb or Philosopher’s Stone?” While the West continued to develop and test nuclear weapons, the article asserted, the Soviet Union and the socialist world offered peaceful uses of the same nuclear technology. Nuclear fission could be used to fuel space travel, combat cancer, reverse human aging, and create artificial food in times of poor harvests, the article claimed. However, the author believed that the use of atomic power to generate electricity was impractical because of its high cost.<sup>41</sup> Soviet authorities and the East German press made no mention of the testing of the first Soviet atomic bomb on 29 August 1949. NBI first mentioned Soviet nuclear capabilities in December of that year, unveiling a proposal to change the course of two Siberian rivers by detonating a nuclear bomb.<sup>42</sup> In trying to conceal or rationalize nuclear weapons programs, the superpowers provided arguments for latecomer nations trying to skirt nonproliferation agreements years later.

At the Geneva Conference of 1955, the Soviet Union joined the United States in providing what had, until then, been classified information on atomic reactor designs and the prospect of helping many nations to develop nuclear power. This conference unleashed “messianic hopes” around the world.<sup>43</sup> In West Germany, it unleashed a wave of “nuclear euphoria,” particularly on the political left.<sup>44</sup> H.G. Wells, the first writer to embrace the idea of nuclear power as an answer to the danger of nuclear weapons, was a Fabian socialist. In a work written shortly after the war but not published until 1955, prominent Marxist philosopher Ernst Bloch asserted that the betterment of humankind through climate change was the true mission of nuclear fission: “A few hundred pounds of uranium and thorium would suffice to make the Sahara and Gobi Deserts disappear and to turn Siberia, North America, Greenland and Antarctica into the Riviera.”<sup>45</sup> Social Democrat Leo Brandt made similar fantasy-filled statements regarding the peaceful atom in a high-profile speech in 1956.<sup>46</sup> Many nonsocialists joined in the paeans to this “Atomic Age,” a term that in Germany had a utopian ring to it.

In the GDR, atomic-powered fantasies equated the advance of socialism, “scientific–technical progress,” and technological spectacles. These were inspired in part by the start-up of nuclear research in the GDR.<sup>47</sup> NBI, as well as the comic book series *Mosaik*, featured pictures of nuclear-powered jet aircraft. In artists’ renditions, passengers sat in the front, far from the reactor, which was located in the tail section.<sup>48</sup> A popular East German illustrated book on nuclear technologies featured atomic trains that pulled into atomic train stations.<sup>49</sup> The source of inspiration for this technological daydreaming was probably a 1946 American study titled *Applied Atomic Power*.<sup>50</sup> The first nuclear-powered Soviet icebreaker, the *Lenin*, forced its way through a mighty sea of ice in another NBI article: “In numerous battles, the Soviet icebreakers have proven themselves stronger than the polar ice’s powers of nature.”<sup>51</sup> Here, the caption writer, Lothar Hitziger (an author of popular books on science and technology), was invoking several narratives common in Soviet thinking about technology: the struggle to master technology as military engagement, socialism as the technologically superior system, and the taming of nature as central to progress.<sup>52</sup>

The US government also made major attempts to mold popular perceptions of nuclear power by sending traveling “Atoms for Peace” exhibitions around the globe. Although to my knowledge no pictures or materials from a 1955 exhibition in Frankfurt have survived, a survey commissioned by the HICOG (High Commissioner for Germany) research staff gives an impression of its layout and impact on the public.<sup>53</sup> Utopian visions found no place here. Instead, the exhibition was “sober,” “factual,” and well organized,

according to visitors. When asked what their favorite part was, 42 percent of those surveyed mentioned science demonstrations involving, for example, Geiger counters and measuring devices.

A “young lady” demonstrated how “magic hands” were used to manipulate radioactive materials. Other visitors particularly enjoyed the films (the high point for 16 percent) and “lectures and explanations” (favored by 12 percent). Visitors were first shown a film, which provided a “very instructive” and “easily understandable” overview of the subject. They then walked around the exhibition hall, which contained large models illustrating, for example, nuclear fission and the functioning of an atomic reactor. They viewed Otto Hahn’s workbench, which was on display.

The comments revealed curiosity, a desire to learn, and respect for science. One attendee offered, “I was impressed by the medical angle, that atomic energy can be used for the benefit of mankind, since I am interested in cancer therapy.” Another had high hopes that these new medical breakthroughs would benefit all of society, not just the well-off, believing that it would be “possible in all probability to provide low cost cancer treatment, above all, for the lower income brackets.” Other visitors were highly enthusiastic about the exhibition because it contained a great deal of information about the potential benefits of atomic power overall: “Everybody should see it! Atomic energy is a means by which to achieve prosperity throughout the world.”

Participants in the survey saw themselves as living in a society in which citizens were expected to have at least a basic understanding of atomic power: “This has become part of the overall knowledge everybody is expected to have. Since it is of current interest, you are expected to know something about it.” For them, research in this area was not something esoteric and impossible to understand, and they were grateful to have the opportunity to inform themselves. One attendee, when asked what he or she understood the purpose of the exhibition to be, responded, “To enlighten people about the atom and to popularize the latest findings in atomic research.” Another answered, “To make people understand what the aims of atomic research are. That people who live in the 20<sup>th</sup> century just have to concern themselves with atomic energy.” These were not necessarily highly educated people. Of the 400 visitors who participated in the survey, 21.5 percent had only completed elementary school and 42.5 percent had some high school education but had not graduated; only 36 percent had at least a high school diploma. However, the lesser educated felt they should make a real effort to understand the exhibition: “For dumb amateurs things were a little too difficult to grasp, although the staff tried hard to make everything quite clear. One should see the exhibition a number of times.”

One man thought that women should not visit the exhibition: "Women can be depended upon to ask terribly stupid questions, that's why I would advise only men to visit this exhibition." However, about 20 percent of the attendees were women. They were slightly more inclined than men to deem the exhibition "excellent." One woman who visited the exhibition when it traveled to Berlin did not feel that it was not intended for women: "This exhibition was arranged mainly because we women know almost nothing about these things." Another was enthusiastic about the "wonderfully comprehensible demonstration of the process of nuclear fission. Being a woman I know very little about all that, but this was really excellent."<sup>54</sup>

The visitors felt the exhibition was highly effective. In Frankfurt, 77 percent found it "excellent" or "very good." Almost all indicated they had learned something. Few saw the exhibition as propagandistic in nature. It was a resounding success for the United States, promoting good feelings and the conviction that US intentions were benevolent. Visitors to the same exhibition in Berlin extolled its objectivity ("The whole way of presentation is so purely factual that I lack the words to praise it properly") and its logical presentation ("I have never before seen such a well-organized and ingeniously contrived exhibition"). German pride expressed itself when one of those surveyed complained "that they don't attach enough importance to the fact that this thing actually originated in Germany. Merely showing Professor Hahn's table isn't enough."<sup>55</sup>

"America Houses" throughout West Germany distributed American booklets on nuclear technologies that were also sober and scientific and lacked a utopian dimension. One such booklet contained small, unspectacular pictures of scientific and technical personnel at work, equipment, and results, such as potatoes that had been irradiated and others that had not.<sup>56</sup>

In Berlin, one attendee struck a critical note: "I noticed the tendency to divert attention from the military to the civilian sector. They didn't show the destruction atom bombs caused in Japan." Indeed, "Atoms for Peace" was only one side of the story.

## Dystopian Visions in an Era of Military Threat, 1954–1960

Images of a world of peace and plenty spread around the world at the same time as dystopian visions of death and destruction spurred by East–West tension and, particularly, the Castle Bravo hydrogen bomb test conducted by the United States at Bikini on 1 March 1954. The sheer force of the explosion and the four-mile-wide fireball it produced symbolized for many

the terrible destructiveness of this new weapon. Inhabitants of the Marshall Islands, who were not evacuated at first, suffered from radiation sickness.

NBI coverage marked a shift in focus from a Stalin-era focus on capitalist conspiracies to humanitarian concerns. A drawing depicted a Pacific Islander mother trying to protect the toddler in her arms from the terrible blast. A grass skirt and lei identified her and her child as part of the indigenous population—a defenseless victim of Western imperialism.<sup>57</sup> The caption expressed outrage: “The U.S.A. won new enemies, and the World Peace Council, whose demand for the prohibition of all atomic and H-bomb experiments was also heard on the Pacific islands, won new friends and comrades in the struggle for peace and the happiness of humanity.”<sup>58</sup>

*Stern* employed sarcasm to condemn Castle Bravo: “When the head of American civil defense, O’Brien, saw the first pictures of the explosion of the hydrogen bomb on the Marshall Islands, he said, ‘All of that is so fantastic! We don’t know where to begin!’ He must mean, where will it all end[?]”<sup>59</sup> Scholar Ilona Stölken-Fitschen has argued that, thanks to the highly restrictive information policies of the Western occupation powers during the period of occupation, Germans did not fully absorb the great peril posed by nuclear weapons until this American H-bomb test at Bikini in 1954.<sup>60</sup>

Moreover, that test changed the fundamental perception of the nature of the threat posed by nuclear weapons, shifting focus from the impact of the blast to radiation, which became a worldwide obsession. The fallout of the hydrogen bomb explosion fell on a Japanese fishing vessel, the *Lucky Dragon*. The irony of the ship’s name and its Japanese identity came to endow this event with great symbolic significance. Six months after the test, the Japanese crew member Aikichi Kuboyama died as a result of exposure to the fallout. An article about this event in *Stern* featured a photograph of Kuboyama, lying dead or dying in the hospital, his body emaciated and maimed. The autopsy revealed how deeply the radiation had penetrated and damaged his body: “Radiation had destroyed all his internal organs, leaving them beyond all recognition.”<sup>61</sup> The article contrasted images of Japanese women as angelic caregivers and Americans as destroyers of life.

In 1954 physicist Pascual Jordan warned against “heedless optimism” regarding the triumph of peaceful uses of atomic technologies, writing, “No one can know what clouds of horror we may have to march through or crawl through.” Nonetheless, he believed the development of atomic power to be a worthwhile endeavor.<sup>62</sup> Rejection of nuclear technologies were often framed in emotional and nonrational terms. A 1956 article expressed the new understanding of the significance of Hiroshima in metaphysical terms: “In reality, the fireball over Hiroshima set in motion the destruction of the balance of fundamental forces in the godly economy of nature.” However,

the article also included a brief discussion of genetic mutations caused by radiation as well as the problems associated with the disposal of radioactive waste from atomic power plants.<sup>63</sup>

*Stern* became far more critical of US defense policies in the mid-1950s. A 1956 article on intercontinental ballistic missiles (ICBMs) made clear that both the United States and the Soviet Union bore responsibility for the arms race, depicted here in frightening terms: “If one of the world powers wins the race, the pendulum of the world clock will point to doom.”<sup>64</sup> By contrast, NBI articles in 1957–1958 presented Soviet success in developing ICBMs and in expanding and upgrading its nuclear arsenal as the best guarantee for peace.<sup>65</sup>

Articles in both magazines reflect shifting sensibilities resulting from the Berlin Crisis of 1958–1961, when the Soviet Union attempted to dislodge Western forces from West Berlin. During this period, East and West Germans contemplated the possibility of war on a daily basis. Unlike earlier articles on the arms race, a 1960 NBI article on an ICBM tested by the Soviet Union did not trumpet this as a success for the socialist world. Instead, the piece assured readers that the target area was far from islands, fishing grounds, and shipping routes and that there was no nuclear warhead on the missile. It also claimed that its purpose was not military, but rather related to the Soviet space program.<sup>66</sup> It is not known how East Germans viewed this cover-up.

This was the era of *On the Beach*, a US film released in December 1959 that depicted the end of the human race owing to a nuclear war. *Stern* was quite taken by the film’s realism, asserting that it was “not a sermon, not an appeal, [and] not a warning,” but rather “a realistic picture of the day after tomorrow, when it is too late.” It was a “beacon of hope” that might bring political leaders who saw it, such as Eisenhower and Khrushchev, to their senses.<sup>67</sup> A review in the East German newspaper *Neues Deutschland* had kind words for the film: “A film with such a perspective is something new for American [film] production. One can clearly see in it the spirit of détente developing between the two camps.”<sup>68</sup>

Articles on Hiroshima and Nagasaki reflected a new awareness of the bleak horror of nuclear war. At the height of the Berlin Crisis, *Stern* published a serialized novel featuring Claude Eatherly, the pilot of a small scouting plane that accompanied the *Enola Gay* on its mission to drop an atomic bomb on Hiroshima on 6 August 1945. Eatherly was the subject of intense fascination because it was thought that feelings of guilt had caused him to suffer a mental breakdown.<sup>69</sup> This novelization described the sufferings of the people of Hiroshima in graphic detail. The author, Hans Herlin, a pilot who deserted from the *Luftwaffe* in 1944,<sup>70</sup> explored themes of guilt, remorse, and victimization in ambiguous ways. Germans could either identify with the American pilot, who, although he was responsible for many deaths, was

ennobled by his mental suffering. Or they could identify with the Japanese victims of the bombing. Side-by-side photos of Berlin and Hiroshima in August 1945 compared the two cities' fate. The message appeared to be that the atomic bomb could have been dropped on Berlin if the historical circumstances had been a bit different.<sup>71</sup> This very effectively brought home the danger nuclear war posed to Germany.

NBI also ran articles about Hiroshima and Nagasaki around this time, but there were no hints of soul searching as in the novel published in *Stern*. NBI viewed Hiroshima as an example of imperialist warmongering, which NBI said had continued in the postwar era and was the cause of East–West tensions. However, like the *Stern* serialized novel, the NBI articles put a human face on wartime suffering and reinforced feelings of utter horror and revulsion toward nuclear war. The GDR's first science fiction film, *The Silent Star*, released in 1960, depicted an international crew's visits to Venus, whose inhabitants wanted to annihilate earth's population, but instead were themselves wiped out by their own weapons. One member of the crew was a Japanese survivor of the dropping of the atomic bomb on Hiroshima.<sup>72</sup>

In “The New Sun,” part of the comic book series *Mosaik*, the central characters of the series discovered a planet destroyed by atomic war. To make it inhabitable again, they replaced its double sun—nearly burned out—with a new, nuclear-powered sun.<sup>73</sup> Works by Stanislaw Lem and other Eastern European science fiction writers served as an inspiration for this story.<sup>74</sup>

Only slightly less utopian was a 1961 NBI article that imagined a better world that could be created if the arms race ended. In Africa, the money saved could be used for advanced medical care, modern housing complexes, and atomic power. “Out of the billions (in savings) from disarmament, one or several atomic reactors could be built for every African country.”<sup>75</sup> At that time, the GDR was still not recognized as a sovereign nation by most countries and was trying to court favor with African nations.<sup>76</sup> A drawing (Illustration 1.1) accompanying the NBI article did not show the European experts and the indigenous population as equals, however. The socialist planners and builders of African atomic reactors had brought their instruments, blueprints, and expertise to the jungle. They were wearing colonial gear—pith helmets and khakis. A native passively looked on holding a bamboo pole, perhaps waiting for orders. The picture showed discernable racial and cultural hierarchies. It did not appear to be a manifestation of specifically socialist racism so much as an unintentional revival of much older imperialist fantasies linked to an ideology of socialist modernization.<sup>77</sup>

This socialist version of the “Atoms for Peace” narrative also took on more pragmatic aspects at times. A 1958 article held up research at the Central Institute for Atomic Physics in Rossendorf as proof that the GDR





**Illustration 1.1** East German fantasy of bringing nuclear power to Africa. “Wohin mit dem Geld?” NBI 4, 1961. Courtesy of Verkehrsmuseum Dresden, GmbH.

was a peace-loving nation, committed to the development of the peaceful atom, unlike West Germany, which was pursuing military uses of nuclear technologies. Journalist Lothar Hitziger enthused, “The atom will become part of our daily life to an extent that today we wouldn’t dare to imagine in even our boldest dreams.”<sup>78</sup> This, along with articles from the early 1960s, emphasized the cleanness and safety of this and other East German nuclear facilities as well as the authority of male scientists.<sup>79</sup> Photographs featured healthy, attractive young women working as laboratory technicians in a safe, socialist environment.<sup>80</sup> Here, the healthy female body was depicted as enjoying the protection of male scientists, the state, and socialism.

No such sense of security was found in articles on radiation in *Stern*. That magazine began reporting on nuclear accidents in 1957 with an article on an incident at a nuclear laboratory in Houston, Texas. The director of the laboratory had unwittingly tracked radioactive material into his automobile and his home. He was photographed in a hospital, where he was being examined for radiation poisoning. His young son’s friends were forbidden to play with the child: “He doesn’t understand what it means when the

parents of his friends tell their children, ‘Don’t play with that radioactive [boy].’” According to the title of the article, radioactivity was “Worse than the Plague.”<sup>81</sup>

*Stern* also reported on a 1958 accident at a Yugoslav nuclear power plant that exposed six plant employees to high doses of radiation. The article focused on the lone woman in the group, Rosa Ristic. She was photographed lying in bed, holding a hand to her forehead and looking weak and vulnerable.<sup>82</sup> The cover of another 1958 *Stern* issue featured a nubile young woman in her underwear. “Through naked force to the x-ray machine?” asked the title. The article was more than an excuse to titillate, although a picture in the inside article of young women wearing nothing but sheets or towels wrapped around themselves probably did just that. The women in the photograph were subject to compulsory mass x-ray screenings for tuberculosis. The message was that no one could shield the vulnerable female body from radiation.

In fact, the state, embodied by a male judge, was trying to force citizens to expose themselves to this danger. The article cited a U.N. study that warned against unnecessary exposure to radiation. According to a chart, the average person was exposed to more radiation through radiological examinations than as a result of environmental pollution caused by nuclear weapons testing or nuclear power plants.<sup>83</sup>

Such sensitivity to unseen poisons was probably heightened by the Contergan tragedy. Known as thalidomide in the United States, Contergan was a pharmaceutical developed in West Germany and approved for use to combat morning sickness in pregnant women. In 1957–1961, many thousands of babies were born with severe birth defects because they had been exposed in utero to this medication. Initially, it was feared that nuclear weapons testing was to blame.<sup>84</sup> Although this fear proved unfounded, the tragedy intensified fears that the creations of modern science could maim and kill.

Although GDR press coverage of nuclear power was generally quite positive, fears concerning radiation did make their way into NBI. A 1958 article picked up on transnational discussions on the health impact of radioactive fallout from atmospheric nuclear weapons testing. Of particular concern was Strontium-90, which got into food and water supplies and could cause birth defects and cancer, particularly in children. Here, the vulnerability of the human body was illustrated with a picture of an infant. The need to protect vulnerable innocents from the dangers posed by radioactive contamination, blamed here on *Western* atomic tests, was manifested in another 1958 article, accompanied by a photo of a father and his children happily running in the rain, oblivious to the potential danger.<sup>85</sup> Despite the anti-Western slant, these two articles contained a message about the dangers of radiation that

could potentially undermine trust in the ability of the socialist system to protect the population from harm.

*Stern* contained virtually no positive coverage of nuclear power. *Stern* did publish one utopian article on energy—not fission-based nuclear power, but fusion power, a form of power whose development has eluded researchers to the present day.<sup>86</sup> In a “city of the future,” this “radiation-free” form of energy would provide enough power for ten million people, according to the article.<sup>87</sup> A 1959 Allensbach Institute survey indicated that the overwhelming majority of West Germans had reservations against nuclear energy.<sup>88</sup> These misgivings derived from the association of atomic power with nuclear weapons, testing, radiation, and the very real danger of nuclear war. The GDR was also affected by such concerns.

## Winning Popular Support through Education and Safety?

The state, industry, and scientists were determined to educate the public concerning nuclear power, an effort that took on particular importance with the start-up of nuclear power programs in East and West Germany. The first East and West German research reactors went online in 1957. West Germany completed the first nuclear power plant, in Kahl, which began producing power in 1961, while the first East German atomic power plant, in Rheinsberg, went critical in 1966. In these years, state and industry hoped to establish the foundations on which both safety and trust were based.

The West German Atomic Law (*Atomgesetz*) of December 1959 addressed well-known safety issues in ways specific to the West German system. It did so within the framework of US hegemony and European integration. Allied prohibition of nuclear research in Germany officially ended in 1955 and was superseded by the new legal framework of the Atomic Law. The United States sought to ensure the long-term pacification of West Germany through binding international agreements, notably the Rome Treaties of 1957, which created the Common Market and Euratom. Political leaders in West Germany and elsewhere successfully resisted handing authority over the development of nuclear power to a supranational organization—a role that US leaders had hoped to entrust to Euratom.

Instead, the West German model allowed the private sector to play a central role in the development of nuclear power, while the federal (i.e., national) government took over primary responsibility for overseeing nuclear safety. The West German constitution, the *Grundgesetz*, had to be modified to give the state this power. State (in the sense of provincial) governments

were in charge of licensing nuclear facilities. However, there was no central regulatory agency in West Germany. The institutions overseeing nuclear safety were comparatively weak. On the other hand, bureaucratic procedures were rather complex. The approval process was split among various offices and courts, making it much more complicated than in other countries. The courts had to determine questions of safety without adequate technical knowledge. Initially, however, this bureaucratic and judicial oversight was rather lax. Technical supervision became more rigorous by the late 1960s.<sup>89</sup>

The early history of nuclear power in the Federal Republic was punctuated by conflicts among elites, institutions, and experts, as historian Joachim Radkau has shown, but only rarely did these spill over into the public realm. Once industry became aware of the tremendous costs involved in developing nuclear power, it turned to the state for support. Although the Atomic Ministry was created under Adenauer, the Christian Democrats were very skeptical about a large government role in the development of atomic power, mainly because of their free market orientation. Rather, it was left-leaning Social Democrats who spearheaded efforts to institute state subsidies. It was not until the mid-1960s that earlier frugality was cast aside and the state became heavily involved in atomic power. Most plants were public utilities partially owned and run by state governments.<sup>90</sup>

The GDR took the opposite course. After a period of state support for nuclear research and reactor development, the SED surprised its scientists by largely shutting down the East German nuclear power program in 1962–1965. Historians Mike Reichert and Burghard Weiss believe that the high production cost of atomic power and the inability to produce equipment in the GDR were the primary reasons for this about-face. However, one East German nuclear scientist—Heinz Barwich—claimed after his defection to the West that the Soviet Union wanted to stop all nuclear power research and atomic power plant construction in its satellite states so as to be able to take over this lucrative industry itself. And in fact, this is essentially what happened, making the GDR highly dependent on the Soviet Union, which built East Germany's nuclear power plants, supplied most of the needed equipment, and initially established the parameters of nuclear safety.<sup>91</sup>

The GDR continued to rely heavily on brown coal as an energy source. It is ironic, as Burghard Weiss noted, that in capitalist West Germany the state came to play a dominant role in the development of atomic power, whereas in socialist East German, the state largely withdrew from involvement in atomic power.<sup>92</sup>

There were no public protests in the Federal Republic against the first generation of nuclear power plants. Throughout the 1950s and 1960s, antiwar activists saw no connection between nuclear weapons and nuclear

power. According to historian Holger Nehring, this was true of the Campaign against Atomic Death, launched in 1958 by the Social Democratic Party (SPD) and labor unions, as well as of the Easter Marches, yearly peace marches that began in 1960.<sup>93</sup> Environmentalists had not yet discovered nuclear power as an issue.<sup>94</sup> However, water authorities made the press and the public aware of their concern that the use of rivers to cool reactors would overheat rivers. Such issues generated distrust and a certain amount of local resistance to the construction of atomic power plants.<sup>95</sup>

In the GDR such criticism of nuclear power would never have made it into the press. However, consensus was achieved, not just through dictatorial control but also through popular participation in technology. The SED's model of citizenship was rooted in participation in the building of a modern economy—in factories, on farms, and on construction sites. Atomic energy was depicted as part of this collective socialist effort in a 1967 educational television program, evidently aimed at primary and secondary school students. Nuclear power was part of a comprehensive plan in the GDR to achieve peace and prosperity and to make the GDR one of the most modern industrial states in the world, according to the program. Upbeat, jazzy music underlined the theme of industrial modernization. Young people were exhorted to participate in this collective effort, following the example of the popular campaign to build the International Seaport at Rostock.<sup>96</sup> This megaproject, completed in 1960, had mobilized the East German population, which contributed money and even stones.<sup>97</sup>

The socialist world's technical and scientific expertise was the most important argument used on television to win public approval for nuclear power. East German TV programs often highlighted the Soviet Union's leading role in developing nuclear power and ensuring the safety of East German atomic power plants.<sup>98</sup> Programs from around the time that the Rheinsberg nuclear power plant went into operation also contained pedagogical elements, explaining to viewers the splitting of the atom, the way nuclear reactors worked, and safety systems. These programs tried to make science appear as appealing as possible. The development of nuclear power was, for example, depicted as an "adventure" involving the "drama of daring lines of thought."<sup>99</sup>

But under socialism, technological progress was also compatible with preservation of the cultural legacy of the past—cleansed, of course, of Nazi and capitalist elements. One television program assured viewers that the Rheinsberg nuclear power plant would not diminish the charm, cultural significance, or historical value of the town of Rheinsberg. "Much is like back then," according to a voice-over that narrated scenes evoking the past: a horse-drawn wagon going along a cobblestone street, the Rheinsberg castle,

chestnut trees, the lake, people out in rowboats. It was “a city that attracted writers and poets.” The narrator quoted the nineteenth-century German writer Theodor Fontane, who had described just such scenes in an account of a trip that brought him to Rheinsberg.

The program emphasized how well that traditional German world harmonized with the modernity of socialist society. The castle had been turned into a diabetes clinic. Life went on, and citizens were safe and secure. The atomic power plant was producing energy in accordance with the state’s economic plan, and it had a better than average safety record, according to the voice-over. This scene featuring the Rheinsberg nuclear power plant was squeezed in between a segment on vacationing in Rheinsberg and one on the inhabitants’ quality of life. A family consisting of a man, a woman, and a child walked in the sunshine past shops, holding hands, as modern, optimistic music played. Many healthy, happy children were featured, the offspring of young families that had moved to Rheinsberg to work at the nuclear power plant. A woman was shown walking with three small children and pushing a baby carriage. “When Rheinsberg began to grow, the babies came.” Diapers and children’s clothing were drying on a clothesline. “Diapers waving in the breeze tell of life, fecundity, and love.”<sup>100</sup>

A decade later, *Our Sandman*, a universally popular children’s show that children across the GDR watched at bedtime, referred to the new Greifswald nuclear power plant in somewhat similar terms. The evening’s short film took children on a tour of Greifswald. As cheerful music played, the camera panned the town from the air. Children were shown at play. The brief film then cut from street scenes to a glimpse of the nuclear power plant, which was under construction. Immediately after came scenes of housing and children on a playground. A reference to Caspar David Friedrich, a major nineteenth-century artist who had painted the market square, established the town’s cultural continuity. Technological modernity did not disturb the environment either, the final scene suggested, featuring boats on the river, where children were swimming.<sup>101</sup> This, like the 1967 program on Rheinsberg, sought to embed atomic energy in a narrative about progress, health, and the welfare of the population. In my sample, however, this theme appeared far less often than the attempt to legitimize and normalize the use of nuclear power through science.

## Conclusion

Science was an important anchor of the Western Atoms for Peace narrative and its Eastern equivalent. A postwar sense of disorientation, disillusionment

with ideology, and desire to overcome the odium of the Nazi past encouraged many Germans to look to science and scientists for guidance. Even those without an advanced education respected science and felt that they should engage with it. In the GDR, science and engineering provided a career path for those who wished to avoid onerous party and ideological commitments.<sup>102</sup> The long German tradition of scientific excellence was a supposedly unsullied aspect of the German past that Germans could identify with. At the same time, the internationalism and public roles of scientists promoted a belief in the rationality and humane qualities of science. This image of science endowed nuclear power with reassuring emotional associations.

Hopes that it would be possible to create a better world through science also sprang from American and Soviet culture. Americans had long found science and technology deeply inspiring, even “sublime.”<sup>103</sup> In the Soviet Union, science and technology were understood to be the foundations of the socialist project.<sup>104</sup> Under the aegis of dialectic materialism, East German ideology portrayed science as a replacement for religion. For example, all young people completing a secular substitute for confirmation, the *Jugendweihe*, were given a book that focused largely on science and technology. It began with this sentence: “This book is the book of truth,”<sup>105</sup> an echo of the “book of truth” out of which the Angel Gabriel reads to Daniel in the Old Testament.<sup>106</sup>

Nuclear power occupied a place of honor in the Soviet Union as a force helping to build a socialist society. A Moscow exhibition on nuclear power that opened in 1956 aimed to educate, enlighten, and inspire Soviet citizens.<sup>107</sup> The 1955 American “Atoms for Peace” Exhibition also aimed to educate, but in a more pragmatic, less emotional manner. At that exhibition, science was presented as a lingua franca and a bridge between the two societies. The intention was to gain West German acceptance of American leadership. Actual transfer of nuclear technology served to cement that bond—as it did in the case of the Soviet Union and the GDR.

The Berlin Crisis, the arms race, and aboveground bomb testing disrupted and undermined the narrative of the “peaceful atom.” The Bikini H-bomb test of 1954 and the ensuing *Lucky Dragon* incident shifted the focus of popular fears from the explosive power of the bomb to radioactive fallout. In West Germany, *Stern* became increasingly critical of US policies and weapons testing and at the same time began to highlight nuclear power plant accidents and concerns about exposure to radiation. Criticism of the Soviet Union was impossible in the GDR, but articles in NBI about the nuclear arms race lost their swagger, while a couple of articles about the dangers of radiation made their way into the magazine. The latter was the kind of topic that might catch the attention of readers in both countries—an

older equivalent of “click bait.” In NBI, the West was blamed for the problem. Nonetheless, popular anxieties were awakened.

Whatever small anti–nuclear power protests occurred in West Germany in the 1950s and 1960s were small and not widely known. There was no network of environmentalist or political sympathizers. On the whole, science appeared to be on the side of atomic energy’s proponents. The narrative of progress through science prevailed in East German television programs about nuclear power, reflecting the SED’s ability to maintain a nuclear consensus by force, but also through persuasion. In West Germany, trust in science was declining, reflected in works such as *Die Physiker* (The Physicists), a 1962 play by Swiss writer Friedrich Dürrenmatt that dealt with the responsibility of scientists for the development of nuclear weapons.

What ultimately was to lead to the emergence of a full-blown anti–nuclear power movement in West Germany was the confluence of science and a questioning, skeptical spirit nourished by the late 1960s protest movement. Nuclear power experts hoped that they would be left solely in control of nuclear power plant safety. The next chapter shows how they conceptualized safety and implemented safety regimes and how these safety philosophies were discussed and disrupted in West and East Germany. As will be seen in Chapter 3, dissenting scientists and activists challenged this technocratic approach in West Germany. Since this sort of fundamental challenge to technical expertise arose later in the GDR and in the context of a different sort of system, the emergence of scientifically motivated activism in the GDR will not be discussed until Chapter 7.

## Notes

1. Max von Brück, “Völkerrecht im Zeichen des Atoms,” *Süddeutsche Zeitung* (13 August 1946), 3. Even in the international scientific community, there was some uncertainty as to whether such horrors might one day be technically possible. See, for example, Anthony Leviero, “Bomb vs. Big Ships Posed to Senators,” *New York Times* (6 December 1945); William Laurence, “Langmuir Urges Atom Pact, Says War Might Strip Earth,” *New York Times* (17 November 1945). On Manhattan Project discussion as to whether the explosion of an atomic bomb could ignite the atmosphere, see Spencer Weart, *Nuclear Fear: A History of Images* (Cambridge, MA: Harvard University Press, 1989), 100–101.
2. No author, “Atomkraft so oder so?” *NBI (Neue Berliner Illustrierte)* 28, 1946.
3. Dolores Augustine and Dick van Lente, “Conclusion: One World, Two Worlds, Many Worlds?” in *The Nuclear Age in Popular Media: A Transnational History*,



- 1945–1965, ed. Dick van Lente (New York and Houndmills, UK: Palgrave Macmillan, 2012), 234; ch. on 233–48.
4. H.G. Wells, *World Set Free* (London: Macmillan, 1914), 47; W. Warren Wagar, “H.G. Wells and the Scientific Imagination,” *The Virginia Quarterly Review* 65, no. 3 (1989): 390–400; Justin Busch, *The Utopian Vision of H.G. Wells* (Jefferson, NC and London: McFarland, 2009), 118, fn. 113.
  5. Paul Boyer, *By the Bomb’s Early Light: American Thought and Culture at the Dawn of the Atomic Age* (New York: Pantheon Books, 1985), esp. 294–302; David Nye, *American Technological Sublime* (Cambridge, MA: MIT Press, 1994), 228–29.
  6. Joachim Radkau, *Aufstieg und Krise der deutschen Atomwirtschaft 1945–1975: Verdrängte Alternativen in der Kerntechnik und der Ursprung der nuklearen Kontroverse* (Reinbek bei Hamburg: Rowohlt Taschenbücher, 1983), 92.
  7. On popular media such as tabloids and illustrated magazines, see Corey Ross, *Media and the Making of Modern Germany: Mass Communications, Society, and Politics from the Empire to the Third Reich* (Oxford and New York: Oxford University Press, 2008); Frank Bösch, *Mass Media and Historical Change: Germany in International Perspective, 1400 to the Present*, trans. Freya Buechter (New York: Berghahn Books, 2015), 148–49; Wolfgang Pensold, *Eine Geschichte des Fotojournalismus* (Wiesbaden: Springer VS, 2015).
  8. Polling was introduced into US-occupied regions of Germany by the Opinion Survey Section of the Information Control Division of the Office of Military Government in late 1945. After the founding of the Federal Republic of Germany in 1949, the US High Commission for Germany (HICOG) took over the conducting of surveys, some in parts of Germany outside of the American zone of occupation. In 1950, the Deutsches Institut für Volksumfragen (DIVO) took over the fieldwork. See Anna Merrit and Richard Merrit, *Public Opinion in Semisovereign Germany: The HICOG Surveys, 1949–1955* (Urbana, IL: University of Illinois Press, 1980), 5, retrieved 24 September 2016 from <https://archive.org/details/publicopinionins00merr>. Also Anna Merrit and Richard Merrit, *Public Opinion in Occupied Germany: The OMGUS Surveys, 1945–1949* (Urbana, IL: University of Illinois Press, 1970).
  9. In 1961, the total population of the Federal Republic was about 56.6 million. Thus, it passed through the hands of about one in five West German inhabitants. On 1950: NARA USIA RG 306 Records of the United States Information Agency, Office of Research, Reports and Related Studies 1948–53, Germany, West, Box 29, “Germany: Media Impact Study I,” 63.
  10. “Basisdaten des stern,” *Gruner + Jahr, Media-Forschung und -Service*, Stern Archives.
  11. NARA USIA RG306/250/67/04/02-04/Box 7, report 214, “Written Media in West Germany: A Study of Public Reactions and Extent of Penetration,” 62. According to this US study, 70 percent of professionals, 75 percent of business professionals, and 76 percent of office workers read “magazines and/or illustrated magazines.” By contrast, only 49 percent of semiskilled workers and 33 percent of farmers and farmhands read magazines.
  12. Michael Meyen and William Hillman, “Communication Needs and Media Change: The Introduction of Television in East and West Germany,” *European Journal of Communication* 18, no. 4 (2003): 465; article on 455–76.

13. NARA USIA RG306/250/67/04/02-04/Box 7, report 214, "Written Media in West Germany: A Study of Public Reactions and Extent of Penetration," 59, 61, 65, 77.
14. Sixty-one percent of West German and 54 percent of East German households had a television set in 1966. Meyen and Hillman, "Communication Needs," 465.
15. Otto Haseloff, *Stern: Strategie und Krise einer Publikumszeitschrift* (Mainz: v. Hase & Koehler, 1977), 453, 893, 896; Daniela Münkkel, *Willy Brandt und die 'Vierte Gewalt': Politik und Massenmedien in den 50er bis 70er Jahren* (Frankfurt am Main: Campus Verlag, 2005).
16. Simone Barck, Martina Langermann, and Siegfried Lokatis, *Jedes Buch ein Abenteuer? Zensur-System und literarische Öffentlichkeiten in der DDR bis Ende der Sechziger Jahre* (Berlin: Akademie-Verlag, 1997); Julia Martin, "Der Berufsverband der Journalisten in der DDR (VDJ)," in *Journalisten und Journalismus in der DDR*, ed. Jürgen Wilke (Cologne: Böhlau Verlag, 2007). Example in SAPMO/Barch (*Stiftung Archiv der Parteien und Massenorganisationen der DDR im Bundesarchiv*, Foundation of the Archive of the Parties and Mass Organization of the GDR in the Federal German Archives) DY 30/IV 2/9.02 37, Krüger (of the SED division for security questions) to Sindermann (of the SED division for Agitation/Propaganda), dated 1 December 1960. On cooperation with Soviet counterparts, see SAPMO/Barch DY 30/IV 2/9.02 58, 128–29. On the World Peace Council guidelines, see SAPMO/Barch DY 30/IV 2/9.02 119, "Hinweise für Presse, Rundfunk und Fernsehfunk. . .," dated 3 May 1962.
17. Michael Meyen, *Denver Clan und Neues Deutschland* (Berlin: Christoph Links Verlag, 2003), 138.
18. Landesarchiv Berlin (Provincial Archive of Berlin), C Rep. 904-089, Nr. 16 Bestand GO Berliner Verlag, Aktentitel Protokolle der Leitungssitzungen der ZPL, Bd. 7 (1962), "Protokoll der ZPL-Sitzung vom 21.3.62."
19. Dick van Lente, ed. *The Nuclear Age in Popular Media: A Transnational History, 1945–1965* (New York and Houndmills, UK: Palgrave Macmillan, 2012). Augustine, "Learning from War," 79–116. None of these issues were digitized.
20. Here, I have double counted the six articles that covered both civilian and military technologies. On the other hand, I have not included eight articles on "other" nuclear themes, which often centered on personalities or used the concept of "nuclear" as a metaphor or metonym. There were 201 articles on nuclear themes.
21. "Das Strahlenwunder. Röntgen," NBI 8, 1945.
22. No author, "Bergknappe der Physik," *Der Spiegel* 41, (1947).
23. Dieter Hoffmann, *Max Planck: Die Entstehung der modernen Physik* (Munich: Verlag C.H. Beck, 2008), 84–104. As head of the Kaiser Wilhelm Society, Planck did not show solidarity with Albert Einstein's protests against the Nazis, then a member of the society. In fact, he allowed the Kaiser Wilhelm Society to issue a letter in his name criticizing Einstein and calling on him to resign.
24. On the circumstances, see Walter Moore, *Schrödinger: Life and Thought* (Cambridge, UK and New York: Cambridge University Press, 1989), chs. 7–9.
25. Comprehensive research has been done on scientific research in the Kaiser Wilhelm Society. See the book series "Geschichte der Kaiser-Wilhelm-Gesellschaft im Nationalsozialismus," edited by Reinhard Rürup und Wolfgang Schieder on behalf

- of the Max-Planck Society. For a list of the individual studies, see <http://www.mpiwg-berlin.mpg.de/KWG/publications.htm#B%C3%BCcher> (retrieved 25 October 2017). For a brief English-language analysis, see Margit Szöllösi-Janze, “National Socialism and the Sciences,” in *Science in the Third Reich* ed. Margit Szöllösi-Janze (Oxford and New York: Berg, 2001), 1–35.
26. Mark Walker, *German National Socialism and the Quest for Nuclear Power 1939–1949* (Cambridge, UK: Cambridge University Press, 1989); Charles Frank, *Operation Epsilon: The Farm Hall Transcripts* (Berkeley, CA: University of California Press, 1993); Manfred Popp, “Misinterpreted Documents and Ignored Physical Facts: The History of ‘Hitler’s Atomic Bomb’ Needs to be Corrected,” *Berichte zur Wissenschaftsgeschichte* 39, no. 3 (2016): 265–282. DOI: 10.1002/bewi.201601794. Mark Walker, “Physics, History, and the German Atomic Bomb,” *Berichte zur Wissenschaftsgeschichte* 40, no. 3 (2017): 271–288. DOI: 10.1002/bewi.201701817.
  27. For a solid interpretation, see David C. Cassidy, *Uncertainty: The Life and Science of Werner Heisenberg* (New York: Freeman, 1992).
  28. Christoph Mick, *Forschen für Stalin: Deutsche Fachleute in der sowjetischen Rüstungsindustrie 1945–1958* (Munich and Vienna: R. Oldenbourg Verlag, 2000); Tom Bower, *The Paperclip Conspiracy: The Hunt for the Nazi Scientists* (Boston: Little, Brown, 1987); Dolores Augustine, *Red Prometheus: Engineering and Dictatorship in East Germany, 1945–1990* (Cambridge, MA: MIT Press, 2007), ch. 1; Samuel Goudsmit, *Alsos: The Failure of German Science* (New York: Schuman, 1947).
  29. Agnes Tandler, “Geplante Zukunft: Wissenschaftler und Wissenschaftspolitik in der DDR 1955–1971” (Diss. Europäisches Hochschulinstitut, Florence, Italy, 1997), 50–54.
  30. Augustine and van Lente, “Conclusion,” 236.
  31. Radkau, *Aufstieg und Krise*, 36, 39. Werner Heisenberg, held only briefly by the British, was able to begin organizing postwar German atomic research in 1946. Atomic research was officially prohibited until 1955, so he had to maintain the appearance of doing only theoretical work.
  32. Cathryn Carson, *Heisenberg in the Atomic Age: Science and the Public Sphere* (Cambridge, UK and New York: Cambridge University Press, 2010), 103–13, 225–26.
  33. “6 davon vernichten Deutschland,” *Stern* 22, 28 May 1950.
  34. Appendices I and II, in van Lente, *Nuclear Age*, 249–50, 262–63.
  35. Kenneth Alan Osgood, *Total Cold War: Eisenhower’s Secret Propaganda Battle at Home and Abroad* (Lawrence, KS: University of Kansas, 2006).
  36. Mara Drogan, “Atoms for Peace: U.S. Foreign Policy and the Globalization of Nuclear Technology: 1953–1960” (PhD diss., SUNY Albany, 2011), iii, 1, 57–58, 73, 85–86, 121; John Krige, *Sharing Knowledge, Shaping Europe: U.S. Technological Collaboration and Nonproliferation* (Cambridge, MA: MIT Press, 2016), 1–7, 20–26.
  37. On the Soviet Union, see Alvin W. Gouldner, *The Two Marxisms* (New York: Seabury Press, 1980), esp. 42–43, 73, 269–75, 385–86; Jonathan Coopersmith, *The Electrification of Russia, 1880–1926* (Ithaca, NY: Cornell University Press,

- 1992); Kendall Bailes, *Technology and Society under Lenin and Stalin: Origins of the Soviet Technical Intelligentsia, 1917–1941* (Princeton: Princeton University Press, 1978), 64–120; Loren R. Graham, *The Ghost of the Executed Engineer: Technology and the Fall of the Soviet Union* (Cambridge, MA and London: Harvard University Press, 1993). On the GDR, see Augustine, *Red Prometheus* and literature cited therein.
38. Ellgaard moved from Berlin to West Germany in 1949.
  39. “In 3 Stunden 27 Minuten—zum Mond! Erster Teil,” NBI 1, 1946.
  40. Walter Heise, “Luftbrücke von Morgen,” *Stern* 7, 1949.
  41. “Bombe oder Stein der Weisen?” NBI 1, 1947.
  42. “Ein Erdteil verändert sein Klima,” NBI 51, 1949. Under the name Operation Plowshare, the United States also tried to develop techniques for using nuclear bombs for peaceful construction projects. Scott Kirsch, *Proving Grounds: Project Plowshare and the Unrealized Dream of Nuclear Earthmoving* (New Brunswick: Rutgers University Press, 2005). On Soviet technological gigantomania, see Paul R. Josephson, “‘Projects of the Century’ in Soviet History: Large-Scale Technologies from Lenin to Gorbachev,” *Technology and Culture* 36, no. 3 (1995): 519–59.
  43. Joachim Radkau, *Nature and Power: A Global History of the Environment*, trans. Thomas Dunlap (New York: Cambridge University Press, 2008), 256.
  44. Ilona Stölken-Fitschen, *Atombombe und Geistesgeschichte: Eine Studie der Fünfziger Jahre aus deutscher Sicht* (Baden-Baden: Nomos Verlagsgesellschaft, 1995), 166–79; Radkau, *Aufstieg und Krise*, 78–88.
  45. Ernst Bloch, *Das Prinzip Hoffnung*, vol. 2 (Frankfurt am Main: Suhrkamp, 1973), 775; 1st ed. Berlin [GDR]: Aufbau-Verlag, 1955). Bloch wrote this three-volume work in 1938–1947 in the United States.
  46. Bernd-A. Rusinek, “‘Kernenergie, Schöner Götterfunken!’ Die ‘umgekehrte Demontage’: Zur Kontextgeschichte der Atomeuphorie,” *Kultur und Technik* 4 (1993): 15–21; quotation on 19.
  47. Under Soviet tutelage, the GDR established a number of institutes devoted to the development of nuclear power in the mid-1950s. In 1957, preparatory work for reactor building in the GDR started. See Johannes Abele and Eckhard Hamper, “Kernenergiepolitik der DDR,” in *Zur Geschichte der Kernenergie in der DDR*, ed. Peter Liewers, Johannes Abele, and Gerhard Barkleit (Frankfurt am Main: Peter Lang, 2000), 31–39; ch. on 29–89.
  48. “Start frei für A1,” NBI 49, 1956. *Mosaik von Hannes Hegen: Geheimsache Dgedanium*, reprint (Berlin: Buchverlag Junge Welt, 2003), 28.
  49. Karl Böhm and Rolf Dörge, *Gigant Atom* (Berlin: Verlag Neues Leben, 1957), 272–73.
  50. Edward S.C. Smith, A.H. Fox, R. Tom Sawyer, and H.R. Austin, *Applied Atomic Power* (New York: Prentice-Hall, Inc., 1946), frontispiece. The proposal to use atomic power for trains, planes and ships was endorsed in this work by H.D. Smyth (author of a major US government report on the Manhattan Project) and Leslie Groves (head of the Manhattan Project).
  51. “Atomkraft bricht Eismacht,” NBI 42, 1957.
  52. Josephson, “Projects,” 519–59; Susanne Schattenberg, *Stalins Ingenieure* (Munich: Oldenbourg Verlag, 2002).

53. NARA USIA RG 306, 250/67/04/02-04, Box 7, Report 208, "Frankfurt Visitors Appraise the Atomic Energy Exhibit 'Atoms for Peace,'" 15 February 1955.
54. NARA USIA RG 306, 250/67/04/02-04, Box 6, Report 205.
55. Ibid.
56. "Atomenergie für den Frieden" (Bad Godesberg: USIA, 1957).
57. However, grass skirts and leis were not everyday attire in the Marshall Islands in this period.
58. "Es war, als ob zehn Sonnen aufgingen," in "Zeitgeschehen im Bild," NBI 25, 1954.
59. "Wehe wenn sie losgelassen," *Stern* 15, (11 April 1954).
60. Ilona Stölken-Fitschen, "Der verspätete Schock: Hiroshima und der Beginn des atomaren Zeitalters," in *Moderne Zeiten: Technik und Zeitgeist im 19. und 20. Jahrhundert*, ed. Michael Salewski and Ilona Stölken-Fitschen (Stuttgart: Franz Steiner Verlag, 1994), 144; article on 139–55. However, US authorities did turn a blind eye when, in September 1946, the *Neue Zeitung* published a German translation of John Hershey's *Hiroshima* without official permission. The *Neue Zeitung* was published under the auspices of the Information Control Division of OMGUS, but its German reporters and editors won a large measure of independence. See Jessica Gienow-Hecht, *Transmission Impossible: American Journalism as Cultural Diplomacy in Post-War Germany* (Baton Rouge, LA: Louisiana State University Press, 1999), 92.
61. "Nur außen noch ein Mensch," *Stern* 41 (10 October 1954).
62. Pascual Jordan, *Atomkraft: Drohung und Versprechen* (Munich: Wilhelm Heyne, 1954), 60, 61.
63. "Die radioaktive Sintflut ist schon im Steigen," *Stern* 27 (7 July 1956).
64. "Da hilft nur beten!" *Stern* 22 (2 June 1956).
65. "Sensation um eine Gurke," NBI 36, 1957; "Verteidiger der Luft," NBI 40, 1957; "Vom Meeresgrund in die Stratosphäre," NBI 8, 1958.
66. L. Hitziger, "Raketen, Politik und Wasserwüste," NBI 5, 1960.
67. "Die letzten Tage unseres Lebens," *Stern* 2 (8 January 1960).
68. "Jeder stirbt für sich allein?" *Neues Deutschland* (10 January 1960). From the collection of the Film Museum (Filmmuseum), Potsdam, Germany. According to this archive, the film was never shown in the GDR; however, some East Germans may have seen it in West Berlin since the film was released in 1959, two years before the building of the Wall.
69. Hans Herlin, "Kain, Wo ist Dein Bruder Abel?" *Stern* 12 (19 March 1960); 18 (30 April 1960); 19 (7 May 1960).
70. "Vor 10 Jahren gestorben: Hans Herlin (1925–1994): Schriftsteller und Journalist aus Stadtlohn," *Dokument des Monats* [Stadtarchiv Stadtlohn], December 2004, 1–2, retrieved 6 January 2018 from [http://www.stadtlohn.de/pics/medien/1\\_1190134091/Dokument\\_des\\_Monats\\_2004.pdf](http://www.stadtlohn.de/pics/medien/1_1190134091/Dokument_des_Monats_2004.pdf); "Hans Herlin gestorben," *Frankfurter Rundschau*, 23 December 1994.
71. Hans Herlin, "Kain, Wo ist Dein Bruder Abel?" *Stern* 19 (7 May 1960).
72. Burghard Ciesla, "Droht der Menschheit Vernichtung? Der Schweigende Stern—First Spaceship on Venus: Ein Vergleich," in *Apropos: Film 2002: Das Jahrbuch der DEFA-Stiftung* (2002): 124, 132–33.

73. "Die Neue Sonne," in *Mosaik von Hannes Hegen: Die Reise ins All*, reprint (Berlin: Buchverlag Junge Welt, 2007), 54–75; first published as Hannes Hegen and Lothar Dräger, *Die Neue Sonne: Mosaik 27* (1959).
74. Thomas Kramer, *Micky, Marx und Manitu* (Berlin: Weidler Buchverlag, 2002), 218–21.
75. "Wohin mit dem Geld?" NBI 4, 1961.
76. Under the Hallstein Doctrine, in force until 1972, the Federal Republic vowed to break off diplomatic relations with any country that recognized the GDR. On competition in Africa, see Katherine Pence, "Showcasing Cold War Germany in Cairo: 1954 and 1957 Industrial Exhibitions and the Competition for Arab Partners," *Journal of Contemporary History* 47, no. 1 (2011): 69–95.
77. Susanne Zantop, *Colonial Fantasies: Conquest, Family and Nation in Pre-Colonial Germany, 1770–1870* (Lincoln, NE: University of Nebraska Press, 1990).
78. "Revolution hinter Türen aus Stahl und Paraffin," NBI 45, 1958.
79. "Krebs," NBI 26, 1962; "Wissenschaft am seidenen Faden," NBI 35, 1962; "Atomreaktor aus dem Baukasten," NBI 5, 1963; "Die grosse Koalition," NBI 46, 1964; "Die Wissenschaft von der Wissenschaft," NBI 49, 1964; "Ein Leben für die Physik," NBI 52, 1964.
80. "Phönix aus der Asche," NBI 7, 1960; "Isotopen-Labor," NBI 15, 1960.
81. "Schlimmer als die Pest," *Stern* 38 (21 September 1957).
82. "Erst wenn der Tod kommt, kann das Leben siegen," *Stern* 50 (13 December 1958).
83. "Mit Gewalt vor den Röntgenshirm?" *Stern* 34 (23 August 1958).
84. Willibald Steinmetz, "Ungewollte Politisierung durch die Medien: Die Contergan-Affäre," in *Die Politik der Öffentlichkeit—die Öffentlichkeit der Politik*, ed. Bernd Weisbrod (Göttingen: Wallstein Verlag, 2003), 195–228.
85. "Ja zum Leben," NBI 43, 1958; "Angst vor Regen?" NBI 32, 1958.
86. While fission involves splitting the atom, fusion involves fusing atoms of hydrogen, the process at work in the sun.
87. "Ein Glas Wasser genügt für die Stadt von morgen," *Stern* 18 (30 April 1960).
88. Radkau, *Aufstieg und Krise*, 89.
89. On Allied prohibition of nuclear research in Germany, see John Krige, *American Hegemony and the Postwar Reconstruction of Science in Europe* (Cambridge, MA: MIT Press, 2006), 47–50. On Euratom and West German resistance to this supranational model, see John Krige, "The Peaceful Atom as Political Weapon: Euratom and American Foreign Policy in the Late 1950s," *Historical Studies in the Natural Sciences* 38, no. 1 (2008): 20–22; article on 5–44. On the system that emerged out of the Atomic Law, see Radkau, *Aufstieg und Krise*, 398–408.
90. Radkau, *Aufstieg und Krise*, 20–27, 37–45, 54–56, 58, 71, 90–91, 96, 103–5, 118–19, 138–47, 196–98, 259–64, 278–89.
91. In the GDR, nuclear safety was overseen by the Central State Office for Radiation Protection (Staatliche Zentrale für Strahlenschutz, or SZS), later the State Office for Nuclear Safety and Radiation Protection (Staatliches Amt für Atomsicherheit und Strahlenschutz, or SAAS). The SED shut down the School of Nuclear Physics of the Technical University of Dresden in 1962, the Office for Nuclear Research and Nuclear Technology in 1963, and the Scientific Council for the Peaceful Use

- of Atomic Energy in 1966. Nonetheless, nuclear research continued at the Central Institute for Nuclear Research (Zentralinstitut für Kernforschung) in Rossendorf, which became part of the Academy of Sciences of the GDR. Also important for the training of nuclear power plant personnel was the Rheinsberg nuclear power plant, which not only generated power for the grid but also served as a research and training facility. Some research was conducted by the nuclear industry. East Germans also participated in research at an international center of atomic research, which was established in 1956 and was located in Dubna in the Soviet Union; at that time it was the site of the world's largest particles accelerator. However, Heinz Barwich, a leading nuclear researcher until his defection to the West in 1964, found during research stays in Dubna that he and other non-Soviet scientists were excluded from the most interesting research conducted there.
92. Mike Reichert, *Kernenergiewirtschaft in der DDR* (St. Katharinen: Scripta Mercaturae Verlag, 1999); Burghard Weiss, "Nuclear Research and Technology in Comparative Perspective," in *Science under Socialism: East Germany in Comparative Perspective*, ed. Kristie Macrakis and Dieter Hoffmann (Cambridge, MA and London: Harvard University Press, 1999), 217–20; article on 212–229. My sources on Barwich: NARA FBI (65/230/86/15/07/105), File #134040, CIA teletype dated 15 October 1964; CIA report dated 6 November 1964; CIA report dated 8 February 1965; CIA report dated 16 June 1965; CIA report dated 20 October 1965; United States Mission Berlin, Dispatch No. 119, dated 15 September 1961. See my interpretation in Augustine, *Red Prometheus*, ch. 4.
  93. Holger Nehring, "Cold War, Apocalypse and Peaceful Atoms: Interpretations of Nuclear Energy in the British and West German Anti-Nuclear Weapons Movements, 1955–1964," *Historical Social Research* 29, no. 3 (2004): 150–70.
  94. Uekötter, *Deutschland in Grün*, ch. 4, esp. 82.
  95. Radkau, *Aufstieg und Krise*, 397. He cites resistance to the building of a plant in Biblis in 1969. For examples, see R. Gerwin, "Schwieriges Ja zum ersten deutschen Atommeiler," *Zeitung für Kommunalwirtschaft* (October 1955). This article claimed that there was a "major propaganda campaign" against the building of the Karlsruhe reactor. Also (on escape of radioactive gases from the French nuclear power plant Marcoule), see "Durch diesen Atom-Schornstein," *Der Tag* (1 July 1956).
  96. Deutsches Rundfunkarchiv (German Broadcasting Archives), Babelsberg (abbreviated throughout as DRA) DRA OVC 6442, "Schülerprogramm: Geographie. Beweise unserer Kraft," first broadcast on 22 June 1967.
  97. Rolf Geffken, *Arbeit und Arbeitskampf im Hafen: Zur Geschichte der Hafendarbeit und der Hafendarbeitergewerkschaft* (Bremen: Edition Falkenberg, 2015), 101.
  98. Programs highlighting the Soviet Union as the protector of the GDR as far as nuclear safety was concerned, while also emphasizing the GDR's scientific and technological prowess: DRA OVC 1465, "Im Blickpunkt in Aktuelle Kamera: VEB Atomkraftwerk Rheinsberg," first shown on 9 May 1966; DRA 058210, C7968, "Physik, Klasse 9–10: Energie aus dem Atom—Physik als Produktivkraft"; DRA AC 17901, "Kämpfer und Sieger T: 15," first broadcast on 30 June 1967; DRA OVC 2102, "Im Blickpunkt in Aktuelle Kamera: Besuch der Partei- und Regierungsdelegation der DDR in Nowo-Woronesch," first broadcast on

- 10 November 1967; DRA AC 17909, "Atomzeitalter," first broadcast on 20 March 1968; DRA AC 18816, "Flamme des Atoms: Professor Kurtschatows Entscheidung," first shown on 30 June 1971; DRA OVC 0134, "Strom fließt aus der Heide ... auf der Großbaustelle Kernkraftwerk-Nord erlebt und notiert," first shown on 3 February 1974; DRA AC 5680, "Bericht der neuen Fernseh-Urania: Löst das Atom unser Energieproblem?," first broadcast on 12 March 1975; DRA 004015, "Einsatz Atomstation: Dialog mit einem Mann am Don," first broadcast on 9 June 1976; DRA, 003998, "Am Tag, als der Sputnik kam: 25 Jahre nach einem Jahrhundertereignis," first shown on 4 October 1982.
99. DRA 002700, "Atomstrom aus Rheinsberg," first broadcast on 7 June 1966.
  100. DRA OVC 2908/1, "Im Blickpunkt in Aktuelle Kamera. Rheinsberg," first broadcast on 29 July 1967.
  101. DRA FP3973, "Unser Sandmännchen: Städtebilder: Greifswald," first shown on 2 July 1976.
  102. Augustine, *Red Prometheus*, 64–66, 284–87.
  103. David Nye, *American Technological Sublime* (Cambridge, MA: MIT Press, 1994).
  104. Jonathan Coopersmith, *The Electrification of Russia, 1880–1926* (Ithaca, NY: Cornell University Press, 1992); Susanne Schattenberg, *Stalins Ingenieure: Lebenswelten zwischen Technik und Terror in den 1930er Jahren* (Munich: R. Oldenbourg Verlag, 2002), 70–107; Paul Josephson, *Red Atom: Russia's Nuclear Power Program from Stalin to Today* (New York: Freeman, 2000), esp. 7–19.
  105. Alfred Kosing et al., *Weltall Erde Mensch: Ein Sammelwerk zur Entwicklungsgeschichte von Natur und Gesellschaft*, 13th ed. (Berlin: Verlag Neues Leben, 1965), 5.
  106. Daniel 10:21.
  107. Sonja D. Schmid, "Celebrating Tomorrow Today: The Peaceful Atom on Display in the Soviet Union," *Social Studies of Science* 36, no. 3 (2006): 331–65.





Laufs, an expert with a career in nuclear industry and politics behind him, describes a process of ongoing inquiry and examination of weaknesses in reactor and nuclear power plant design in the Federal Republic; this is overseen by the state as well as by institutions that combine to various degrees state oversight, scientific and engineering expertise, and industrial self-monitoring.<sup>4</sup> In 1981, Marion Dönhoff, publisher of the widely read West German weekly *Die Zeit*, took a position between those of Radkau and Laufs, arguing that anti-nuclear power activism had led to “many safety regulations that make our reactors safer than those of other countries.”<sup>5</sup> These three viewpoints reflect different understandings of the evolution of safety cultures in West Germany.

The development of nuclear power in the GDR has generally been treated as a failure, particularly in light of the GDR’s abandonment of an independent nuclear power program in the mid-1960s.<sup>6</sup> However, a volume of essays by scholars and former East German engineers published in 2000 discusses systematic attempts to improve nuclear power safety in the GDR in the 1970s and 1980s.<sup>7</sup> This chapter looks at the construction of expert knowledge regarding nuclear power safety and at the interaction between engineers, the political leadership, nuclear safety regulators, and nuclear industry management in both East and West Germany. Chapter 3 then discusses public discussion and criticism of technical approaches to safety and risk.

Safety had been the stepchild of nuclear power development in its early stages in the two Germanys. Nuclear power, growing out of military technologies and euphoric hopes for an endless energy supply, was developed in a cultural context that downplayed safety issues. Greater safety awareness grew out of a complex web of factors, which included an economic interest in continuity of the electricity supply, the influence of US and Soviet safety regimes, and the postwar reemergence of German technological systems, involving the rebuilding and expansion of research infrastructure and competition among politico-technological institutions. Growing public concern regarding the risks involved in nuclear power and intensifying activism in West Germany pushed the nuclear industry and the research establishment to greatly expand efforts to improve atomic power plant safety. “It has always been clear to all involved that a serious nuclear power plant accident that had a detrimental impact on the population would bring about the immediate termination of this technology in Germany,” writes Laufs.<sup>8</sup>

But what impetus to improve safety existed under real socialism? It has become abundantly clear that Communist East Germany, like the Soviet Union, was able to produce first-rate technologies in high-priority areas,

at least up through the 1960s.<sup>9</sup> It is less clear what role safety could and did play in an advanced Communist society. Given the dictatorial nature of Communist rule in the Eastern Bloc, public pressure to improve nuclear safety was much weaker than in the West. However, there are striking convergences in approaches to nuclear power plant safety in the GDR and the Federal Republic, although major differences remained.

Accidents in nuclear power plants were treated differently in the two Germanys. Disaster research tells us that catastrophes and, under some circumstances, more garden-variety accidents can be catalysts to change, bringing about safety improvements and, occasionally, deeper social changes. They also make manifest aspects of industrial and political reality that are normally difficult to discern.<sup>10</sup> Thomas Lindenberger sees a preoccupation with safety and security (hard to distinguish in German because both are termed *Sicherheit*) as central to Communist rule in the GDR. His work on industrial disasters shows that in their attempts to prevent a weakening of SED rule, industrial management and the secret police blocked safety improvements and social change.<sup>11</sup>

Nuclear accidents, outside of the scope of Lindenberger's work, were a category unto themselves. In East and West, accidents connected with military nuclear research were treated as state secrets during the Cold War.<sup>12</sup> In the GDR, as in the Soviet Union, any accidents that occurred in civilian nuclear power production were also treated as highly confidential matters. This chapter asks whether they nonetheless generated internal debate in the GDR, while also asking whether nuclear accidents and lesser mishaps were handled in a fundamentally different way in West Germany.

## Safety Philosophies in East and West

"Safety philosophies," an Americanism that came into widespread use in West German industry and from there spread to the GDR, were overarching concepts that helped engineers formulate norms, rules, and procedures for use in planning, building, and operating nuclear power plants. Historian of technology Joachim Radkau points to four that played a major role in West Germany. The first emphasized "experience." The idea was that the safest technologies were those with which industry had the most experience. The light water reactors (specifically, boiling water and pressurized water reactors) that became the energy industry standard across most of the world in the 1960s and 1970s and are still in use in most nuclear power plants evolved from reactors used on nuclear submarines. One problem, pointed to by Radkau, was that such tried-and-true technologies were the oldest and,

given the military origins of these technologies, were often not the safest. Nor could they necessarily be safely scaled up.

A second philosophy looked to spatial location (i.e., distance from population centers) for safety. A third philosophy was that of “inherent safety,” arising out of a search for technologies, for example reactor designs, that were inherently safer than others. According to Radkau, however, fundamental decisions, such as the adoption of the US-made light water reactors for use in commercial nuclear power plants, were based on politics, not scientific rationality. By the 1970s, the US safety philosophy known as “engineered safeguards” triumphed, not only in West Germany but also in the GDR and across the globe. This fourth approach involved the use of monitoring devices and “fail-safe” systems that minimize harm in case of equipment failure or that interrupt operations if malfunctions are detected, such as overheating caused by human error or equipment failure.<sup>13</sup>

Engineers and regulators in West Germany and the United States long clung to a “deterministic” approach to safety involving the cause-and-effect analysis of particular safety issues and vulnerabilities. This went hand in hand with the development of engineered safeguards. The US Atomic Energy Commission found this piecemeal approach lacking because it did not provide a way to estimate overall risk, leaving the public in a state of apprehension. According to historian Thomas Wellock, it was the 1975 Rasmussen Report, also known as WASH-1400, that ushered in a paradigm shift to a probabilistic method that made quantitative risk assessment possible. The methodology was based on the use of “event trees” or “fault trees,” which allowed the calculation of the probability of the occurrence of a series of events that could lead to a nuclear plant disaster. This method was severely criticized by many engineers and bureaucrats.

From a purely technical point of view, this method of risk calculation was deficient because probability can be used to calculate risk, but not uncertainty (that is, an open-ended process in which the number of possible combinations of events is incalculable). Moreover, as sociologist Charles Perrow argued in his 1984 study *Normal Accidents*, efforts to prevent accidents had become a major *cause* of accidents. Faced with an unfolding nuclear power plant crisis, human operators had great difficulty in diagnosing the fundamental problem because multitiered redundant safety systems were so complex.<sup>14</sup> However, probabilistic methods did help improve safety by identifying problematic areas. Eventually, a fruitful synthesis of probabilistic and deterministic methods was achieved. The Rasmussen Report did not, however, reach a second goal of the US Atomic Energy Commission, which was to allay public fears of nuclear power accidents.<sup>15</sup> These quandaries

and disputes became known in West Germany, leading to a questioning of nuclear power safety there, as will be discussed in Chapter 3.

West Germany was much influenced by the United States with regard to standards, approaches, and artifacts that were part of the technological system of nuclear power, at least up into the 1970s. The Federal Republic adopted the American light water reactor as its standard reactor for commercial nuclear power plants, evidently because of confidence in US technological prowess, as well as a desire to please its most important ally.<sup>16</sup> West Germany also adopted and improved on technologies associated with nuclear power production developed in the United States, such as airtight containment domes, automated monitoring systems, and improvements aimed at preventing the explosion of reactor pressure vessels (which contain the reactor core). By the 1970s, an internationalization of the West German nuclear safety regime was under way, as institutions such as the IAEA (the International Atomic Energy Agency) attained new stature and a multinational exchange of technological knowledge became the norm.<sup>17</sup>

The GDR became completely dependent on the Soviet Union after the SED shut down most of East Germany's nuclear power program in 1962–1965. The USSR supplied nuclear power plants for energy production to the GDR. The SED leadership simply assumed that the Soviet Union would ensure the safe operation of the Rheinsberg nuclear power plant (which went critical in 1966), as well as that in Lubmin, near the town of Greifswald (also known as Nord or “Bruno Leuschner,” but referred to in the present study as “Greifswald”). This did not go well, however. In 1965, the GDR complained about Soviet disengagement: a lack of technical assistance, poor customer service, and the unavailability of replacement parts for Soviet equipment.<sup>18</sup>

When, however, Karl Rambusch (then general director of the socialist combine for nuclear energy) tried to put together a coordinated research and development (R&D) program that would address safety issues in 1967, the party leadership accused him of harboring anti-Soviet attitudes. During the building of unit 3 of the Greifswald plant engineers identified safety issues, but in 1975 representatives of the East German government initially refused to allow alterations to the Soviet design that East German experts deemed necessary.<sup>19</sup>

A series of events, including a “serious incident” at the Greifswald nuclear power plant in 1975 and the far graver Three Mile Island (Harrisburg) nuclear power plant accident of 1979, brought about a rethinking of nuclear safety on the part of the SED leadership. Intense worldwide preoccupation with nuclear safety put the GDR under international pressure to improve the safety of its atomic power plants.<sup>20</sup> The GDR nuclear power industry transitioned to the Western paradigm of “engineered safeguards”—implicitly

if not explicitly. In July 1979, four months after Three Mile Island, East German authorities introduced new regulations for the licensing of nuclear power plants. The central regulatory agency of the GDR, the State Office for Nuclear Safety and Radiation Protection (Staatliches Amt für Atomsicherheit und Strahlenschutz, or SAAS), took on a more active role.<sup>21</sup>

The SED leadership could not let go—politically, psychologically, or in practical terms—of its fixation on the Soviet Union, but technical experts were increasingly critical of weaknesses in these Soviet technological systems. The Soviet Union did not export intrinsically risky graphite-moderated reactors such as the one responsible for the Chernobyl catastrophe to the GDR, but rather pressurized water reactors of its WWER<sup>22</sup> line. The Soviet authorities were motivated, not by safety concerns, but rather by total unwillingness to give the GDR a reactor line that produced plutonium. They also did not provide the GDR with the latest models, which incorporated technological improvements, notably containment structures. (Only the later-generation reactor planned for Stendal in the GDR was to have containment, but it never went into operation.<sup>23</sup>)

The Soviet Union did make up for this to a certain extent by helping to rebuild units 1–4 of the Greifswald nuclear power plant in the 1980s.<sup>24</sup> On the whole, Soviet safety systems for nuclear power plants relied far more on human intervention than on automated systems, such as those prevalent in the West.<sup>25</sup> East German researchers attempted to develop nuclear power plant monitoring systems that could compensate for deficits in Soviet equipment, most notably *Rauschdiagnostik*, or noise diagnostics, a technique developed at the Central Institute for Nuclear Research at Rossendorf to deal with dangerous vibrations of Soviet fuel rods.<sup>26</sup>

A third phase, characterized by the adoption of international standards, was ushered in by the Chernobyl disaster. In 1986, both the GDR and the Soviet Union joined the IAEA's newly established early warning system.<sup>27</sup> Chernobyl and Gorbachev's accession to power also unleashed open criticism of safety of Soviet nuclear power plants by GDR officials.<sup>28</sup> The GDR began to measure itself by international standards, as can be seen in SAAS reports, which will be discussed in a later section of this chapter.

In the final phase of GDR history, the slow collapse of the GDR economy and SED rule exacerbated long-term problems and made it very difficult to follow through with an internationalization of the safety regime. Both on the shop floor level and among management, discipline was breaking down. The physical and psychological decay of East German industry in the late 1980s had a very negative effect on nuclear power plant safety. In addition, the Soviet Union stopped shipments in the Gorbachev era. In some ways, however, decay and internationalization converged: By 1987,

the GDR was importing energy from West Germany and other Western countries.

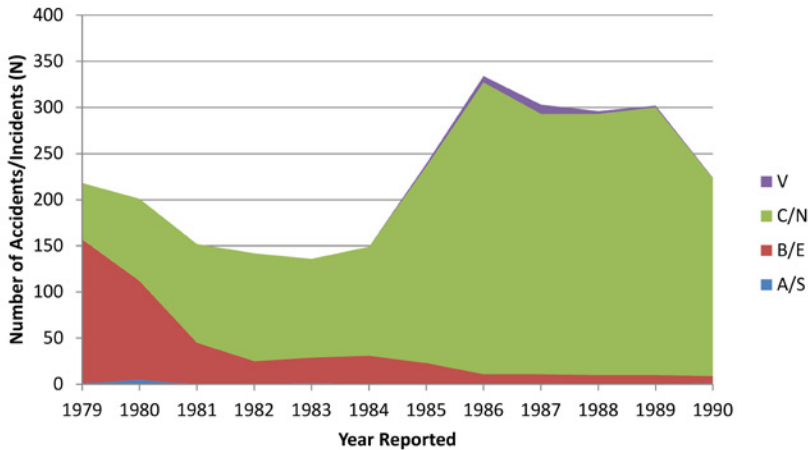
In 1989, the Soviet Union suggested—and the GDR considered—importing a nuclear power plant from the West and seeking Western help in repairing the Greifswald and Stendal plants.<sup>29</sup> The SED leadership decided in June 1989 to shut down Rheinsberg in 1992. But after German reunification, all former East German nuclear power plants were shut down. Whatever convergence had taken place was insufficient in the eyes of Federal German policymakers after reunification. Many East German experts saw this as the outgrowth of the West German energy industry's desire to rid itself of unwanted competition, but Western experts insisted that they based their evaluation on normative safety standards.

## Interpreting Nuclear Power Safety Problems in West Germany

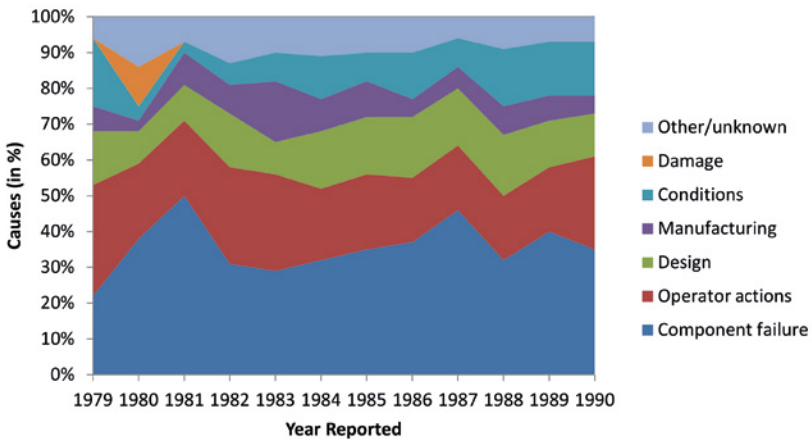
In mid-February 1979, members of the West German environmental organization, the Federal Association of Citizens' Initiatives on Environmental Protection (Bundesverband Bürgerinitiativen Umweltschutz, or BBU), broke into the Hamburg offices of the Society for Reactor Safety (Gesellschaft für Reaktorsicherheit, or GRS)<sup>30</sup> and stole reports on mishaps and accidents in West German nuclear power plants dating back to the mid-1960s.<sup>31</sup> Until that time, these reports (compiled on behalf of the West German government) had not been released to the public, but this act of civil disobedience and the publication that resulted from it forced open the records on nuclear plant safety to public scrutiny.<sup>32</sup>

Figure 2.1 shows that between 1979 and 1990, Category B<sup>33</sup> incidents decreased, while less serious Category C events became more common.<sup>34</sup> The most severe sorts of incidents, Category A, were rare, yet there were five in 1980 and one each in 1979 and 1990. The overall number of accidents and incidents reached a high of 334 in 1986—an unfortunate coincidence in the year of the Chernobyl disaster—and remained around 300 per year through the end of the decade. The report for 1986 attributed this to start-up difficulties with the newest atomic power plants and reactors.<sup>35</sup>

In its report on incidents and accidents at West German nuclear power plants in 1977–78, the Society for Reactor Safety asserted, “The great majority of the incidents can be attributed to technical deficiencies; only in a few cases did managerial negligence or human error play a role.”<sup>36</sup> The data, shown on Figure 2.2, bear out this interpretation. Component failures were faulted for a third to half of all of nuclear power plant accidents in



**Figure 2.1** Nuclear power plant accidents and incidents, Federal Republic, 1979–1990.



**Figure 2.2** Causes of incidents, Federal Republic, 1979–1990.

1980–1990.<sup>37</sup> Manufacturing errors were blamed in a further 3–17 percent of cases in those years. Problems arising from design and layout of the plants were thought to play the main role in 9–17 percent of the accidents.<sup>38</sup> “Human error” was not given much prominence: Operator errors and repair and installation errors<sup>39</sup> were cited as the primary cause in only 18–27 percent of the cases in 1980–1990. Conditions in the specific plants<sup>40</sup> were viewed as the main culprit in 3–16 percent of the incidents. This last factor was probably understood to encompass errors made by plant managers.





**Illustration 2.1** Town seal of Gundremmingen, West Germany, with atomic symbol. Courtesy of Gemeinde Gundremmingen. Wiki Commons.

Thus, nuclear incidents and reactions to them were framed more in terms of control over technology than over people.

The most serious nuclear incident in the history of the Federal Republic took place on January 13, 1977 in the first commercial nuclear power-generating plant in the Federal Republic, at Gundremmingen, which had opened in 1966. (See Illustration 2.1 for town seal with atomic symbol.) While the 1975 “serious incident” in Greifswald, East Germany (to be discussed below) was eventually given a rating of 3 on the INES scale,<sup>41</sup> the 1977 incident in West Germany “only” rated a 2.<sup>42</sup> (Like the Richter scale for earthquakes, the INES scale is exponential, so that each step represents a jump by a factor of ten.) However, this incident is emblematic of perennial problems with this, the original Gundremmingen reactor, built by General Electric in partnership with the German AEG corporation.

Historian Joachim Radkau is highly critical of the way the fundamental decisions regarding the Gundremmingen A plant (so called because two other units, Gundremmingen B and C, were built in 1976–1985) were arrived at. The beneficiary of West German, US, and Euratom subsidies, it was considered too big to fail. According to Radkau, it was built with very serious safety defects, omitting safety features used by General Electric in the United States. This was done despite warnings from TÜV (Technischer Überwachungsverein, or Technical Inspection Association), a semi-official German organization with wide-ranging powers to inspect

machines, vehicles, products, and amusement park rides and to develop new technological concepts.<sup>43</sup>

On 13 January 1977, the Gundremmingen A plant was “totaled” by the most serious accident to ever take place in the Federal Republic. It was, like the Fukushima reactor, a boiling water reactor. Due to extreme cold and ice, the electrical line transmitting power for the grid shorted out, necessitating an emergency shutdown of power generation at the Gundremmingen plant. The reactor’s emergency shutdown system worked. However, due to a malfunctioning relay switch, the turbine’s shutoff valve did not work. Water pressure in the main loop (loop A<sup>44</sup>) fell. The automated system interpreted this as a leak. The emergency cooling water system went on, pumping water into the main loop. The hot, radioactive water flooded the reactor building. In response to the rapidly rising temperature, the emergency sprinkler system went on, adding to the flood. After the accident, it was also discovered that many of the pipes in the reactor core were corroded and cracked.<sup>45</sup> RWE (Rheinisch-Westfälisches Elektrizitätswerk AG, or Rhenish-Westphalian Power Plant) never put the plant back into service after the accident.

Gundremmingen A had been plagued by a series of technological breakdowns, mishaps, and accidents in the decade in which it was in operation (1966–1977). Leaks and material fatigue were widespread in the plant. In 1975, two workers died while trying to repair a leaky valve on a pipe that carried steam from the reactor to the turbine.<sup>46</sup> Remarkably, although the 1975 accident immediately became known to the public, the full significance of the 1977 accident did not become clear until years later. The 1977 accident took place during a period of tremendous turmoil over nuclear power in West Germany. The authorities evidently colluded with plant officials to keep the story quiet. *Der Spiegel* and *Die Zeit* mentioned the accident in passing, but there was little indication of how potentially serious it had been—because no one outside of top government and industrial circles understood this.<sup>47</sup>

In the Federal Republic, a new generation of reactors promised greater inherent safety. Most of the second-generation commercial reactors in West Germany were pressurized water reactors. They were considered safer than boiling water reactors because radioactive water never left the reactor building. In this kind of reactor, water is not converted to steam, thus reducing corrosion and cracking of pipes—a perennial problem in boiling water reactors. Boron mixed into the water in loop A of the pressurized water reactor *does* promote corrosion in carbon steel, although not in stainless steel. However, pressurized water reactors have safety-enhancing fail-safe design features, such as control rods located above the reactor core (instead of below it as in the boiling water reactor). In case of loss of electrical power, gravity

causes the control rods to fall into the core, thus putting the brakes on the nuclear reaction. An additional feature, known as negative temperature coefficient, is that a rise in temperature causes the core to automatically cut back output.<sup>48</sup>

The thorium reactor was also considered as an alternative to “light water reactors,” a category to which boiling water and pressurized water reactors belong. Proponents of the liquid fluoride thorium reactor argue that it is safer, among other reasons, because of its negative temperature coefficient and its low-pressure operation (making it far less likely that the reactor will blow up or leak) and because it produces far less radioactive waste than light water reactors.<sup>49</sup> However, the high-temperature thorium reactor, the THTR-300, developed by West German physicist Rudolf Schulten, had a different design and serious safety issues. Particularly problematic was its fuel delivery system, which took the form of uranium and thorium embedded in graphite balls, called “pebbles.”

In 1986, a paradigmatic “normal accident” of the sort predicted by Charles Perrow took place at the THTR-300. According to *Der Spiegel*, the automated system needed to convey exactly sixty pebbles into the reactor at a time. For whatever reason, only forty-one were available. This led to a pebble getting stuck in the pipe leading into the reactor. In the process of trying to dislodge the pebble by blowing gas, engineers accidentally released radioactive helium into the atmosphere. According to *Der Spiegel*, this came to light because an employee tipped off the authorities anonymously and because an environmentalist group was keeping close track of radioactivity readings around the plant. Otherwise, the release of radioactive dust might not have been noticeable such a short time after Chernobyl. The utility company that owned and ran THTR-300 initially denied that a mishap had occurred.<sup>50</sup> This incident and the ensuing cover-up contributed to the decision to shut down THTR-300, making it one of the most expensive failed projects of all times in West Germany. Thus, in West Germany, technocratic approaches to safety failed not only on technical grounds but also on political and ethical grounds.

The contention that safety should come first in the development of nuclear power was not accepted by all West German politicians and nuclear power experts. The fast-breeder reactor had many proponents worldwide, particularly in the 1960s, because it produces more fuel than it consumes. However, it also produces plutonium, which can be used to produce nuclear weapons and which is highly dangerous to humans, particularly since its deadly radiation accumulates in bones. The use of sodium as a coolant was also considered a major safety concern since sodium can explode upon contact with water.<sup>51</sup> Huge amounts of taxpayers’ money were poured into the building of the Kalkar fast-breeder reactor, but it never went into service.

Another major problem for the West German nuclear power program was how to safely dispose of or recycle nuclear waste. A 1976 amendment to the West German Atomic Law required utility companies seeking permission to build a new nuclear power plant to draw up a plan that would ensure the safe disposal of spent nuclear fuel and radioactive waste. Following American advice, West Germany explored the possibility of using Asse, an abandoned salt mine, as a permanent repository for nuclear waste starting in the 1960s. Water eventually filled the mine, making it unusable. Another possibility was to reprocess nuclear fuel, extracting uranium and plutonium from the spent fuel. In 1977, the minister-president of the West German state of Lower Saxony, Ernst Albrecht, proposed that the salt deposits near the town of Gorleben become a permanent storage site. Originally, a nuclear reprocessing plant was supposed to be built there as well, but in the face of protests Albrecht gave up on that project.

At the time, too little was known about the salt deposits and geological characteristics of the area to make a firm decision on permanent storage of nuclear material. Exploratory work on the salt domes lasted for years and faced considerable protests. In the 1980s, it became clear that ground water was seeping into the salt deposits, threatening to leach radioactive materials into the soil and the groundwater.<sup>52</sup> Plans for a nuclear reprocessing plant in the town of Wackersdorf also faced stiff resistance, mainly because of the high toxicity of plutonium, the danger of nuclear proliferation, and the suspicion that the West German government wanted to use plutonium to develop a nuclear weapons program of its own as well as because plutonium could be used to fuel fast-breeder reactors.<sup>53</sup> The project was never completed. The German nuclear industry never really solved the perennial problem of nuclear waste, settling in the 1990s on a medium-term strategy of nuclear reprocessing in France and temporary storage in Germany.

## Conflicting Understandings of Accidents in the GDR

The East German safety record was lackluster at best. According to secret police reports, there were 290 events between January and October 1974 at the Greifswald nuclear power plant, 234 in 1978, 272 in 1979, and 275 in the first eleven months of 1980.<sup>54</sup> This seems like an extraordinary number of disruptions—nearly six per week on average—even for a plant with four units, each with its own reactor. Exact comparisons with West Germany are impossible. What is clear is that, first, no public discussion of nuclear power plant safety could take place in the GDR. Second, understandings of nuclear power safety and accidents differed greatly in East and West Germany. Third,

there was considerable disagreement among East German institutions and elites regarding the nature of nuclear safety and accidents.

In the GDR, industrial authorities, the party, and the secret police helped to construct the *Havarie*, or industrial accident, as a distinctive socialist phenomenon. The ways in which *Havarien* in nuclear power plants were dealt with were tied to particular safety regimes and claims about socialist society. Ironically, the focus was on assigning blame to a guilty party. Sonja Schmid has shown that in the Soviet Union, the authorities wanted to deflect blame from technological failures, notably in the aftermath of Chernobyl. To question Soviet domination of science and technology was to question the foundations of Communist rule—and that had to be avoided at all costs.<sup>55</sup> Something similar was going on in the GDR. On a more practical level, the state and industry hoped to educate, motivate, and, if necessary, compel employees to better performance.

However, individuals held responsible for a nuclear power plant accident were *not* accused of sabotage. Under communism, sabotage was understood to be a political crime against the state and socialist society. A charge leveled mainly in the early GDR, its absence from any discussion of accidents in the atomic energy sector signals a reduction of political intrusion into this high-tech area. By the late 1980s, the GDR adopted a Western understanding of sabotage, considering the possibility of a terrorist attack on a nuclear power plant in much the same terms used in the Federal Republic and the United States.<sup>56</sup>

Essentially, there were two kinds of *Havarien*: those involving the escape of radioactive materials and those that were considered nonnuclear. In the latter case, factory and industrial regulations were the basis of a quasi-judicial hearing presided over by secret police and industrial administrators and conducted within the walls of the atomic power plant. During an in-depth investigation of the accident, employees who had played some role in the relevant events were interviewed. Investigators identified the culprits, generally fairly low-level employees; for example, in a 1974 case, it was two young mechanists who had ended their apprenticeships only a month before and a foreman who had not properly supervised them to make sure that the proper procedures were carried out.

It was left to the plant management to punish the guilty, but the plant had to report to the Stasi how the employees had been punished. The non-nuclear *Havarie* was also discussed in meetings with plant employees, giving the procedure a pedagogical component.<sup>57</sup> It is noteworthy that the secret police played a major role in the proceedings and that their goal was to assign personal blame to specific individuals. The possibility that immediate problems—such as the reliance on inexperienced workmen and the

lackadaisical attitude of the foreman in the 1974 case—were only symptoms of systemic problems was not explored.

In cases of *Havarien* that endangered the nuclear integrity of the plant, the procedures differed in important points. Whereas conventional accidents were discussed with the work collectives, accidents involving the escape of radioactive materials were only evaluated and discussed on a need-to-know basis.<sup>58</sup> True nuclear accidents (as opposed to garden-variety mechanical and electrical accidents) were shrouded in secrecy. In addition, criminal charges were often brought against the person or persons whose negligence had led to the *Havarie*. One of the most frightening and serious accidents occurred in 1975. It was later classified by the IAEA as an INES-3 event, making it the most serious accident ever to have taken place in a German nuclear power plant.<sup>59</sup> Knowledge of this accident was kept from the public and was not revealed until after the fall of the Berlin Wall.

A 27-year-old electrician was trying to show a 19-year-old helper how equipment worked, when they shorted out a transformer. For some reason, this did not trigger a circuit breaker, and so the short fried the equipment at about five hundred degrees centigrade, igniting electrical cables. The ensuing fire caused 2.2 million marks of damage. It also caused the reactor's pumps to stop working, causing the temperature in the reactor to rise to dangerous levels. A core meltdown was narrowly averted. Criminal charges were brought against the electrician.<sup>60</sup> Again, the secret police report does not mention issues other than personal responsibility. Why did the safety system fail? Did chaotic conditions in the plants, such as unsafe wiring, contribute to the accident? These questions do not appear to have been asked.

The secret police came up with two very different sorts of explanations for *Havarien*. The first was voluntaristic, moralistic, and surprisingly individualistic: Blame was assigned to particular individuals who needed to be punished. This sort of thinking went to the top: After a serious *Havarie* in 1982, Politburo members called for the responsible administrators at the Greifswald nuclear power station to be dismissed.<sup>61</sup>

The Stasi could not overlook the recurrence of certain kinds of accidents involving human error at the Greifswald plant, however. It therefore reached for a second explanatory framework that was political in nature. For example, a 1979 Stasi report found Greifswald workers lacking in a sense of the “honor” of their work,<sup>62</sup> a concept related to the ideal of the “socialist personality.”<sup>63</sup> Management and plant foremen had failed in their responsibility to promote the “development of the socialist personality” and “political-ideological training.” Thus, a lack of “political leadership” at the Greifswald plant was thought to play a major role in these *Havarien*<sup>64</sup> along with deficits in socialist consciousness and simple moral failings.

In its overall analysis of accidents at Greifswald, the Stasi also leaned heavily in the direction of human error. Of the 290 incidents that were investigated between January and October 1974 at the Greifswald nuclear power plant, 178 were attributed to in-house employee error,<sup>65</sup> although a not inconsiderable number—72—were blamed on design, construction, or manufacturing errors, which pointed more in the direction of errors on the part of the Soviets.<sup>66</sup>

The SAAS developed an alternate view of nuclear power plant accidents and safety in the 1980s. Basing its reports on its own inspections, particularly those conducted by the Permanent Oversight Committee for Plant Safety (Ständige Kontrollgruppe Anlagensicherheit), the SAAS formulated fundamental criticism of the East German nuclear power industry and its approach to safety. A 1983 SAAS report stated baldly that the GDR, not the Soviet Union, was responsible for East German nuclear plant and radiological safety. Therefore, the GDR had to conduct and apply its own nuclear safety research but also had to adopt and apply international (i.e., Western) nuclear safety standards.<sup>67</sup>

Over the years, SAAS reported on intractable problems that were not being taken care of and that the Soviets were unwilling or unable to provide assistance with. One of the most serious was the embrittlement of the Greifswald 1 reactor vessel, which could cause the vessel to crack or burst, leading to a core meltdown. This seems to have been an endemic problem with Soviet-made WWER-440/230 reactors. At Greifswald, radioactivity damaged the material out of which the reactor vessels were made, causing small cracks. This was the result of a Soviet design flaw: the fuel rods were too close to the wall of the reactor vessel, thus exposing it to too much bombardment by neutrons. By 1985, SAAS deemed “immediate countermeasures” necessary.<sup>68</sup>

Schmid points to a factor that may explain why the components of the reactor core were overcrowded within the reactor vessel: the Soviet railroad system could not transport loads over a certain size, which limited the size of reactor vessels that were manufactured in Leningrad and transported all across the Eastern Bloc by rail.<sup>69</sup> Soviet experts should have been familiar with the problem of reactor vessel embrittlement, yet they provided no advice.<sup>70</sup> Another problem: Soviet-made fuel rods caused a different safety crisis in Greifswald in 1984, when they unexpectedly overheated the coolant. Soviet industry professed ignorance.<sup>71</sup> Further problems in Greifswald included damaged pipes, corrosion in the steam generator, and seepage of salt water into the plant from the Baltic Sea.<sup>72</sup>

SAAS reports saw recruitment problems as a major explanation for Greifswald’s poor safety record. “Nuclear power plants have to employ the best,” the SAAS affirmed. But this was not the case, due to the “insufficient

number of cadres with university and technical school training” available to the nuclear power industry. Graduates showed “little interest” in working in nuclear power plants, in part because there was an acute housing shortage in Greifswald but also because of limited opportunities to put scientific and technical training to use on the job and the poor state of R&D facilities in the Greifswald plant. Hence, Greifswald could not be highly selective in its recruitment practices.

Recent hires received on-the-job training, but this “can never replace a [good] theoretical foundation and understanding of the complexities.”<sup>73</sup> The SAAS report presented a particularly dismal picture of conditions at the construction site of unit 75 at Greifswald: “Minimum requirements regarding order and cleanliness are not being consistently fulfilled, and fundamental breaches of basic rules of quality work, particularly with stainless steel, are occurring.” No specialized qualifications were required of workers hired to work on this construction site, with the exception of welders. Most were young and inexperienced.<sup>74</sup>

SAAS attributed these and other failures in part to poor management and to the rush to meet deadlines. SAAS tried to put direct pressure on the general director of the Greifswald nuclear power station, Dr. Lehmann, to abide by national standards for highest allowable radiation levels, which Greifswald had apparently been ignoring.<sup>75</sup> At a 1985 meeting, SAAS put pressure on Lehmann to improve management, hire qualified cadres (engineers and managers), provide better housing for employees, and improve pay and the “political–moral recognition” of employees.<sup>76</sup>

What SAAS was asking for was a concerted effort to lift the nuclear industry out of the morass of inefficiency that had enveloped all of East German industry by the 1980s. The reports of the Permanent Oversight Committee for Plant Safety (of the SAAS) in particular are permeated with a deep sense of frustration, even desperation. How was it possible, one report asked, that after three years so little had been done to deal with the totally unacceptable conditions at Greifswald, despite directives coming from the highest level? Intractable problems were to blame: the paucity of R&D capacity in industry; the poor quality of coordination between the nuclear industry and the nuclear equipment industry, which were overseen by two different ministries; and the general lack of industrial capacity in the GDR. The solutions that were offered up—more research, improvements in management, Soviet help, better personnel—were reasonable. However, SAAS had little real authority, and indeed there was little that even those with real authority could do in the face of monumental systemic problems such as these.<sup>77</sup> Moreover, these reports were treated as state secrets, thus greatly limiting their scope of influence.



## Conclusion

Intrinsically, the nuclear power plants used for electricity production in the two Germanys were similar in many ways. Their pressurized water reactors were similar although not identical in design. Typical problems of Soviet WWER-440 reactors can be traced to peculiarities in the Soviet production system. Soviet designs were not always worse than Western designs, however. Notably, the horizontal steam generators attached to WWERs had safety advantages over the vertical steam generators used in conjunction with Western pressurized water reactors.<sup>78</sup> If East Germany was plagued by more safety issues, this was not due to a lack of technical know-how.

The biggest differences lay in the technological and political systems in which nuclear power production was embedded. The Federal Republic had a much larger industrial and research capacity, allowing it to develop far better redundant safety features, termed “defense in depth.” The GDR’s small industrial base and R&D infrastructure would not, of course, have condemned it to backwardness had it like, say, Finland, been more thoroughly integrated into the world economy and global scientific and engineering communities.

Bloc thinking and fear of sabotage or Western espionage cut down on such exchanges, but the Western COCOM embargo also interfered with importation of much-needed equipment, as did the shortage of hard currencies. The GDR received some, but not enough technical help with issues affecting nuclear power plant safety and functionality from the Soviet Union. It is unclear whether this is the result of a general resentment and distrust of this German state or of some other factors such as putting Soviet needs first. International developments eventually made their way to the USSR and the GDR, but only quite late. Containment came too late for East German nuclear power plants. Nevertheless, there was a process of convergence and internationalization that brought some safety improvements to the GDR. Accidents occurred, but not the “big one.”

Improvements were, however, limited by SED attempts to maintain its central control over the economy and society. The SED not only suppressed any outward criticism of nuclear power safety but also interfered on a profound level in the overseeing and development of technology. Until about 1975, loyalty to the Soviet Union stood in the way of an honest discussion of safety problems with Soviet technologies. The SED never entirely freed itself from this self-destructive attitude, but technical experts were essentially able to bring about a shift to the safety philosophy then dominant in the Western world, which was based on the use of redundant safety devices. In the GDR, these engineered safeguards were tailored to deal with typical problems of

the Soviet-made nuclear power plants. East German engineers nonetheless faced severe limitations to their scope of activity, due to the nonnegotiability of Soviet technological domination and the dysfunctions of the East German industrial system.

In addition, the SED and secret police closely supervised the nuclear power industry, particularly when accidents or other mishaps occurred. Investigations focused on individual blame and on political failings. Systemic problems were largely ignored. Engineers and technical staff could not learn from nuclear power plant accidents because they were largely kept secret. The SAAS was not very successful in its attempts to remedy the poor flow of information and lack of mechanisms of self-correction in the East German industrial system. On the positive side, the SED leadership did come to accept an internationalization of its nuclear safety regime after Chernobyl.

The West German nuclear industry had numerous safety problems, some minor, others somewhat more worrisome. New technologies, such as the thorium and breeder reactors, posed high risks, as did attempts to dispose of nuclear waste in salt deposits. As far as can be determined, however, the Federal Republic had a better nuclear power safety record than did the GDR. The West German nuclear industry made better internal use of information on safety problems. Accidents were attributed more to technological problems than to human error, paving the way for technical solutions. Redundant safety systems appear to have cut down on the more serious categories of accidents and incidents. Additional factors that gave West Germany the edge over East Germany were its greater industrial and research capacity, the integration of its scientists and engineers into international scientific and engineering communities, and its easy access to Western technologies.

In West Germany, the relationship between the political and technological realms was problematic, but in a fundamentally different way than in the GDR. Facing stiff public criticism, West German state governments and the energy industry at times tried to cover up problems. However, information networks functioned better in the Federal Republic than in the GDR. A critical West German public demanded and got access to information on accidents and incidents. Public scrutiny put the industry under pressure to improve nuclear power safety. However, state governments and the nuclear industry also waged public relations campaigns and, from the mid-1970s onward, fiercely combated the protests of nuclear power opponents, as will be discussed in the following chapters.

## Notes

1. Augustine, *Red Prometheus*, 22–25, 36 fn. 57; see literature cited therein.
2. Michael Schüring, “Advertising the Nuclear Venture: The Rhetorical and Visual Public Relation Strategies of the German Nuclear Industry in the 1970s and 1980s,” *History and Technology* 29, no. 4 (2013): 374–75; article on 369–98.
3. Radkau, *Aufstieg und Krise*, 14.
4. Paul Laufs, *Reaktorsicherheit für Leistungskernkraftwerke: Die Entwicklung im politischen und technischen Umfeld der Bundesrepublik Deutschland* (Berlin: Springer Verlag, 2013); Wolfgang Müller, *Geschichte der Kernenergie in der Bundesrepublik Deutschland*. Vol. 1: *Anfänge und Weichenstellungen* (Stuttgart: Schäffer Verlag für Wirtschaft und Steuern, 1990). Major West German institutions discussed by Laufs include the German Atomic Commission (Deutsche Atomkommission, which existed from 1956 to 1971 and which laid the foundations for the creation of a nuclear energy research infrastructure and industry in West Germany); the German Radiation Protection Commission (Strahlenschutzkommission, which formulates and oversees regulations on human exposure to radiation); the Reactor Safety Commission (Reaktorsicherheitskommission, which provides expert advice on reactor safety); the Nuclear Technology Committee (Kerntechnischer Ausschuss, or KTA, which creates the specific rules for the nuclear industry); and independent expert organizations, including the Society for Plant and Reactor Safety (Gesellschaft für Anlagen- und Reaktorsicherheit), the Material Testing Institutes (Materialprüfungsanstalten, institutes connected with universities—notably the University of Stuttgart—that, among other things, test reactor and nuclear power plant components), and the Technical Inspection Association (Technischer Überwachungsverein, or TÜV, whose affiliates are independent consultants that inspect and monitor all sorts of equipment, including that used in nuclear power plants). To this list one could add the state-funded research institutes such as the nuclear research centers in Karlsruhe and Jülich.
5. Countess Marion Dönhoff, “Der Rechtsstaat in Gefahr?” *Die Zeit* (6 March 1981).
6. Weiss, “Nuclear Research”; Reichert, *Kernenergiewirtschaft*.
7. Peter Liewers, Johannes Abele, and Gerhard Barkleit, eds. *Zur Geschichte der Kernenergie in der DDR* (Frankfurt am Main: Peter Lang, 2000); Johannes Abele, *Kernkraft in der DDR: Zwischen nationaler Industriepolitik und sozialistischer Zusammenarbeit 1963–1990* (Dresden: Hannah-Arendt-Institut für Totalitarismusforschung, 2000).
8. Laufs, *Reaktorsicherheit*, 9.
9. Augustine, *Red Prometheus*; Nikolai Kremontsov, *Stalinist Science* (Princeton, NJ: Princeton University Press, 1997); Asif Siddiqi, *The Soviet Space Race with Apollo* (Gainesville, FL: University Press of Florida, 2003); and Alexei Kojevnikov, *Stalin’s Great Science: The Times and Adventures of Soviet Physicists* (London: Imperial College Press, 2004).
10. John Lancaster, *Engineering Catastrophes: Causes and Effects of Major Accidents*, 3rd ed. (Cambridge: Woodhead; Boca Raton, FL: CRC Press, 2005); Rebecca Solnit, *A*

- Paradise Built in Hell: The Extraordinary Communities That Arise in Disaster* (New York: Viking, 2009); Lee Clark, *Worst Cases: Terror and Catastrophe in the Popular Imagination* (Chicago, IL: University of Chicago Press, 2006).
11. Thomas Lindenberger, "Havarie." Reading East-German Society through the Violence of Things," *Divinatio* 42–43 (2016): 301–369; "Havarie: Die sozialistische Betriebsgemeinschaft im Ausnahmezustand," in *German Zeitgeschichte. Konturen eines Forschungsfeldes*, ed. Thomas Lindenberger, Martin Sabrow (Wallstein: Göttingen 2016), 242–264.
  12. Kate Brown, *Plutopia: Nuclear Families, Atomic Cities, and the Great Soviet and American Plutonium Disasters* (Oxford: Oxford University Press, 2012).
  13. Radkau, *Aufstieg und Krise*, 71, 147–68, 186–93, 218–84, 364–71.
  14. Charles Perrow, *Normal Accidents: Living with High-Risk Technologies* (New York: Basic Books, 1984), 4.
  15. Thomas Wellock, "A Figure of Merit: Quantifying the Probability of a Nuclear Reactor Accident," *Technology and Culture* 58, no. 3 (2017): 678–721.
  16. Radkau, *Aufstieg und Krise*, 259–64.
  17. Laufs, *Reaktorsicherheit*, esp. 212–13, 343, 928–29.
  18. Johannes Abele and Eckhard Hamper, "Kernenergiepolitik der DDR," in *Zur Geschichte der Kernenergie in der DDR*, ed. Peter Liewers, Johannes Abele, and Gerhard Barkleit (Frankfurt am Main: Peter Lang, 2000), 49; chapter on 29–89.
  19. Bertram Köhler, "Schwerpunkte der Entwicklung im Kraftwerksanlagenbau der DDR," in *Zur Geschichte der Kernenergie in der DDR*, ed. Peter Liewers, Johannes Abele, and Gerhard Barkleit (Frankfurt am Main: Peter Lang, 2000), 149–50; chapter on 115–61.
  20. Abele, *Kernkraft in der DDR*, 75.
  21. Köhler, "Schwerpunkte," 150.
  22. WWER is the German acronym for the *Wasser-Wasser-Energie-Reaktor*, that is, the water-cooled, water-moderated energy reactor. It is also known as the VVER reactor, standing for (in transliterated Russian) *Vodo-vodyanoi energetichesky reaktor*.
  23. Bundesarchiv DC/20/12694, 128.
  24. Bundesarchiv DC/20/12919, 125.
  25. Sonja Schmid, *Producing Power: The Pre-Chernobyl History of the Soviet Nuclear Industry* (Cambridge, MA: MIT Press, 2015), 68, 108–10.
  26. Dieter Hoffmann, "Physiker, Kommunist, Atomspion: die drei Leben des Klaus Fuchs (1911–1988)," *Physik-Journal* 11, no. 2 (2012): 43; article on 39–43; S. Collatz, D. Falkenberg, and P. Liewers, "Forschungs- und Entwicklungsarbeiten des Zentralinstituts für Kernforschung Rossendorf zur Kernenergienutzung," in *Zur Geschichte der Kernenergie in der DDR*, ed. Peter Liewers, Johannes Abele, and Gerhard Barkleit (Frankfurt am Main: Peter Lang, 2000), 447–50; article on 411–74. Also Bundesarchiv DC/20/12919, 126.
  27. A.O. Adede, *The IAEA Notification and Assistance Conventions in Case of a Nuclear Accident: Landmarks in the Multi-Lateral Treaty-Making Process* (Boston: M. Nijhoff; London: Graham and Trotman, 1987), 139–41.
  28. Abele and Hamper, *Kernenergiepolitik*, 64, 77; Alexander Schönherr, "Die ersten vier Blöcke des KKW Gleifswald von der Vorbereitung bis zur Abschaltung," in

- Zur Geschichte der Kernenergie in der DDR*, ed. Peter Liewers, Johannes Abele, and Gerhard Barkleit (Frankfurt am Main: Peter Lang, 2000), 229; article on 221–308.
29. Abele and Hamper, *Kernenergiepolitik*, 64–70. On the general decline of East German industry, Augustine, *Red Prometheus*, ch. 8.
  30. Later known as the Society for Plant and Reactor Safety (Gesellschaft für Anlagen- und Reaktorsicherheit). This was an independent expert organization that prepared studies and collected statistics on behalf of federal German ministries.
  31. “Schnell Erlamt,” *Der Spiegel* (2 August 1982); Frank Bösch, “Taming Nuclear Power: The Accident Near Harrisburg and the Change in West German and International Nuclear Policy in the 1970s and early 1980s,” *German History* 35, no. 1 (2017): 81; article on 71–95.
  32. Bundesverband Bürgerinitiativen Umweltschutz, *Unfälle in deutschen Kernkraftwerken: Veröffentlichungen der vertraulichen Störfallberichte der Bundesregierung*, 2nd ed. (Ludwigshafen: Bundesverband Bürgerinitiativen Umweltschutz, 1979).
  33. The most severe accidents, which necessitated immediate actions to ensure safety, were placed in category A (later S); Category B (later E) included less serious incidents involving safety issues that had to be addressed, but not immediately. Category C (later N) was for events that did not pose a threat to safety but that disrupted energy production. A fourth category, V, was introduced in 1985.
  34. My calculations, based on annual reports found on the Bundesamt für Strahlenschutz website, retrieved 6 September 2016 from <http://www.bfs.de/DE/themen/kt/ereignisse/berichte/jahresberichte/jahresberichte.html>.
  35. “Übersicht über besondere Vorkommnisse in Kernkraftwerken der Bundesrepublik Deutschland für das Jahr 1986,” retrieved 6 September 2016 from <http://www.bfs.de/DE/themen/kt/ereignisse/berichte/jahresberichte/jahresberichte.html>.
  36. “Übersicht über besondere Vorkommnisse in Kernkraftwerken der Bundesrepublik Deutschland in den Jahren 1977 und 1978,” 8, retrieved 6 September 2016 from <http://www.bfs.de/DE/themen/kt/ereignisse/berichte/jahresberichte/jahresberichte.html>.
  37. Changes in the categories led to my decision to omit the 1979 report from this analysis.
  38. “Auslegung.”
  39. “Bedienung, Wartung, Reparatur, Montage” in 1980 report.
  40. “Betriebsweise” in the 1980 report, “Betriebsweise/Betriebsbedingung” in later reports.
  41. The INES scale (International Nuclear and Radiological Event Scale), established by the IAEA (International Atomic Energy Agency) in 1990, rates events involving the civilian use of radioactive substances according to the level of human exposure, environmental contamination, and intactness of barriers and safety systems. See <http://www-ns.iaea.org/tech-areas/emergency/ines.asp> (retrieved 25 October 2017).
  42. The part of the definition of an INES-2 event most relevant to the classification of the 1977 Gundremmingen incident is the following: “Significant failures in safety provisions but with no actual consequences.” See <http://www-ns.iaea.org/tech-areas/emergency/ines.asp> (accessed on 25 October 2017).

43. The US government was accused of promoting exports of US-manufactured reactors. Euratom collaboration with the United States caused bad blood with the French government. Radkau, *Aufstieg und Krise*, 178–79; 184–85; 199–200; 405.
44. This was a simple reactor type, akin to a large hot coil used to heat water. In most reactors, fission takes place in the nuclear fuel, usually uranium contained in fuel pins, which releases heat and radioactivity. This nuclear chain reaction has to be moderated to the point that no explosion (as in a nuclear bomb) or core meltdown can take place. This is done with fuel rods that are clad, in this case, in boron carbide, which is a moderator in boiling water reactors. When inserted into the nuclear fuel, these fuel rods absorb neutrons, thus lowering the rate at which atoms are split in the uranium. (The nuclear fuel and control rods together form the reactor core.) The reactor core sits in the reactor pressure vessel, which is filled with demineralized water. This water, flowing through what we may call loop A, transfers the heat. First it is heated and turns into steam. This steam powers a conventional turbine, which drives a conventional generator (both outside of the reactor), thus turning heat into electricity. This water is cooled down by water in a separate loop (which we can call loop C), fed by water from a river or the ocean. Thus, water is also a coolant in this kind of reactor. Once cooled and condensed, water from loop A is then pumped back into the reactor pressure vessel, and the cycle begins again. Water in loop A not only transfers heat but also serves as a second moderator whose rate of flow through the reactor can be adjusted. See the diagram in the Wikipedia article on boiling water reactors: [https://commons.wikimedia.org/wiki/File:Boiling\\_water\\_reactor\\_no\\_text.svg](https://commons.wikimedia.org/wiki/File:Boiling_water_reactor_no_text.svg). Author: Robert Steffens (alias RobbyBer 8 November 2004), SVG: Marlus\_Gancher, Antonsusi (talk) using a file from Marlus\_Gancher.
45. Laufs, *Reaktorsicherheit*, 326.
46. “Besondere Vorfälle in Kernkraftwerken in der Bundesrepublik Deutschland. Berichtszeitraum 1965–1976,” dated July 1977. Retrieved 6 September 2016 from Bundesamt für Strahlenschutz, <http://www.bfs.de/DE/themen/kt/ereignisse/berichte/jahresberichte/jahresberichte.html>.
47. “Datum: 17. Januar 1977 Betr.: Serie, Essay,” *Der Spiegel* (17 January 1977); “Störungen in Kernkraftwerken,” *Die Zeit* (28 January 1977).
48. Laufs, *Reaktorsicherheit*, 18–24.
49. Robert Hargraves and Ralph Moir, “Liquid Fluoride Thorium Reactors,” *American Scientist* 98 (2010), 304–13. Radkau also sees the failure to develop the thorium reactor as a lost opportunity. Radkau, *Aufstieg und Krise*, 258.
50. “Umweltfreundlich in Ballungszentren: Hoffnungen und Fehlschläge beim Hochtemperaturreaktor” and “Kernkraft: Funkelnde Augen,” *Der Spiegel* (9 June 1986).
51. Radkau, *Aufstieg und Krise*, 278–81.
52. Anselm Tiggemann, *Die “Achilles-Ferse” der Kernenergie in der Bundesrepublik Deutschland: Zur Kernenergiekontroverse und Geschichte der nuklearen Entsorgung von den Anfängen bis Gorleben 1955 bis 1985* (Lauf an der Pegnitz: Europaforum-Verlag, 2004). On problems with Asse, “Umwelt: Expedition in ein Milliardengrab,” *Der Spiegel* 8 (18 February 2013).
53. “Schleichweg zum Atomwaffenstaat?” *Der Spiegel* 46 (10 November 1986).
54. BStU, BV Rostock AKG, Nr. 178, T. 2, 52, 323.

55. Schmid, *Producing Power*, esp. 10–14, 21–22.
56. BStU, MfS-BCD, Nr. 2599, 360. The document refers to “criminal attacks and unauthorized action against a nuclear facility.”
57. BStU, BV Rostock AS, Nr. 166, no. 78, 1–45 and BV Rostock AKG, Nr. 178, T. 2, 379–386 and 393–396.
58. BStU, BV Rostock AKG, Nr. 178, T. 2, 314–315.
59. IAEA, “INES: The International Nuclear and Radiological Scale” [brochure], Information Series 08-26941-E (Vienna: IAEA, no date). Retrieved 6 September 2016 from IAEA, <https://www.iaea.org/sites/default/files/ines.pdf>.
60. BStU MfS ZAIG 2462, 58–60.
61. Abele, *Kernkraft*, 75–77.
62. BStU Rostock AKG, Nr. 178, T. 1, 107.
63. See, for example, Fokko Ukena, “Sozialistische Persönlichkeit: Grundlagen, Ziele, Methoden und Resultate der sozialistischen Persönlichkeitskonzeption in der DDR” (Diss. University of Osnabrück, 1989); F.W. Willmann, “Moralische Gefühle und ihre Bedeutung für die sozialistische Persönlichkeit” (Diss. Karl-Marx-Stadt, Technische Hochschule, 1982).
64. BStU MfS ZAIG Nr. 2624, 67–73.
65. Wiring error/malfunction, operator error, maintenance error, repair error, installation error, or error while starting up.
66. BStU, BV Rostock AKG, Nr. 178, T. 2, 313–15, 323–36. In forty cases, the cause was unknown or the investigation was ongoing. In one case, a mishap was blamed on forces of nature.
67. Bundesarchiv DC/20/12694, 126–31.
68. *Ibid.*, 58.
69. Schmid, *Producing Power*, 109–10.
70. Bundesarchiv DC/20/12629, 97.
71. Bundesarchiv DC/20/12694, 17–22.
72. Bundesarchiv DC/20/12629, 82, 98.
73. *Ibid.*, 57, 122; quotations on 99 and 117.
74. *Ibid.*, 120–22; quotation on 100.
75. Bundesarchiv DC/20/12694, 169.
76. Bundesarchiv DC/20/12629, 70.
77. *Ibid.*, 106–7.
78. Schmid, *Producing Power*, 269, fn. 66.





scientific and technical issues and attempted to educate their supporters and the public in these areas. This chapter of the movement's history provides important evidence that West Germany's turn away from nuclear power was not founded on a rejection of science. However, as will become evident, counterelites also mounted challenges to mainstream science, questioning the process whereby expert opinion was formulated. What became contentious was not so much the construction of abstract systems of knowledge as the political decisions regarding how knowledge was presented and applied to concrete problems.

In the GDR, the ruling SED long suppressed public discussion of nuclear power safety, and counterexperts only emerged there in the 1980s, as will be discussed in Chapter 7.

## Experts and Counterexperts on Radiation and Human Health

One strand of criticism of nuclear power grew out of biomedical and radiological research. According to historian Alexander von Schwerin, the concept of the "endangered body" emerged in the nineteenth century with the rise of industrial society, science, public health, national insurance systems, and the interventionist state. Hiroshima and Nagasaki presented scientists and the public with a new level of danger to the human body. Increasing numbers of people were being regularly exposed to radiation as technologies of the Atomic Age proliferated in medicine, industry, and atomic energy production. Major resources were allocated for research on the health impact of radiation across the industrialized world.<sup>3</sup>

In the years after World War II, scientists understood the impact of radiation as primarily genetic in nature. This is not surprising, given the worldwide preoccupation with eugenics in the first half of the twentieth century. A US study in Hiroshima, begun in 1947 and overseen by the US Atomic Energy Commission (AEC), looked primarily for inheritable defects among the offspring of Hiroshima bomb survivors.<sup>4</sup> US geneticist Hermann Muller (1890–1967), who won the Nobel Prize in 1946 for his work on genetic mutations caused by x-rays, spoke during his acceptance speech and on later occasions about the perils of genetic degeneration of human populations due to radiation exposure. Muller was an unabashed proponent of negative eugenics (or weeding out of negative traits, including those resulting from radiation exposure), although only on a voluntary basis. The West German scientific establishment also worked within a eugenic paradigm, while at the same time breaking with the form that eugenics had taken in the Nazi era.<sup>5</sup>

Is there such a thing as a safe level of radiation exposure? Scientific thinking on this question was changing in this period. Geneticists adhered to a linear, nonthreshold model of genetic mutation resulting from radiation exposure. This meant that the risk of mutation increased proportionally with increasing levels of exposure and that there was no minimum level below which the risk of mutation was zero. By contrast, most experts believed, at least until the early 1950s, that there was a threshold for “somatic effects,” that is, impacts on the health of exposed individuals, such as radiation sickness and cancer. In other words, they were convinced that low doses of radiation could not, for example, cause cancer. Partly because of this view, and partly due to pragmatic considerations and political expedience, nuclear standards had for decades been based on a threshold model that assumed that it was safe for humans to be exposed to radiation below a certain threshold level, called the “tolerance dose” (*Toleranzdosis*).<sup>6</sup>

These standards, developed since the 1930s, were initially based on observations of radiation burns, later on animal experiments, and even on human experiments. They were expressed in units of measure in an attempt to measure the biological impact of ionizing radiation exposure, based on the kinds of rays and energies involved and the distance from the source. The “rem” (“roentgen equivalent in man”) and millirem (one-thousandth of a rem) were generally used in the United States, the “sievert” (named after physicist and medical research Rolf Sievert) and millisievert in Europe.<sup>7</sup> A distinction was made between whole-body exposure and exposure of individual organs. In the United States, the AEC established five rems per year as the upper limit for whole-body exposure to radiation as part of occupational duties and one-tenth this level (0.5 rems per year) for the general population in the mid-1950s.<sup>8</sup> Euratom also adopted this norm.<sup>9</sup>

The *Lucky Dragon* incident of March 1954, in which Japanese fishermen aboard a boat of this name were sickened or killed by the fallout from a US atomic test on the Bikini Atoll, awakened popular fears concerning aboveground nuclear weapons testing. These tests, which had been going on since 1946, drew scientists to the study of low-level radiation. Their attention was also shifting from inheritable genetic defects caused by radiation to its somatic effects. Research showing a causal relationship between low-level radiation exposure and leukemia was quite controversial because of its implications. When British medical researcher Alice Stewart (1906–2002) demonstrated in work conducted in 1953–1956 a correlation between exposure of fetuses to x-rays and later leukemia, the Medical Research Council, a British government agency, cut off her funding. The significance of her research was not widely acknowledged by the medical community until years

later. Her work was instrumental in the discontinuation of the practice of x-raying pregnant women.<sup>10</sup>

Public concern over the health impacts of radiation exposure abated somewhat after the signing of the Nuclear Test Ban Treaty of 1963 but flared up again when another controversy broke out among US scientists in the late 1960s and early 1970s. US physicist and academic Ernest Sternglass widely publicized the link between radioactive fallout and childhood cancer, but the numbers he came up with were thought to be highly inaccurate, even among scientists who believed that radiation exposure carried grave health consequences with it. In their work at the AEC's Lawrence Livermore National Laboratory, US researchers John Gofman (1918–2007) and Arthur Tamplin came up with more conservative, but nonetheless alarming estimates of the impact of radiation exposure.

Scholar Ioanna Semendeferi has argued that they conducted highly valuable research, establishing that low-level radiation damaged chromosomes and linking such damage, not only to leukemia—as was already established—but to a wide variety of other sorts of cancer as well. Their findings indicated that there was no “threshold” of radiation exposure below which there was no risk of cancer; rather, even very low doses carried with them a small risk of cancer.

They argued that AEC standards of “safe” radiation exposure were responsible for fifteen thousand deaths a year in the United States that could be prevented if tighter standards were introduced. In retaliation, the AEC cut off funding to the Lawrence Livermore National Laboratory and waged a publicity campaign against them. Gofman and Tamplin were professionally marginalized and their findings were rejected by many in the scientific community at the time. In the long run, they proved to be quite influential, although the controversy over whether low levels of radiation exposure are harmful continues to the present day.<sup>11</sup> The popular impact of their work was immediate, however. They turned to a popular audience in their 1971 book, *Poisoned Power: The Case against Nuclear Power Plants*.<sup>12</sup> Their work was discussed in the popular press in Germany, even reaching the GDR, although their names were not mentioned there.<sup>13</sup>

In the postwar period, West German scientists conducted important research on radiation protection, genetics, cancer caused by radiation exposure, and other topics relevant to the impact of radiation on the human body but did not publicly express disapproval of radiation standards or nuclear power. Although well versed in the concept that even low levels of radiation exposure could damage DNA, West German scientists habitually deflected qualms about the use of nuclear technologies by referring to natural background radiation, an argument that ignores the fact that radiation exposure

is cumulative. Von Schwerin believes they wanted to avoid conflict with the state, in part because of habits acquired during the Nazi period, but they also depended on funding from the state-financed German Research Foundation (Deutsche Forschungsgemeinschaft).<sup>14</sup> US researchers were somewhat more independent because of the US system of private universities, which offered a far larger number of job openings for academics.

## Critics of Nuclear Power Plant Safety

Criticism of the prevailing system for nuclear reactor safety and risk calculation helped kick off the anti-nuclear power movement. Here again, US scientists led the way. By the mid-1960s, there was considerable internal dissent within the AEC, which was in charge of both promoting nuclear power and ensuring safety. Staff scientists charged that oversight of the nuclear power industry was extremely lax. Of particular concern was the possibility of nuclear reactor accidents, particularly core meltdowns. A 1967 AEC report highlighted problems with emergency reactor core cooling systems. Many scientists feared that a nuclear reactor accident resulting from a loss of coolant could lead to a core meltdown and breach of the containment building. The Union of Concerned Scientists (UCS), founded at MIT (the Massachusetts Institute of Technology) in 1969,<sup>15</sup> assailed the AEC on just this issue.

The AEC nonetheless gave preliminary approval to emergency reactor core cooling systems that researchers at two testing facilities believed were inadequate for a new generation of larger reactors. These scientists, along with members of the UCS and an association of some sixty environmentalist organizations, testified during AEC hearings held in 1972–1973. Critics did not prevail, but the UCS started up an anti-nuclear power campaign. Increasingly, the AEC faced litigation brought by environmentalist organizations. The then-powerful Joint Committee on Atomic Energy, which consisted of members of the US Senate and the US House of Representatives, also held high-profile hearings on nuclear power safety in 1973–1974. The AEC was split in 1974, leading to the creation of the Nuclear Regulatory Commission, which was solely responsible for nuclear power safety.<sup>16</sup>

Several prominent US scientists were scathing in their criticism of the US Nuclear Regulatory Commission's Rasmussen Report (WASH-1400) of 1975, which purported to demonstrate that the risks associated with nuclear power were negligible. One of these was Henry Kendall, a nuclear physicist, professor at MIT, founder of the UCS, then-advisor to Ralph Nader, and later Nobel laureate in physics. At his behest, a NASA scientist well versed

in event tree methodology testified before the California legislature that this method could not be used to calculate overall risk, as the Rasmussen Report attempted to do. An entire “generation of activist scientists” sprung up in the United States in the 1960s.<sup>17</sup>

These critics of nuclear power safety attained considerable public visibility in the United States. For example, in a *New York Times* Sunday magazine section article, Kendall was quoted in 1974 as saying:

The radioactive accumulation in a large power reactor is equivalent to the fallout from thousands of Hiroshima-size nuclear weapons . . . Consider, for example, that 20 per cent of a reactor’s radioactive material is gaseous in normal circumstances and, if released to the environment in one way or the other, could be swept along by the winds for many tens of miles to expose people outside of the reactor site boundaries to what could be lethal amounts of radioactivity. The lethal distance may approach 100 miles.<sup>18</sup>

The warnings of US experts such as Kendall were well known in West Germany, thanks to media coverage.<sup>19</sup> However unrealistic the scenario described by Kendall would appear to be given experiences in the ensuing decades, the important point here is that some of the more extreme statements made by nuclear power opponents in West Germany were not based on irrational imaginings but on public statements of scientists, generally from the United States.

West German scientists faced tremendous barriers to taking on public roles as opponents of nuclear power. West German physicists did become involved in high-profile activism against nuclear war in the 1950s and 1960s—for example in the Pugwash movement—but overwhelmingly supported “peaceful uses of the atom.”<sup>20</sup> One such exceptional figure was Karl Bechert (1901–1981), a theoretical physicist who combined a top-flight academic career with a political career in a way unusual in Germany, serving as a member of the West German *Bundestag*, that is, the national parliament, from 1957 to 1972. In 1956, he brought one researcher’s discovery of high levels of radioactive contamination on fields and in milk and other food products in Bavaria to the attention of the public. Atomic Minister Franz-Josef Strauß called the director of the institute where the researcher worked to complain.<sup>21</sup> Such incidents were exceptional, and they illustrate the political alarm that greeted criticism of nuclear power in that era.

Jens Scheer (1935–1994), a physicist and prominent anti-atomic power activist in the 1970s and 1980s, recalled that as a young professor in Bremen in the early 1970s, he was not acquainted with criticism of nuclear power safety: “The few scientific studies from the United States were not published

for a long time because they were unwelcomed, and that's why [those findings] didn't make their way into textbooks.”<sup>22</sup> Initially, he was a proponent of nuclear power. However, student activists in Bremen motivated him to read this critical literature. Also important was his direct contact with US opponents of nuclear power: “I visited people in America and [it] changed my mind.”<sup>23</sup> A member of the KPD (Kommunistische Partei Deutschlands, or Communist Party of Germany), Scheer was suspended from his professorship from 1975 to 1980 under the West German Radicals' Decree of 1972 and 1976 prohibition of speech advocating violence.<sup>24</sup>

Scientists involved in the development of nuclear power faced particular scrutiny. In 1975, the Verfassungsschutz (the Office for the Protection of the Constitution, the West German equivalent of the FBI) conducted illegal surveillance of technical expert and nuclear manager Klaus Traube (born in 1928). An engineer, he worked for years in the development of nuclear power in West Germany and the United States. During his years as the director of Interatom, an important enterprise in the field of reactor construction, he was in charge of the development of the fast-breeder reactor in Kalkar. Minister of the Interior Werner Maihofer approved the surveillance operation because Traube had friendly contacts with a person connected to the Red Army Faction (also known as the Baader-Meinhof Gang). This operation, uncovered by *Der Spiegel* in 1977, generated much outcry because it violated constitutionally guaranteed rights. As it turned out, Traube was not involved in any terrorist plot, but he nonetheless left the nuclear industry and became a prominent anti-nuclear power activist.<sup>25</sup>

On the other hand, anti-nuclear power activists in West Germany initially faced high hurdles in terms of understanding the scientific issues and incorporating them into their movement. The movement grew out of local protests by the residents of areas where there were plans to build nuclear power plants. They represented a cross-section of the population. In the movement against the building of an atomic power plant in Wyhl, West Germany (to be discussed in greater depth in Chapter 4), people with something of a scientific education did play a certain role, as historian Stephen Milder has shown. Among those who started asking questions about the possible health consequences of an atomic power plant in Wyhl were Engelhard Bühler, a geneticist who had worked in the Kaiser Wilhelm Society during the Nazi period, and a group of young chemistry students at the University of Freiburg. However, most members of the citizens' initiative that provided the organizational backbone of the movement were not initially interested in the effects of low-dose radiation exposure or the risk of a nuclear power plant accident. They joined the movement out of concern for the impact of the proposed plant on agriculture.<sup>26</sup>

However, circumstances pushed them to seek out experts who could muster scientific arguments, speak with the media, and testify on their behalf at government hearings as well as in court.<sup>27</sup> This need became urgent when the Freiburg administrative court agreed to hear a suit to halt construction of the Wyhl nuclear power plant in 1977. A major anti-nuclear power umbrella organization, the Bundesverband Bürgerinitiativen Umweltschutz (BBU, or Federal Association of Citizens' Initiatives on Environmental Protection) very much bolstered the case of the opponents of the Wyhl plant by publishing results of a 1976 study of the Institute for Reactor Safety (Institut für Reaktorsicherheit, or IRS),<sup>28</sup> IRS Report 290, commissioned by the Federal German Ministry of the Interior.

The study's most important conclusion was that in the hypothetical case of the worst imaginable accident—involving total ejection of nuclear material from a breached reactor—anyone within a 100-kilometer radius of the plant would receive a lethal dose of radiation. The IRS found this to be an unrealistic scenario. The IRS conducted a second study that assumed an accident of far lesser proportions and that yielded far fewer potential fatalities. The ministry refused to release either of the reports, but the BBU got copies through backdoor channels. The BBU published IRS Report 290 in full and asserted, based on the calculations in that study, that 30.5 million West German residents might die in such an accident. Report 290 became the point of departure for questioning expert witnesses before the administrative court.<sup>29</sup>

Before the court, Wyhl activists felt outmanned and outgunned. “There are hardly any nuclear power opponents who have the necessary specialized knowledge,” one activist lamented.<sup>30</sup> The citizens' initiatives actually brought over Ernest Sternglass and former AEC staff scientist Robert Pollard from the United States to testify, paying their way with contributions made by local citizens. Evidently, attempts to form alliances with professors from the nearby University of Freiburg had not been very successful. One professor backed out of testifying in court at the last minute. Of the fifty-three experts who testified, forty-two were considered proponents of nuclear power by the activists. Scientists not pegged as allies provided the decisive testimony, according to Laufs. While arguing that the scenario described in IRS Report 290 simply could not occur, they described possible situations in which a reactor *could* explode, killing people within fifteen kilometers. As good engineers, they argued in terms of probability, not absolute certainty.

Citing insufficient safety features to prevent the rupture of the reactor core in case of an accident, the court in fact stopped construction in Wyhl.<sup>31</sup> This decision was reversed on appeal in 1982. But what is interesting about the 1977 court case is that it makes clear that the scientific issues

were complex enough that judges could come down on the side of the anti-nuclear power forces on the basis of testimony of major nuclear experts who believed nuclear power to be safe, but who revealed details about the safety of the nuclear power plants that made this assertion appear to be false. It also marks an important step in the development of the West German anti-atomic power movement, which was embracing science to an ever-greater extent and trying to establish ties to experts who could help them in their fight.

In 1977, activists from the Wyhl movement founded the Eco Institute of Freiburg (Öko-Institut Freiburg), whose purpose was to provide the movement with scientific expertise.<sup>32</sup> In 1980, this institute published a translation of the UCS's rebuttal to the 1975 US Nuclear Regulatory Commission's Rasmussen Report (WASH-1400).<sup>33</sup> This report analyzed the various possible failures that could lead to an accident in a light water reactor and concluded that the chances of a reactor core meltdown was one in twenty thousand per reactor per year. Nevertheless, it concluded that the risks of injury, death, and financial loss were far less in the case of a nuclear power plant accident than in the case of more everyday disasters, such as fire, earthquake, and airplane crash.<sup>34</sup> On the basis of documents obtained through a Freedom of Information Act request, the UCS concluded that the scientists involved in WASH-1400 had strongly tilted the results of their research in a direction beneficial to industry—and it is this rebuttal that the Eco Institute published.<sup>35</sup> *Der Spiegel* noted that US scientists such as Harold Lewis, and even the US Nuclear Regulatory Commission itself, found that WASH-1400 greatly understated the safety risks.<sup>36</sup>

Scientific ways of arguing fundamentally remolded the anti-nuclear power movement in the 1970s. Student groups studied the scientific issues in depth and self-published brochures on the scientific arguments against nuclear power.<sup>37</sup> Previously, as shown in Chapter 1, arguments against nuclear power had been characterized by “moralizing pathos” and cultural arguments rooted in antimodern German intellectual traditions.<sup>38</sup> Now, science became central to opposition to nuclear power.

The first truly scientifically argued anti-nuclear power tract that was widely read in Germany was Holger Stroh's *Friedlich in die Katastrophe* (Peaceably into the Catastrophe), which he published in 1973. It became a very influential work in the anti-nuclear power movement and went through numerous reprintings and new editions.<sup>39</sup> The book was based on a wide variety of literature, not only studies written by US scientists who were opposed to nuclear power but also official reports from West Germany, Canada, and the United States. He pointed to pollution problems caused by uranium mining as well as lung cancer cases among uranium miners.



He explained the way nuclear power plants of the various sorts functioned, pointing to major vulnerabilities: the possibility that an earthquake, sabotage, or human error could cause the cooling system to fail, leading to a core meltdown; embrittlement of the reactor pressure vessel; insufficiencies of emergency cooling systems; the possibility of nuclear leaks into the atmosphere and water; and defective fuel elements. All these problems had been encountered or at least discussed in the United States. In explaining the impact of radiation on the human body, Strohm embraced the no-threshold model, citing not only Gofman and Tamplin but also other participants in debates over low-level radiation and radiation standards.

Economic arguments also played a role in the book, which criticized the subsidies and other burdens taxpayers were forced to shoulder; these would be generated by high research and development costs, pollution, nuclear waste, the unwillingness of insurance companies to issue policies that would cover reactor catastrophes, and the general unprofitability of the nuclear industry. The book's principal political argument, based on the work of US public advocate Ralph Nader, was that governments that had made major investments in nuclear power could not be trusted to honestly face safety problems associated with it. Strohm's account was polemical, but it cited the arguments of government officials, the IAEA, and nuclear power advocates.

It also remained within the boundaries of the scientific debate of that era, and it provided anti-nuclear power activists with scientifically tenable arguments. At the same time, Strohm was not always able to distinguish between reasonable hypotheses and untenable theories that found no support among scientists. Sternglass, to name an example of a counterexpert cited by Strohm, was more of a media phenomenon than a serious scientist.

Graduating from college with a degree in production engineering, Strohm was not an expert in nuclear power. However, his education and a brief career in industry gave him enough of a grasp of the technological issues that he felt able to take on "the virtually united front of experts from industry, the scientific community and politics," which supported nuclear power. Along with physics professor Dieter von Ehrenstein—one of the few university professors who took a public stand against atomic power—Strohm testified before a committee on environmental protection of the Bundestag in 1972.<sup>40</sup> In the mid-1970s, other counterexperts also published numerous books that showcased scientific and technical arguments against nuclear power.<sup>41</sup>

Only slowly were opponents of nuclear power in the scientific community able to overcome the skepticism of the media and gain full recognition as experts in West Germany. Counterexperts enjoyed a triumph at the government's Gorleben hearings of 1979, which stopped the building

of a nuclear reprocessing plant there.<sup>42</sup> The 1980 Bundestag Commission of Inquiry on Future Energy Policies paid considerable attention to dissenting views among scientific and technical experts.<sup>43</sup> By the early 1980s, journalists, critical scientists, and other counterexperts were arguing that the main force supporting nuclear power was not science but politics.<sup>44</sup> Counterexperts were fully embraced by the media and the public after the Chernobyl catastrophe in 1986. This was a democratizing development, but one that threatened to create uncertainty regarding who could or could not speak in the name of science.

## Educating the Public

For the anti-nuclear power movement, science was not something for the elite but for all citizens, who should be empowered through education. Educating the public was important, one anti-nuclear power group asserted in 1977, because “every additional bit of information limits the possibility of manipulation and strengthens resistance against the atomic state.”<sup>45</sup> In his 1977 book *Der Atomstaat* (The Atomic State), public intellectual and journalist Robert Jungk (1913–1994) posited that the buildup of nuclear weapons and nuclear power taking place across the Western world would necessitate a level of security that would destroy democracy and lead to the rise of a dictatorial security state.<sup>46</sup>

He saw comprehension of scientific issues as crucial in the fight to defend democracy, asking in 1975, “Should journalists study physics?” a question that he answered affirmatively. In fact, he was a regular contributor to *Bild der Wissenschaft*, a popular science magazine intended for a broad public.<sup>47</sup> Many activists also believed that science could be used to counteract what they saw as propaganda and manipulation on the part of the energy industry and the state. This preoccupation with mass manipulation, so typical of the 1960s and 1970s, can be traced back to the writings of public intellectuals and philosophers such as Theodor Adorno and Jürgen Habermas.<sup>48</sup>

A good example of science popularization by activists is a 1977 publication of the Hamburg chapter of the Bürgerinitiative Umweltschutz Unterelbe (Lower Elbe Citizens’ Initiative on Environmental Protection, or BUU), the main organization behind the campaigns against the building of a nuclear power plant in Brokdorf (a town in the north of West Germany). This self-published booklet explained the science, economics, and politics of nuclear power in just under 150 pages. Written in clear, straightforward prose and illustrated with easy to understand hand-drawn diagrams and politically pointed cartoons, “Atomkraft Nein Danke: Informationen zur

Atomenergie” (Atomic Power No Thanks: Information on Atomic Energy) began its exploration of the physics behind nuclear power with simple explanations of the atom, matter, compounds, isotopes, nuclear fission, and radiation.

The booklet went into considerable depth on how the major kinds of modern nuclear power plants functioned and what could go wrong with them. It was particularly critical of breeder reactors, which in the 1970s were thought to be the reactors of the future because they recycled nuclear fuel, creating plutonium as an end product. However, the booklet pointed out, the sodium they used as a coolant could cause an explosion if it came into contact with air and water. It speculated that an uncontrolled critical mass in the reactor core of this kind of reactor could unleash a nuclear explosion that could be “twenty times as strong as the Hiroshima bomb.”<sup>49</sup> This claim appears to come—directly or indirectly—from the US literature, in particular concerning a near disaster in the Detroit Fermi Reactor in 1966.<sup>50</sup>

The brochure also discussed the safety problems connected with the nuclear reprocessing and disposal of nuclear waste, referring to accidents in the United States and citing works by Jens Scheer and Holger Strohm. The booklet discussed the impact of radiation on human health in much the same vein as the body of scientific literature that asserted the validity of the linear nonthreshold model, which proposed that no amount of radioactivity was safe and that there was a direct correlation between the amount of radiation exposure and risk of chromosomal damage that could lead to cancer.

The nuclear power industry and state governments had been trying to counteract the effect of the anti-nuclear power movement and the publications of counterexperts with books, articles, and brochures of their own.<sup>51</sup> The BBU sought to systematically refute these pro-nuclear power publications and unmask what it considered to be dishonest propaganda. A 1975 BBU brochure in its series “Informationen zur Atomenergie” (Information on Atomic Energy) illustrates the lines of argumentation the organization used and made available to BBU members and those who visited BBU events.

One article in this brochure sought to unmask manipulative techniques developed by a Hamburg public relations firm working for the nuclear industry, analyzing the firm’s four-point plan: it employed “education” to “conquer fears”; “dramatization” of the problems that would follow if nuclear power plants were not built to “cover up present fears with fears for the future”; “concealment” and “downplaying of problems” to minimize problems with nuclear power; and “improving the image” of nuclear power to “negate fears and build up a positive image” of nuclear power. The BBU newsletter also pointed out infantilizing use of language in pro-nuclear power literature, as well as coffee and cake events at which politicians, members of the clergy,

physicians, and other opinion makers were presented with pro–nuclear power arguments.<sup>52</sup>

The Aktionsgemeinschaft für Umweltschutz Darmstadt (Action Committee for Environmental Protection of Darmstadt, West Germany) published a booklet that analyzed—mainly from a scientific and technical point of view—an exhibition about nuclear power at the information center of the Rhenish-Westphalian Power Corporation (Rheinisch-Westfälisches Elektrizitätswerk AG, or RWE) in Biblis.<sup>53</sup> It went through the exhibit, panel by panel, paragraph by paragraph, using simple, clear language and illustrations. For every point made in the energy company’s presentation, this booklet had critical points to make, based on sound scientific and technical reasoning.

For example, in a section on problems with disposal of nuclear waste, it pointed to accidents in the transportation of nuclear waste, water damage to salt mines and salt stocks where waste was supposed to be stored, corrosion of spent nuclear fuel elements, and the instability of borosilicate glass containers for nuclear waste. Since no permanent waste depositories were available, much nuclear waste was stored at nuclear power plants, which greatly increased the risk of accidents at the plants. The brochure called nuclear waste the “skeleton in the closet of industrial society” that could never truly be disposed of.<sup>54</sup>

It became a point of honor among opponents of nuclear power to become acquainted with the scientific and technical arguments against nuclear power. Even publications as political in nature as the Communist League’s *Arbeiterkampf* and *Graswurzelrevolution*, a periodical with a non-violent leftist orientation, felt it necessary to provide explanations of the scientific issues.<sup>55</sup>

Popularization was also a linguistic process. The anti–nuclear power movement appropriated, redefined, and popularized scientific terminology. In claiming scientific arguments as their own and appropriating scientific terminology, counterexperts, activists, the popular media, and the public remolded these concepts, turning them into arguments against nuclear power. This can be seen in the evolution of the term “GAU” (*größter anzunehmender Unfall*, or “maximum credible accident”). “Maximum credible accident” was a technical term developed by the Reactor Safeguards Committee of the US AEC, which was headed by Edward Teller in 1947–1953. It meant the worst accident that engineers thought possible—a kind of thought experiment to be used to develop technical means of preventing such an accident.<sup>56</sup> In West Germany, the concept became enmeshed in bureaucratic procedures.

West German authorities were willing to give energy companies permission to operate a nuclear power plant only if they provided assurance that this worst case scenario would not involve the release of high levels of radioactivity.

However, engineers complained that they could not, on the basis of their expertise, exclude the possibility of an out-of-control accident with absolute certainty. Such uncertainties, along with the subjective nature of defining a GAU, became fodder for opponents of nuclear power. In popular parlance, “Super-GAU” came to mean a core meltdown with catastrophic consequences for the environment. “GAU” and “Super-GAU” were widely used as metaphors for major catastrophes that had nothing to do with nuclear power, ensuring their place in the West German imagination. They proved to be far more long-lived and durable than the equivalent term “China syndrome”—taken from the name of a film—in the English-speaking world.<sup>57</sup>

According to scholar Matthias Jung, the term *Restrisiko* (residual risk) entered public life as part of political debate. In 1970, the West German science minister rejected a proposal to place a nuclear power plant in an urban area, arguing that the residual risk connected with human error, lack of experience, and statistical uncertainties were too great to allow the project to go forward. From the start, therefore, the question was how much of a residual risk was tolerable. This shifted the nuclear power debate “from the technical to the ethical and moral level,” according to Jung.<sup>58</sup> Engineers adapted the concept to their own needs, defining it as an unforeseeable and unavoidable risk.

The courts also found it useful. The concept played a central role in the 1978 decision of the Federal Constitutional Court to allow the construction of a fast-breeder reactor in Kalkar, West Germany. The court argued that it was not humanly possible to guarantee absolute safety but that it was reasonable to expect the public to accept the residual risk connected with nuclear power.<sup>59</sup> According to legal expert Heike Mrasek-Robor, the state was required under the Atomic Law to intervene in the case of a danger to public safety. The German courts did not consider a technology to pose a danger if technical and scientific experts agreed that the risk of a major accident was “virtually” nonexistent. This is what the Federal Constitutional Court determined in the Kalkar case.<sup>60</sup> Nuclear power opponents vehemently disagreed. Judicial and professional attempts to turn around the meaning of “residual risk” were a failure and indeed engendered a sense of injustice and fear of collusion between the state and the nuclear industry that was ably deployed in numerous articles and speeches.

## Conclusion

The nuclear power movement emerged, not from a rejection of science but from scientific controversies. Atmospheric nuclear weapons testing

stimulated research and debate on low-level radiation. Many scientists came to accept the linear, no-threshold model with regard to genetic effects of radiation and somatic effects such as cancer. Generally, it was not the scientist working quietly in his or her laboratory or presenting research results at professional conferences who encountered professional difficulties as a result of such work. Rather, the scientists who had difficulties were the rare ones who addressed the public, criticized regulatory agencies, and extrapolated from research that nuclear power could pose public health problems.

Much of the early criticism of reactor safety came from the ranks of scientists working for the US AEC. This was above all a US phenomenon, made possible by the existence of private universities such as MIT and the tenure system, which protected scientists from dismissal. Conflicts over the Vietnam War doubtlessly contributed to the rebelliousness of US scientists. By contrast, the older generation of West German scientists involved in research on nuclear power and radiation had been conditioned by experiences during the Nazi regime to remain circumspect.

Since the experts largely supported nuclear power, it was left to the West German counterexperts, who had some scientific background but did not have top-flight careers, to spread knowledge and become public spokesmen of the nascent nuclear power movement. Activist leaders quickly realized the importance of making full use of this science-based critique of nuclear power and educating the members of the growing movement and the general public about these issues. They disseminated and popularized concepts such as the idea that there was no “safe” level of exposure to radiation, but rather a continuous risk curve.

Facing stiff public criticism, West German state governments and the energy industry waged major public relations campaigns, but they found they could not easily win science wars over nuclear power. Anti-nuclear power activists insisted that pro-nuclear power experts who laid claim to scientific objectivity were in fact beholden to political and economic elites. Popularization of science provided the anti-nuclear power movement with a set of arguments that could bridge ideological gaps and begin to influence mainstream society.

## Notes

1. “Ionizing radiation” is what is commonly referred to simply as radiation, and it will be referred to as such in this chapter. Ionizing radiation is radiation that has enough energy that it can knock an electron out of its shell, leaving the atom charged. There are three kinds: alpha, beta, and gamma radiation. Examples are x-rays and the rays

- emitted by radioactive elements such as uranium and plutonium. Examples of *non-ionizing* radiation are microwave radiation, visible light, and infrared.
2. For a discussion of the meaning of “transnational” in this context, see Astrid Mignon Kirchhof and Jan-Henrik Meyer, “Global Protest against Nuclear Power: Transfer and Transnational Exchange in the 1970s and 1980s,” *Historical Social Research/ Historische Sozialforschung* 39, no. 1 (2014): 170–73, 175; article on 165–90.
  3. Alexander von Schwerin, “Der gefährdete Organismus: Biologie und Regierung der Gefahren am Übergang vom ‘Atomzeitalter’ zur Umweltpolitik (1950–1970),” in *Wissensobjekt Mensch: Humanwissenschaftliche Praktiken im 20. Jahrhundert*, ed. Florence Vienne and Christina Brandt (Berlin: Kulturverlag Kadmos, 2008), 188–89, 195–96; article on 187–214.
  4. The ABCC study was not able to detect significant heritable genetic mutations. M. Susan Lindee, *Suffering Made Real: American Science and the Survivors at Hiroshima* (Chicago, IL: University of Chicago Press, 1994), 60–61, 217–41.
  5. Alexander von Schwerin, *Strahlenforschung: Bio- und Risikopolitik der DFG, 1920–1970* (Stuttgart: Franz Steiner Verlag, 2015), 336–40.
  6. Angela Creager, “Radiation, Cancer, and Mutation in the Atomic Age,” *Historical Studies in the Natural Sciences* 45, no. 1 (2015): 14–48.
  7. A rem was redefined in 1976 as a hundredth of a sievert. Thus, a millirem = 0.01 millisievert. (Previously, the rem was rather elastically defined.) Measures of radioactivity—becquerels and curies—and absorbed radiation—rads and grays—cannot be easily converted into millirems and millisieverts because the impact of radiation on the human body depends on many factors.
  8. J. Samuel Walker, *Permissible Dose: A History of Radiation Protection in the Twentieth Century* (Berkeley, CA: University of California Press, 2000), 8–9, 16 (on human experiments conducted in the United States), 20–21, 27. The standards for rems were changed in 1976, making comparisons with older standards difficult.
  9. Joachim Radkau, “Der Größte Anzunehmende Unfall,” in *Ökologische Erinnerungsorte*, ed. Frank Uekötter (Göttingen: Vandenhoeck & Ruprecht, 2014), 54; article on 50–60.
  10. Creager, “Radiation.” On Stewart, see Lisa Rumiel, “‘Random Murder by Technology’: The Role of Scientific and Biomedical Experts in the Anti-Nuclear Movement, 1969–1992” (Ph.D. Dissertation, York University, Canada, 2009), 106, 155, 258; Gayle Greene, *The Woman Who Knew Too Much: Alice Stewart and the Secrets of Radiation* (Ann Arbor, MI: University of Michigan Press, 1999).
  11. Rumiel, “Random Murder,” 37–39, 105–10; Ioanna Semendeferi, “Legitimizing a Nuclear Critic: John Gofman, Radiation Safety, and Cancer Risks,” *Historical Studies in the Natural Sciences* 38, no. 2 (2008): 259–301; Radkau, *Aufstieg und Krise*, 436–37; Walker, *Permissible Dose*, 29–37.
  12. John Gofman and Arthur Tamplin, *Poisoned Power: The Case against Nuclear Power Plants* (Emmaus, PA: Rodale, 1971).
  13. For an example of popularization of Sternglass’s work in the GDR, see “Ja zum Leben,” *NBI* 43, 1958, 3–5. For an example of publicizing of Gofman and Tamplin’s work in the Federal Republic, see Kai Krüger, “Strom aus der Bombe,” *Die Zeit* (21 January 1972).
  14. Von Schwerin, *Strahlenforschung*, 325–31, 336–59, 377–79.

15. The original purpose of the USC was to combat the spread of military research at institutions such as MIT. At the time, the Vietnam War was in full swing.
16. Gary L. Downey, "Reproducing Cultural Identity in Negotiating Nuclear Power: The Union of Concerned Scientists and Emergency Core Cooling," *Social Studies of Science* 18, no. 2 (1988): 242–56; article on 231–64; Richard Lyons, "Nuclear Experts Share Doubts on Power Plant Safety," *New York Times* (12 March 1972); Dean Abrahamson: Citizens vs. Atomic Power, *Bulletin of the Atomic Scientists* 29, no. 5 (1973): 43–45; Steven Del Sesto, "Uses of Knowledge and Values in Technical Controversies: The Case of Nuclear Reactor Safety in the US," *Social Studies of Science* 13, no. 3 (1983): 397–99; article on 395–416.
17. Wellock, "Figure of Merit," 705 and 702–7, 710–11.
18. Ralph Lapp, "Nuclear Salvation or Nuclear Folly?" *New York Times* (10 February 1974).
19. "Ein furchterregendes Unterfangen," *Der Spiegel* (21 July 1975).
20. Nehring, "Cold War," 160–66.
21. Radkau, *Aufstieg*, 434–36; Nehring, "Cold War"; "Atomstrahlen: Die Herbst-Wolke," *Der Spiegel* 44 (31 October 1956).
22. Ulrich Stock, "Jens Scheer: Der gefragte Gegner. Der Bremer Physiker und die Macht des Atoms," *Die Zeit* (23 May 1986).
23. Ibid.
24. Ibid. and Joachim Radkau, *Die Ära der Ökologie: Eine Weltgeschichte* (Munich: Beck, 2011), 364–65.
25. Hanshew, *Terror*, 166–67.
26. Milder, "Today the Fish," 34, 36, 44–46, 48, 49, 56, 67.
27. Radkau, *Aufstieg*, 439.
28. The Institute for Reactor Safety became part of the Society for Reactor Safety.
29. Laufs, *Reaktorsicherheit*, 107–8. Some might argue that a military or terrorist attack might precipitate such a catastrophe.
30. "Wyhl: Geballte Ladung," *Der Spiegel* 8 (14 February 1977).
31. Laufs, *Reaktorsicherheit*, 108–13; WDR Historisches Archiv, Archivnr. 0103355, Series: "Vor Ort"; Episode: "Wyhl-Prozess" (first shown on 31 March 1977).
32. Jens Ivo Engels, "'Inkorporierung' und 'Normalisierung' einer Protestbewegung am Beispiel der westdeutschen Umweltproteste in den 1980er Jahren," *Moving the Social: Journal of Social History and the History of Social Movements* 40 (2008): 81–100; retrieved 29 June 2016 from [http://moving-the-social.ub.rub.de/index.php/Moving\\_the\\_social/issue/view/53](http://moving-the-social.ub.rub.de/index.php/Moving_the_social/issue/view/53). Also Joppke, *Mobilizing*, 126–28, 165–66, 239.
33. For the original report, see U.S. Atomic Energy Commission, *Reactor Safety Study: An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants: Summary Report* (Washington, DC: U.S. Government Printing Office, 1974). For the Union of Concerned Scientists' critique, see Henry Kendall, Richard Hubbard, and Gregory Minor, *The Risks of Nuclear Power Reactors: A Review of the NRC Reactor Safety Study, WASH-1400 (NUREG-75/014)* (Cambridge, MA: Union of Concerned Scientists, 1977). For the German translation, see Ökō-Institut Freiburg, *Die Risiken der Atomkraftwerke: Der Anti-Rasmussen-Report der Union of Concerned Scientists*, trans. Richard Donderer (Fellbach: Adolf Bonz, 1980).
34. Laufs, *Reaktorsicherheit*, 662–69.



35. David Burnham, "Atom Safety Study by U.S. Is Questioned," *New York Times* (27 April 1977).
36. "Kronzeuge der Kernkraft," *Der Spiegel* 20 (14 May 1979). On the Lewis Committee, see Wellock, "Figure of Merit," 707.
37. For example, FU Berlin, UA, APO-Archiv: S, Sig. 037–038. "Schneller Brüter: Eine Informationsbroschüre über Funktionsweise Unfallgefahren Plutonium" (Freiburg: Arbeitskreis Umweltschutz an der Universität Freiburg, 1977).
38. Matthias Jung, *Öffentlichkeit und Sprachwandel: Zur Geschichte des Diskurses um die Atomenergie* (Wiesbaden: Springer Fachmedien, 1994), 84–85.
39. Holger Strohm, *Friedlich in die Katastrophe: Eine Dokumentation über Kernkraftwerke* (Hamburg: Verlag Association, 1973). By the 15th edition, the book had sold 132,000 copies. Holger Strohm, *Friedlich in die Katastrophe: Eine Dokumentation über Kernkraftwerke*, 15th rev. ed. (Frankfurt am Main: Zweitausendeins, 1988).
40. Frank Lübberding, "Kernkraftkritiker der ersten Stunde: Einer steht im Weg," *Frankfurter Allgemeine Zeitung*, 24 April 2011.
41. Arbeitsgruppe "Wiederaufarbeitung" (WAA) and der Universität Bremen, *Atom Müll oder Der Abschied von einem teuren Traum* (Reinbek bei Hamburg: Rowohlt Verlag, 1977); Ralph Graeb, *Die sanften Mörder* (Rüschlikon-Zürich, Switzerland: Albert Müller Verlag, 1972); Peter Weish and Eduard Gruber, *Radioaktivität und Umwelt* (Stuttgart: Gustav Fischer Verlag, 1975).
42. Uekötter, *Deutschland in Grün*, 132.
43. Enquete-Kommission des Deutschen Bundestages, *Zukünftige Kernenergie-Politik: Kriterien—Möglichkeiten—Empfehlungen: Bericht der Enquete-Kommission des Deutschen Bundestages* (Bonn: Dt. Bundestag, Presse- und Informationszentrum, 1980).
44. Häusler, *Der Traum*, 149–55.
45. Jung, *Öffentlichkeit und Sprachwandel*, 175.
46. Robert Jungk, *Der Atom-Staat: Vom Fortschritt in die Unmenschlichkeit* (Munich: Kindler, 1977). English translation: Robert Jungk, *The New Tyranny: How Nuclear Power Enslaves Us*, trans. Christopher Trump (New York: F. Jordan Books/Grosset & Dunlap, 1979).
47. Reprinted in Robert Jungk, *Und Wasser bricht den Stein: Streitbare Beiträge zu drängenden Fragen der Zeit*, ed. Marianne Oesterreicher-Mollwo, paperback ed. (Munich: Deutscher Taschenbuchverlag, 1988), 165.
48. Jürgen Habermas, *Strukturwandel der Öffentlichkeit: Untersuchungen zu einer Kategorie der bürgerlichen Gesellschaft* (Neuwied: Luchterhand, 1962); English translation: Jürgen Habermas, *The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society*, trans. Thomas Burger with Frederick Lawrence (Cambridge, MA: MIT Press, 1989), 175–77. Adorno's most important works in this context are: Theodor Adorno and Max Horkheimer, *Dialektik der Aufklärung*, hectograph manuscript, 1944; Theodor Adorno and Max Horkheimer, "The Culture Industry: Enlightenment as Mass Deception," in *Dialectic of Enlightenment: Philosophical Fragment*, trans. Edmund Jephcott (Stanford, CA: Stanford University Press, 2002).
49. FU Berlin, UA, APO-Archiv: S, Sig. 039–040, "Atomkraft Nein Danke. Informationen zur Atomenergie" (Hamburg: BUU Hamburg, 1977).

50. For an example of a book that the BUU team could have gotten its information from, see John Fuller, *We Almost Lost Detroit* (New York: Reader's Digest Press, 1975). The author was a popular nonfiction writer.
51. Der Bundesminister für Forschung und Technologie, Kernenergie. *Eine Bürgerinformation* (Bonn: Author, 1975); Hans Grupe and Winfried Koelzer, *Fragen und Antworten zur Kernenergie* (Bonn: Informationszentrale der Elektrizitätswirtschaft, 1975); Johannes Koppe, *Zum besseren Verständnis der Kernenergie: 66 Fragen: 66 Antworten* (Hamburg: HEW, 1971).
52. FU Berlin, UA, APO-Archiv: S, Sig. 029-032, BBU, "Informationen zur Kernenergie," Number K 8, "Die Atomenergie-Propaganda."
53. Biblis is a town in Germany (then West Germany), about twenty miles from Darmstadt.
54. FU Berlin, UA, APO-Archiv: S, Sig.039-040, Aktionsgemeinschaft für Umweltschutz Darmstadt, "Was nicht im 'Informations'-Zentrum in Biblis zu erfahren ist" (Darmstadt: Aktionsgemeinschaft für Umweltschutz Darmstadt, 1977), 30; also see 27-30.
55. Examples include "Warum werden Kernkraftwerke gebaut?" *Arbeiterkampf* (1 November 1976); "Schnelle Brüter: Die Kernkraftreaktoren die Päng können," *Graswurzelrevolution* 25-26 (1976): 12.
56. Laufs, *Reaktorsicherheit*, 258-259, 264.
57. Jung, *Öffentlichkeit und Sprachwandel*, 17, 70-72, 87-88. The 1979 film *The China Syndrome* describes the possibility of a reactor core meltdown that breaches the floor of the containment structure and pours into the earth, theoretically able to bore its way "all the way to China."
58. Jung, *Öffentlichkeit und Sprachwandel*, 74-75.
59. Laufs, *Reaktorsicherheit*, 116-18.
60. Heike Mrasek-Robor, "Technisches Risiko und Gewaltenteilung" (Dr. iur. Dissertation, University of Bielefeld, 1997), 60.





**Illustration 4.1** Locals participating in the occupation of the nuclear power plant construction site in Wyhl, West Germany, 1975. HStAS, EA 1/924 Bü 1741. Courtesy of Hauptstaatsarchiv Stuttgart (Provincial Archives of Baden-Württemberg, Main State Archive, Stuttgart).

What viewers saw was police using high-powered water cannons and truncheons in an attempt to end the occupation of the Wyhl nuclear power plant construction site. Peaceful protesters were soaked to the skin on a brutally cold day, 20 February 1975. Police officers dragged many of them off. Among them were many locals, including an elderly woman and a fresh-faced farm woman who cried out in anger and despair before the TV camera. If the women's scarves and the men's porkpie hats and work jackets left any doubt as to their rural identity, their *Allemanisch* dialect did not. (Illustration 4.1.) These were salt of the earth, tradition-minded Germans whose love of their *Heimat* (home turf) was rooted in an often romanticized history of peasant ties to the land. (West Germans suffered from amnesia regarding the Nazi blood-and-soil variation of this narrative.) Local women who participated in protests did not challenge traditional gender roles.<sup>2</sup>

Minister-President Filbinger tried to blame the resonance of the protests in February 1975 on “communist” television journalists and executives. In the face of a seismic shift in public opinion, he proved no match for West German students and environmentalists, who flooded into Wyhl and participated in a long occupation of the site of the planned atomic power

plant. Wyhl activists also mobilized science in a way that provided the movement with fundamental, universal arguments and gave nuclear power a leading role in the breakthrough of environmentalism as a major political cause. Antinuclear protesters in Germany and abroad tried to duplicate the occupation of the Wyhl construction site elsewhere—often without success. However, Wyhl set the stage for popular challenges to technocratic approaches to science and technology policymaking.

## Wyhl and the Demise of the Nuclear Consensus: Issues and Actors

Powerful forces were arrayed against the anti-nuclear power movement. West German elites saw the acceleration of the nuclear power program as a way out of the crises caused by the oil embargos of 1973 and 1976. Social Democratic chancellors Willy Brandt (1969–1974) and Helmut Schmidt (1974–1982) very much wanted to develop nuclear power as an alternative to petroleum but also to coal, which was dirty and dangerous, particularly for coal miners, a major constituency of the Social Democratic Party. In a 1974 report for the West German government, experts projected a rise in the use of atomic power from 1 percent of energy sources in 1972 to 15 percent in 1985.<sup>3</sup>

Like most Christian Democratic leaders, Hans Filbinger, in office from 1966 to 1978, embraced this nuclear strategy with particular fervor. He saw the building of an atomic power plant in an “underdeveloped” corner of Baden as essential to the development of his state.<sup>4</sup> In addition, Filbinger was the chair of the board of directors of a utility company involved in building the nuclear power plant and as such was responsible to its shareholders. This conflict of interest was fully tolerated under German law as part of a system of partially state-owned utilities.

The Filbinger government laid claim to the right to decide where to build a nuclear power plant, based on its public mandate, its adherence to the law (in particular the Atomic Law of 1959), and its extensive reliance on experts. It presented itself as objective and rational. Expert reports, solicited by the government, purported to show that there were no major safety, seismological, hydrological, geological, meteorological, or agrometeorological issues that stood in the way of carrying out the project.<sup>5</sup> Filbinger claimed that conditions in Wyhl had been studied by experts “with a thoroughness unique in the world.”<sup>6</sup>

This technocratic approach collided head on with a civil society that was rapidly expanding in the 1970s. First were the locals. Organized in

*Bürgerinitiativen* (citizens' initiatives), these farmers and small-town professionals were generally quite conservative. Although many were Christian Democrats, they were willing to take on the Christian Democratic state government (Illustration 4.2.). Transborder ties with environmental activists in France and Switzerland strengthened their resolve. On a December 1974 bus ride to Stuttgart, where they wanted to meet with politicians, these middle-aged small-town activists questioned the economic and scientific arguments brought forth by the government, which they believed was acting in bad faith: "They're greedy for money. Because it's thinly populated, they think they can move industry here."

Moreover, they rejected the argument that the building of the nuclear power plant would create jobs. Lacking in higher qualifications, locals could at most work as janitors in the plant. Besides, they argued, there was little joblessness among the rural population. In addition, they argued that due diligence had not been done in the compiling of expert reports, underestimating the danger of microclimate change that could endanger agriculture. Claiming a "basic right to *Heimat*, to nature," they saw themselves as protectors of the land: "We have to defend ourselves, for the sake of our children. The land there is very fertile." After a meeting with unresponsive government ministers in the state capital, Stuttgart, in December 1974, one Kaiserstuhl resident exclaimed that the state's stance was a "mockery" and a "dictatorship." Another said, "I'm completely unsatisfied. What they're doing with us is shameful." Yet another promised a "fight to the finish."<sup>7</sup>

A segment of the Christian Democratic Party of the Kaiserstuhl was also against the Wyhl project. Alois Schätzle and Albert Burger, Christian Democrats who represented the Emmendingen district (where Wyhl was located) in the state assembly and the *Bundestag*, respectively, were profoundly critical of the way the government handled the Wyhl controversy. In July 1974, they wrote state Economics Minister Rudolf Eberle, a major proponent of the Wyhl nuclear power plant project, that the population was more worried than ever. They and citizens who had approached the project with an open mind were now dead set against it. "The insecurity of the population and their fears, which cannot be allayed through discussion, have totally taken over." Schätzle and Burger advocated placing "human beings at the center of all decisions." "People's misgivings should be respected . . . and not just pushed aside for the sake of economic motives."<sup>8</sup>

Cultural differences may have played a role in the rebelliousness of some members of the Kaiserstuhl CDU (Christlich Demokratische Union Deutschlands, Christian Democratic Union of Germany, the more conservative of the major parties in West Germany). The population of the Kaiserstuhl felt a particular affinity for the French Alsace and Switzerland

**Illustration 4.2** Locals participating in a rally during the occupation of the nuclear power plant in Wyhl, West Germany. Annemarie Sacherer at the microphone. HStAS, EA 1/924 Bü 1741. Courtesy of Hauptstaatsarchiv Stuttgart (Provincial Archives of Baden-Württemberg, Main State Archive, Stuttgart).

















































































































































































































































































































































































































































