

Part II

Technopolitics of the Cold War: Secrecy, Bureaucracy, and the Production of Ignorance

After the arrival of the U.S. Navy in La Maddalena, important sectors of the Italian scientific community, the Communist Party, and environmentalist movements launched a nationwide campaign to alert the public of the risks of radioactive contamination due to routine operations of nuclear submarines and to possible accidents. Only after two years of technopolitical debates did the Ministry of Health instruct a full environmental study of the site, involving a series of radioecological campaigns. Recognition that La Maddalena was exposed to the risks of nuclear contamination was the result of a long political struggle, but was only the first step in making nuclear risk visible to local residents and the Italian public.

The next two chapters analyze how active strategies of knowledge removal and concealment, the complex and multilayered Italian nuclear bureaucracy, and research protocols dictated by the epistemic approaches of expert agencies produced considerable knowledge gaps that made certain aspects of nuclear risk in the archipelago visible and others invisible. I argue that the case of La Maddalena can only be explained by considering two complementary sides of the production of ignorance: the first is secrecy, intended as the active concealment and removal of existing information; the second is the creation of knowledge gaps resulting from epistemic traditions and regulatory practices that, with time, institutionalized selective processes of scientific knowledge production while excluding other areas from national research agendas. The narrative arch of Chapters 3 and 4 reflects this thesis, zooming in and out of La Maddalena to address national and international nuclear regulatory regimes and their particular adaptation to the political and environmental circumstances of the archipelago, Italian nuclear bureaucracy and local responses to its organizational shortcomings.

Works on agnotology—the production of ignorance—have demonstrated how strategic acts of knowledge removal impede access to information by the public in various fields: from the

concealment of data about the health effects of smoking by the tobacco industry, to the production of uncertainty concerning global warming data.¹

Kuletz, Hecht, and Brown, to cite only a few, have abundantly demonstrated that radiation and its effects are also made invisible by hiding, confining, challenging, and classifying information.² Stated otherwise, the apparent “immateriality” of radiation is also produced by the very material acts of confining knowledge and data only to experts and military authorities.³ This happened in La Maddalena as well.

Military secrecy imposed by the U.S. Navy, and secured by Italian authorities, stonewalled the application of scientific protocols that Italian experts routinely implemented at other nuclear sites. CNEN and ISS personnel involved in the radioecological campaigns voiced these contradictions and explained how the concealment of technical data concerning the U.S. nuclear submarine reactors and the lack of information about environmental characteristics of the archipelago forced them to adopt alternative and more complex research designs. The radiosurveillance system of La Maddalena, I argue, was a technopolitical compromise between military security and public safety, which epitomized the limits of Italy’s sovereignty during the Cold War. From this angle, La Maddalena is one example of the larger compromise between national security and public safety characteristic of the Cold War.

In this part of the dissertation I detail how specific institutional, political, and bureaucratic arrangements made possible the assemblage of the radiosurveillance system of La Maddalena. By focusing on the localized results of these arrangements I intend to explore their larger significance for the analysis of Cold War technopolitics.

As mentioned above, Italy was not an exception or a unique case. Even a cursory reading of the vast literature on Cold War secrecy would suffice to place La Maddalena in the broader

¹ See Naomi Oreskes and Erik Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*, (Bloomsbury Press, 2010); Robert N. Proctor and Londa Schiebinger (Eds.). (2008). *Agnology: The Making and Unmaking of Ignorance*, (Stanford University Press, 2008).

² See Kate Brown, *Plutopia*; Gabrielle Hecht, “Invisible Production and the Production of Invisibility: Cleaning, maintenance, and mining in the nuclear sector,” in Daniel Lee Kleinman and Kelly Moore (Eds.), *Routledge Handbook of Science, Technology, and Society*, (Routledge, 2014): 353-368; 2012; Valerie Kuletz, *The Tainted Desert: Environmental and Social Ruins in the American West*, (Routledge, 1998).

³ To be clear, I am not trying to deny the importance of the physical characteristics of radiation and radioactive materials, which are doubtlessly relevant. What I want to do is to demystify “the nuclear” as a special field of studies and put it in fruitful conversations with others that are equally concerned with the problems of environmental risk and advocacy, popular epidemiology and non-expert knowledge, and the relationship between science, technology, capitalism, and democracy. For example, see Stuart Kirsch, *Mining Capitalism: The Relationship between Corporations and their Critics*, (University of California, 2014), especially Chapter 4, “Corporate Science.”

context of the cultural and social phenomenon of the “security state.” Joseph Masco argues that secrecy became an integral component of the national security state in the United States, transforming the very nature of American democracy into a “compartmentalized knowledge society.”⁴ The Atomic Energy Act (1946) and the National Security Act (1947) separated national security from state security and officially “introduced a new kind of information—nuclear weapons data—that did not need to be formally classified” because it was born secret.⁵ The exclusion of activities and information of strategic interest from public scrutiny created a typical Cold War phenomenon. On the one hand “removing knowledge” created absences.⁶ On the other hand, removing knowledge entailed the proliferation of extensive bureaucratic apparatuses exclusively devoted to maintaining and producing secrets. For Masco, the expansion of secrecy and secret apparatuses into the social fabric of American democracy has provoked a dislocation of the secret itself from a clearly definable center of power into a pervasive and yet fragmented and uncoordinated security system in which “knowledge is rendered suspect.”⁷

Secrecy is a ruling technique but also a diffused cultural formation, which percolates society and becomes embedded into the daily practices that shape individual expectations. By establishing a system of compartmentalized knowledge in which few can feel confident about the information he/she possesses, Cold War secrecy became “a pathological administrative form.”⁸ Masco thus makes clear how secrecy is the corollary of nuclear exceptionalism. In the democratic ideology, secrecy is an exception, required under situations of emergency (in which the survival of the polity as such is at stake) or superior interest of the community.

The *secrecy/threat matrix*, which sits at the core of the national “security affect,” justified the passage from the provisional use of secrecy during WWII to the institutionalization of state secrecy as a permanent condition for the survival of the nation during the Cold War. In sum, for Masco nuclear secrecy is a form of social technology, which allowed the American state to achieve collective “perception management and control.”⁹ Masco’s analysis of the Cold War security state (and its continuity post-9/11), I think, suggests at least two related areas of inquiry

⁴ *The Theater of Operations*, especially Chapter 3, “Sensitive but unclassified,” pp. 113-144.

⁵ *Ibidem*, cit. p. 124.

⁶ Peter Galison discusses this aspect of state secrecy: “Removing Knowledge: The Logic of Modern Censorship,” in Robert N. Proctor and Londa Schiebinger (Eds.), *Agnology: The Making and Unmaking of Ignorance*, (Stanford University Press, 2008): 37-54.

⁷ Masco, 2014, cit. p. 123.

⁸ *Ibidem*, cit. p. 123.

⁹ *Ibidem*, cit. p. 125.

that I will explore in the next two chapters. The first has to do with the ways in which the national security state, as a Cold War political and cultural construct, organized and incorporated secrecy into its diverse institutions.¹⁰ The second is the multifaceted and pervasive presence of secrecy not only as a tool of state power but also as a social device that regulates individual and collective interactions. Before moving to the case of La Maddalena, below I discuss relevant cases and concepts through which I frame my analysis. Let us begin with the first point—the incorporation of secrecy into democratic institutions.

In his recent book on the Israeli nuclear program, *The Worst Kept Secret*, Avner Cohen ably explores the tension between secrecy and democracy and describes the institutional arrangements that allowed the Israeli national security compromise to hold. Cohen analyzes Israel's nuclear policy—identified with the Hebrew term of “*amimut*,” which means opacity—by showing how Israel successfully maintained an ambiguous posture with regards to its nuclear status.¹¹ *Amimut* required particular diplomatic arrangements (the U.S. active contribution to the protection of Israel's nuclear secrets and Israel decision to not sign the Non Proliferation Treaty). Internally, the politics of opacity and its conditions of possibility were created through an invisible bureaucratic infrastructure: special constitutional provisions; direct and exclusive control of the executive and the military commands over the nuclear program; and a vast apparatus of surveillance, censorship, and classification. Cohen makes clear that opacity was not a unique feature of Israel's nuclear program. Other states adopted similar strategies before they revealed the nuclear capabilities of their military forces. In order to be efficacious, the military has to maintain a degree of secrecy, until the moment when this technological prowess and power is acknowledged through the visible performance of the nuclear test.

¹⁰ Can secrecy, as a pillar of the security state, be compatible with democratic institutions? Countless commentators have tried to answer this vexed question during the Cold War. For example, warning against the extremes of McCarthyism, Shils argued that the survival of American democratic institutions was possible only at the condition that secrecy and publicity co-existed in a fine balance, guaranteeing freedom and security. He was not alone. Other contemporary commentators underlined with alarming tones the exponential growth of secrecy in American society and its danger for democratic institutions. Expressly connected to nuclear weapons and the advent of national security state during the Cold War, Wise and Ross opened their bestseller *The Invisible Government* with an urgent admonition: “There are two governments in the United States today. One is visible. The other is invisible. The first is the government that citizens read about in their newspapers and children study about in their civics books. The second is the interlocking, hidden machinery that carries out the policies of the United States in the Cold War.” David Wise and Thomas B. Ross, *The Invisible Government*, (Random House, 1964), cit. p. 3; Edward A. Shils, *The Torment of Secrecy: The Background and Consequences of American Security Policies*, (The Free Press, 1956).

¹¹ The criterion of introduction as stated in the Nuclear Non-Proliferation Treaty of 1970 (that is the evidence of nuclear capabilities provided by nuclear tests), allowed Israeli's elites to maintain an official non-nuclear status.

In her comparative history of plutonium production in the Cold War United States and U.S.S.R., Kate Brown offers multiple examples—a fascinating and terrifying inventory—of the art of deception that scientists, military personnel, corporate officials, and party officers learned in the name of national security.¹² At Hanford, military secrets were an alibi for covering up alarming discoveries of radiological harm connected to plutonium dispersion in the environment. For example, citizens of Richland (an atomic city) lived their life under the special provisions of the security state: controlled mail, only one (censored) newspaper, policed unions, and no rights of free assembly. In the Soviet Union, closed cities offered the benefits of a consumerist society, which, in the eyes of party commissaries, would foster acquiescence to the special regime of plutonium production. In both the U.S. and the U.S.S.R., atomic cities represented large-scale exceptions to the founding ideologies of the respective states.

Here, the category of the state of exception, as discussed by Giorgio Agamben, offers a useful analytic for exploring how governments presented and justified secrecy as a suspension of democratic rules while substantially expanding security provisions to the point that they were no more exceptional at all. As Masco and others make clear, the national security state—the typical form of government during the Cold War—extended secrecy so much that it became incorporated into the everyday life of entire nations. As an analytical category, the notion of state of exception, then, becomes useful to understand, comparatively, the historical manifestations of Cold War technopolitical compromises between military security and public safety and their justification as exceptional measures to guarantee supreme national interests.

I argue that in Italy (not a military nuclear state), military authorities jealously kept for themselves the management of radiosurveillance systems around nuclear military sites. The Italian executive achieved this goal by leaving the area of military nuclear applications unregulated. This lack of formal regulation guaranteed a *de facto* separation of military activities from civilian radiosurveillance programs and preserved the autonomy of the first from public agencies' scrutiny. The result of this informal institutional arrangement was the creation of a *dual system of radiosurveillance* that guaranteed the compartmentalization of nuclear knowledge in Italy.

Let's consider now the second aspect of secrecy as a pervasive phenomenon that shapes interpersonal relationships and the very content of citizenship—that is the relations between

¹² Kate Brown, *Plutopia*.

individuals and groups with the state. If we shift our attention from the microphysics of power inside state agencies, corporations, and the military to the effects that secrecy has on institutional and interpersonal relations we can see it as a widespread cultural formation.

An inherently social device, secrecy has been at the center of classic sociological analyses. For example, Georg Simmel argued that every social relationship is characterized by a certain degree of secrecy. Sharing a secret creates bonds and solidarity; conversely, it excludes those who are not given privileged access to the secret.¹³ Wondering what is concealed is part of the secret's allure, which also invites its transgression.¹⁴

Amimut, as Cohen argues, could not have worked if, beyond the institutional arrangements of secrecy, opacity, and dissimulation, the existence of the bomb had not been transformed into a taboo, a form of tacit knowledge that has been individually interiorized and collectively expunged from public discourses. This is an example of what Taussig calls a "public secret," which he defines as: "that which is generally known, but cannot be articulated."¹⁵ For him, secrecy is also about the strategic and widespread use of ignorance among local communities and entire societies: knowing what not to know, which he calls the "labor of the negative," is the widespread deployment of ignorance as a strategy for surviving within a context in which knowing is risky.

Secrecy, as the chapters of Part II reveal, can be a reflex of technocratic approaches to public participation in technical matters when the public is deemed unprepared, immature, not educated enough, and too emotional to be able to deal with the culture of risk in a rational way. For example, Brian Wynne has described the highly formalized rituals of exclusion implemented by the UK government in the Windscale inquiry.¹⁶ Secrecy, confidentiality, and opacity are ways of excluding the public from decision-making processes as much as public audits and hearings whose goal is to neutralize critiques through the rationalizing (and patronizing) techniques of administrative practices.¹⁷

¹³ Georg Simmel, "The Sociology of Secrecy and of Secret Societies," *American Journal of Sociology* 11 (4), January 1906: 441-498.

¹⁴ Joseph Masco, "Lie Detectors: On Secrets and Hypersecurity in Los Alamos," *Public Culture* 14 (3), Fall 2002: 441-467.

¹⁵ Michael Taussig, *Defacement: Public Secrecy and the Labor of the Negative*, (Stanford University Press, 1999), cit. p. 5.

¹⁶ Brian Wynne, *Rationality and Ritual: Participation and Exclusion in Nuclear Decision-Making*, (Earthscan, 2011) (2nd edition).

¹⁷ See for example Raminder Kaur, "Sovereignty without Hegemony, the Nuclear State, and a 'Secret Public Hearing' in India," *Theory, Culture, & Society* 0 (0), 2013: 1-26.

The public can also invoke secrecy as an interpretative scheme to make sense of the behavior of public institutions when they are not otherwise legible. In Italy, state secrecy, which has been used to interpret historically unresolved episodes of political terrorism (from Piazza Fontana in Milan—in the late 1960s—to the mafia bombings in early 1990s), is a widespread cultural scheme for making sense of opaque, unintelligible or unexplainable actions and inactions of public institutions.¹⁸ It is not by chance, I think, that Italian jurist and philosopher Norberto Bobbio has been among of the most rigorous scholars of the perilous relationship between secrecy and democracy. In various articles and books—but most importantly, *The Future of Democracy* (1987)—Bobbio argued that state secrecy in Italy was a pervasive threat to the life of democratic institutions.¹⁹ He used two concepts to describe Italian state secrecy: *sotto governo* or “subterranean government” and “cryptogovernment.” The first term referred to the growing intervention of the state in the economy through which political elites exercise an inscrutable control over centers of power—such as banks, nationalized, and state subsidized industries. By “cryptogovernment,” he meant “the totality of actions carried out by paramilitary political forces which operate behind the scenes in collaboration with secret services.”²⁰

In La Maddalena, military secrecy and diffused technocratic views of nuclear technology as a matter for experts only created a substantial exclusion of the local community from important decisions making processes concerning the radiosurveillance system. This systematic divide between decision-makers and citizens, however, contributed to establish an atmosphere of doubt. The proliferation of conspiracy theories and their circulation through rumors provided interpretative schemes that the local community adopted to explain otherwise unexplainable bureaucratic delays, malfunctions, and silences by expert and military authorities.

As I have already pointed out, the limits to the organization and implementation of radioecological campaigns in La Maddalena were not only the result of military secrecy. Framed within a larger national historical context, La Maddalena’s case exemplifies some of the organizational and institutional complexities and contradictions that shaped the Italian nuclear program at large. I argue that in La Maddalena both secrecy and knowledge gaps resulting from

¹⁸ For an analysis of the categories of state secrecy and the “dual state” in Italian historiography see Franco De Felice, “Doppia lealtà e doppio stato,” *Studi Storici* 30 (3), Jul. - Sep., 1989): 493-563.

¹⁹ Norberto Bobbio, *The Future of Democracy*, (University of Minnesota Press, 1987). Originally published in Italy in 1984 with the title *Il Futuro della democrazia*, (Einaudi). See especially Chapter 4 “Democracy and Invisible Power,” pp. 79-97.

²⁰ *Ibidem*, cit. p. 95.

epistemic traditions and regulatory practices produced ignorance. As Scott Frickel recently observed, scholars working on agnotology have explored the first aspect of secrecy as an active removal of existing knowledge, or “knowledge sequestration,” while leaving the second aspect aside.²¹ According to Frickel this happened not only for the challenges that documenting “what is not there” poses. Work on agnotology has generally given preference to individual cases, to the intentional and strategic use of ignorance, and to the microphysics of power behind the concealment, contestation, dismissal, and removal of scientific knowledge.²²

Inspired by Hess’s work on undone science, Frickel and colleagues instead propose a “new sociology of scientific knowledge” focusing on the “structural” analysis of the production of ignorance, to explain why certain areas of scientific investigation become chronically excluded from epistemic approaches and regulatory regimes in the first place.²³ Explaining the “selective attention” given to certain areas of research, while leaving others unexplored, requires developing an analytic frame that is more attentive to the bureaucratic and institutional processes that produce and reproduce ignorance. Frickel’s approach aims at avoiding the trap of considering the lack of scientific knowledge production only as the result of interested strategies of state agencies, corporations, and the military to conceal the “truth” from the public or as the result of bad science. From this analytical perspective, the institutionalization of ignorance is instead the product of systemic overlooks created by multiple agencies distributed across legal and regulatory systems, institutional practices, and research protocols.

Instead of considering these two approaches (knowledge sequestration and selective attention) as alternative analytical strategies, I argue that they should be adopted simultaneously to grapple with the political economy of knowledge production shaped by interested acts of knowledge removal and institutional arrangements that create and reproduce knowledge gaps. The institutional approach to the production of ignorance should not lose track of the political responsibilities associated with strategic acts of knowledge removal and with bureaucratic inertia, especially when their effects contribute to create zones of exclusion and marginalization

²¹ See Scott Frickel, “Not Here and Everywhere: The non-production of scientific knowledge,” in Kleinman, Daniel Lee and Kelly Moore (Eds.). (2014). *Routledge Handbook of Science, Technology, and Society*, (Routledge, 2014): 263-276.

²² Scott Frickel, “Absences: Methodological Note about Nothing, in Particular,” *Social Epistemology* 28 (1): 86-95.

²³ David J. Hess, *Alternative Pathways in Science and Industry: Activism, Innovation, and the Environment in an Era of Globalization*, (The MIT Press, 2007).

of vulnerable groups—which are usually also the most exposed to the consequences of environmental disasters and industrial pollution.

By keeping these two perspectives in dialogue I will show that the Italian government made specific institutional choices concerning the radiosurveillance program to implement political designs (what I described as the Cold War technopolitical compromise between public safety and military security) and that within the limits of institutional arrangements and epistemic traditions of Italian regulatory agencies some experts voiced their disagreement and proposed solutions to achieve more inclusive—and consequently more accurate—radioprotection practices.

Another reason to keep the agnotology and the institutional production of ignorance perspectives together is exemplified by the last argument of Part II: In La Maddalena frequent malfunctions, delays, bureaucratic inefficiency, and lack of expert communication about the radiosurveillance system, with time, produced a sense of hopelessness and resignation about the legitimate expectations for a ready and efficient response of public institutions among both the Maddalenini and local administrators. I call this sense of induced hopelessness the “politics of resignation.” Benson and Kirsch originally used this concept to analyze the response of corporations to social movements addressing the social and environmental costs of their operations.²⁴ Using tactics of denial, counter-evidence, forms of compensation and accommodation, and strategies of damage control, corporations seek to perpetuate their economic gains by neutralizing activists’ arguments and attempts to organize for environmental and social justice. In Benson and Kirsch’s analysis, corporate responses to social movements appear systematic, coherently enacted, and coordinated. In my adaptation of the concept to Italian bureaucracy, I define the politics of resignation as a tacitly shared, diffuse, but not necessarily coherent, enactment of ruling relations, which presuppose and cause a *de facto* incapacity of the public (clients, subordinate employees, users and receivers of public services) to remain vigilant and active enough to effectively make public institutions and individual officials accountable for their actions or inactions. In other words, one of the main characteristics of bureaucracies—distributed and impersonal agency—makes it difficult to attribute specific political responsibilities for recurrent malfunctions and delays. Concrete enactments of the

²⁴ Peter Benson and Stuart Kirsch, “Capitalism and the Politics of Resignation,” *Current Anthropology* 51 (4), August 2010: 459-486.

politics of resignation come under various forms. Sometimes the dilation of the time of response is used to instill a sense of the inutility of legitimate requests. Time transforms individual and collective rights into favors, establishing asymmetrical power relations and networks of patronage. In a rich scholarship on the politics of waiting, sociologist Javier Auyero has documented the strategic use of time by state officials and bureaucrats to describe the “temporal processes in and through which political subordination is reproduced.”²⁵ As Auyero calls it, this “tempography of subordination”—akin to Pierre Bourdieu’s analysis of the use of time in gift exchanges—does describe in part the situation I found in La Maddalena. As a state of induced hopelessness the politics of resignation is certainly the outcome of asymmetrical power relations, which are nonetheless subject to change. As Benson and Kirsch argue, widespread dissatisfaction with public authorities—in La Maddalena’s case—can be politically mobilized and constitutes a potential reservoir of political activism and contestation of the *status quo*, as I will show further in Chapter 6.

²⁵ Javier Auyero, *Patients of the State: The Politics of Waiting in Argentina*, (Duke University Press, 2012), cit. p. 2.

Chapter 3

Radioecology, Military Secrecy, and the State of Exception in Cold War Italy

3.1. Under the Clouds: Nuclear Tests and Radioecology

The inclusion of La Maddalena into the Italian network of marine radio-surveillance stations took place immediately after the installation of the U.S. Navy base in September 1972.²⁶ Before then, the archipelago did not have nuclear status and its relevance from a radioecological point of view was deemed negligible, apart from a few studies conducted during the 1930s by experts of the University of Cagliari, who discovered the radioactive qualities of granite rocks abundant in the archipelago. Yet, like most of Sardinia and the rest of Italy, La Maddalena was subjected to the same processes of fallout deposition provoked by nuclear atmospheric tests performed by the U.S., U.S.S.R., Great Britain, and France from the late 1940s through the early 1960s. For example, Italian experts at the EURATOM Study Center of Ispra (near the city of Varese) were able to detect the effects of the first atomic test conducted by France in the Sahara desert on February 13, 1960.²⁷ In particular, Italian radiometric stations installed around research centers had more or less systematically monitored the effects of atmospheric nuclear tests since the mid 1950s, including fallout depositions on the soil, rainwater, seawater, and artificial radionuclides' concentrations in edible products, like milk and meat. Specialized personnel were able to elaborate analytical models for inferring the time and place of explosions, and

²⁶ It was only for the initiative of the president of CNEN and the explicit request of Professor Carlo Polvani, the father of radioprotection in Italy and the leader of the radioprotection units of CNEN, that on October 1972 La Maddalena was included within the stable monitoring sites of the national network of radio-ecological surveillance established in the mid 1950s. For example, see: AA.VV., "Misure di radioattività ambientale presso l'isola della Maddalena eseguite dal Laboratorio per la Radioattività Ambientale del CNEN," *Notiziario CNEN*, Anno 20, n. 5, May 1974, pp. 87-90; S. D'Amato (Ed.), "Rapporto annuale sulla radioattività ambientale in Italia," Vol. 2 "Reti Locali," 1976, pp. 313-322; Boeri G. C. and F. Giorcelli, "Le reti nazionali per il rilevamento della radioattività ambientale in Italia," *CNEN-RT/DISP (81)*, 1981, pp. 28-35.

²⁷ Cigna, A., Domenici, G., Malvicini, A., and L. Vido, "Radioattività dei prodotti di fissione nel fallout raccolto dopo l'esplosione nucleare francese nel Sahara," *Minerva Nucleare*, Vol. 5, n. 4 (April), 1961: 73-78.

extrapolating data about composition and provenance of the bombs through radio-chemical treatments of rainwater samples (Figure 3.1.).²⁸

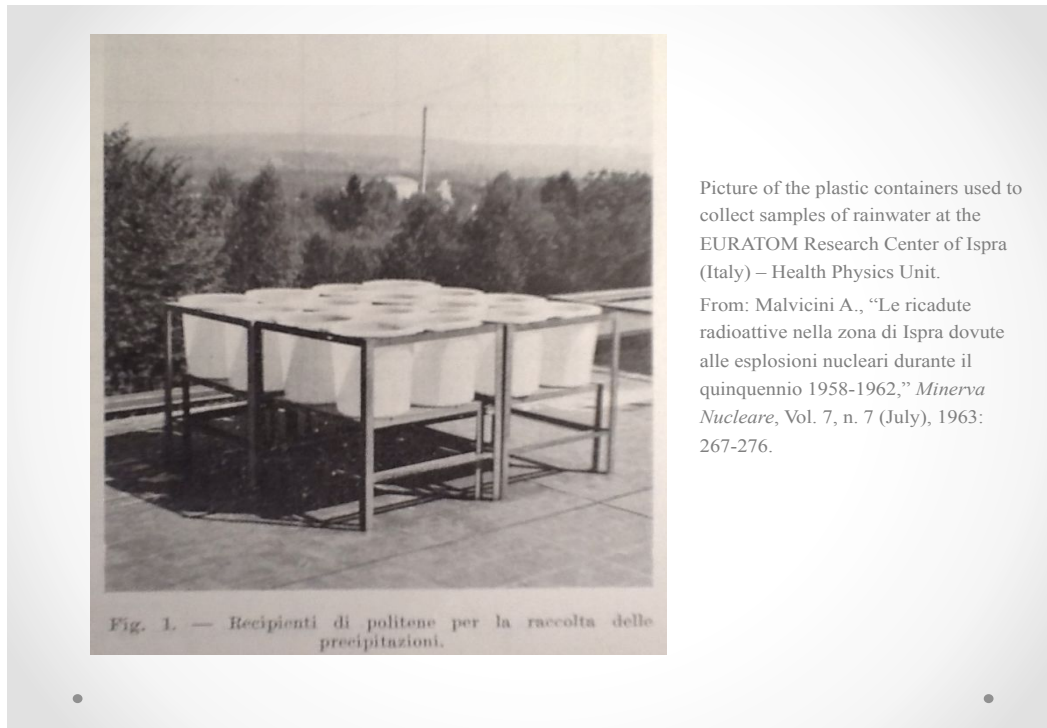


Figure 3.1. Plastic containers used to collect samples of rainwater at EURATOM.

Several pioneers of fallout detection in Italy conducted their first studies in the late 1940s. Their applications were small-scale and artisanal, often performed with Geiger counters borrowed from labs and complemented with variable regulated high voltage supply. Dr. Arrigo Cigna, former director of CNEN radiocontamination laboratories from the beginning of the 1970s to the mid 1980s, and past president of the International Association of Radioprotection, conducted his early radiometric experiments in Milan with a Geiger counter that he himself adapted by using an old military radio-transmitter (Figure 3.2.).²⁹ He described the technical procedures required to assemble the instrument on *Radio Rivista*, a specialized journal circulating among radio transmission experts and radio amateurs (Figure 3.3.).

²⁸ For example, see Cigna, A. and A. Malvicini, “Determinazione della data dell’esplosione di una bomba nucleare mediante analisi del decadimento radioattivo dei prodotti di fissione raccolti su filtro,” *Minerva Nucleare*, Vol. 4, n. 6 (June), 1960, 162-169; Malvicini, A., “Le ricadute radioattive nella zona di Ispra dovute alle esplosioni nucleari durante il quinquennio 1958-1962,” *Minerva Nucleare*, Vol. 7, n. 7 (July), 1963, 267-276.

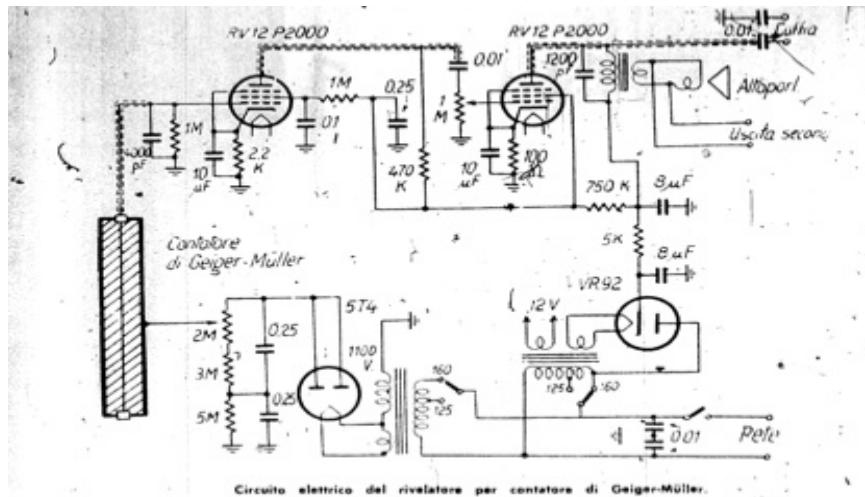
²⁹ See Cigna, Arrigo, “Ripercussioni anche in Italia degli scoppi atomici di Las Vegas?” *Incontri*, n. 5, May 1951, 84-87.



Figure 3.2. Artisanal Geiger Counter assembled by Dr. Arrigo Cigna.

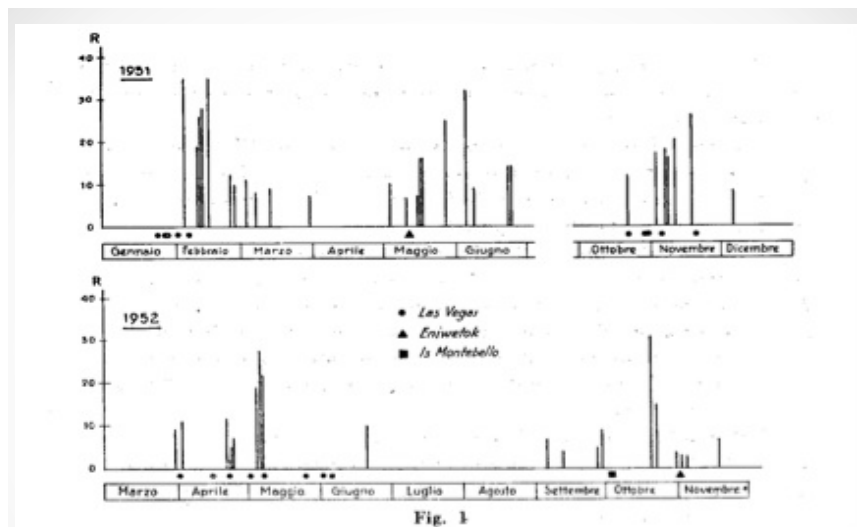
The major source of guidance for Cigna was an article published a year earlier by Richard J. Watts, an expert working at the Los Alamos Scientific Laboratory of the University of California.³⁰ In his paper Watts explained how to fix the problem of high voltage supply oscillation and interruptions for the use of Geiger counters, which needed a steadily regulated influx of energy to reliably detect radioactivity over longer periods of time.

³⁰ Richard J. Watts, "Pulse Type Regulated High Voltage Supply for G-M Tubes," *Review of Scientific Instruments*, Vol. 21, n. 4 (April), 1950: 342-343.



A. Cigna: Scheme of high voltage regulating circuits for Geiger-Müller counter. From Cigna, A., "Un rivelatore per contatore di Geiger-Müller," *Radio Rivista*, Vol. 5, 1952: 15-16.

Figure 3.3. Scheme of high voltage regulating circuits for Geiger-Müller counter.



L. Santomauro and A. Cigna: Histogram of the correlations between US and GB atomic tests explosions in Las Vegas, Eniwetok, and Montebello Islands and levels of radioactivity in rainwater samples collected in Milan, Italy, between 1951 and 1952. From Santomauro, L. and A. Cigna, "Prime misure sulla radioattività delle precipitazioni atmosferiche," Communication presented at the national meeting of the Italian Geophysics Association, Rome, June 17-18, 1953

Figure 3.4. Histogram of the correlations between US And GB atomic tests.

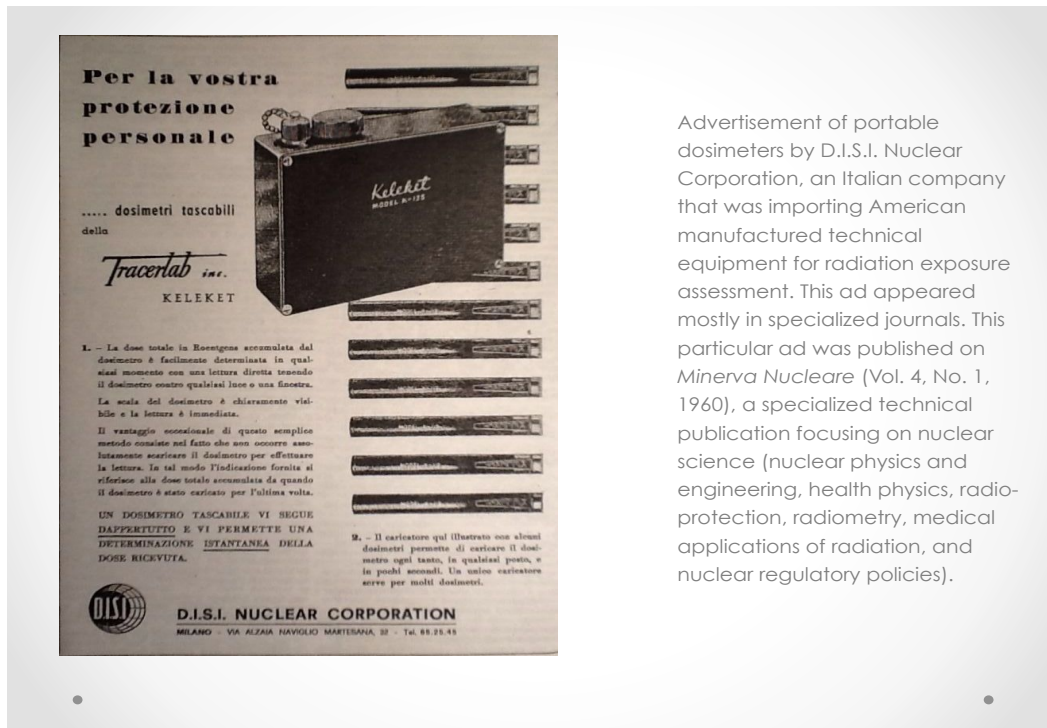


Figure 3.5. Advertisement for portable dosimeters.

In 1953, Cigna presented the results of his experiments with rainwater samples at the national meeting of the Italian Geophysical Association: observations of the levels of radioactivity in the samples taken after nuclear atmospheric detonations established a correlation between the tests and the higher levels of radio-contaminants in the atmosphere also detectable in Italy (Figure 3.4).³¹ The name of miniscule Pacific atolls like Eniwetok (in the Bikini archipelago), unknown to most Italians, became as familiar as Las Vegas, now involved in the nuclear tests gambling business. Improbable connections materialized through nuclear fallout circulation made visible by new scientific questions, methods, and instruments of calculation. Ten years after Cigna's initial artisanal experiments, the optimization of instruments like Geiger counters was standardized enough to make possible their industrial, large scale production and circulation. In Italy specialized journals such as *Minerva Nucleare* published ads of American manufactured counters, underlining their accessibility for everyday use, offering immediately readable results “for your personal safety” (Figure 3.5).

³¹ Santomauro, L. and A. Cigna, “Prime misure sulla radioattività delle precipitazioni atmosferiche,” Communication presented at the national meeting of the Italian Geophysics Association, Rome, June 17-18, 1953

The high number of nuclear tests performed by U.S. and U.S.S.R. during the early 1950s was a clear menace to the environmental safety of the planet. But nuclear contamination also generated a scientific opportunity: nuclear parcels spreading around the globe could be used as tracers for the study of atmospheric motions. In 1952 the Health and Safety Laboratory (HASL) of the U.S. Atomic Energy Commission started “a monitoring program to detect the amount of ‘global fallout,’ defined as radioactive debris injected into the stratosphere and widely dispersed before returning to the ground as particulate ash or in rain and snow.”³² Caught in its political contradictions, nuclear exceptionalism has been constructed around the dual meaning of atomic weapons: the ultimate diplomatic trump card assuring deterrence and global peace and the nightmares of human annihilation. Radio-contamination paralleled the destiny of the bomb: it was a potential menace to public and environmental health, but also a vehicle for scientific knowledge of natural phenomena. As the prominent ecologist Eugene Odum remarked:

[...] It is generally conceded that environmental contamination with its current dangers of genetic damages, stands as the most important limiting factor in the large-scale use of atomic energy in the immediate future. This prospect is rapidly transforming ecology from a rather obscure and ill-defined member of the biological family into a more organized and coherent division, which will be expected to provide the basic answers necessary for solving practical problems.³³

Eugene Odum and his brother Howard started to reshape the field of ecology at the Eniwetok Atoll, in the Pacific, where at the beginning of the 1950s the United States Atomic Energy Commission gave them the opportunity to study the effects of radiation on populations and entire ecological systems after thermonuclear tests. Radioecology was, in short, the study of ecology in the atomic age.³⁴

Radioecology emerged in the late 1950s as an interdisciplinary field of studies concerned with the biological effects of radiation and the processes of dispersion and accumulation of radio-contaminants in the environment in Italy and in Europe. The discipline had roots a decade

³² See Paul N. Edwards, *A Vast Machine: Computers, Models, Climate Data, and the Politics of Global Warming*, (The MIT Press, 2010), cit. p. 208. See also Angela N. H. Creager, *Life Atomic: A History of Radioisotopes in Science and Medicine*, (University of Chicago Press, 2013), especially Ch. 1, “Tracers,” pp. 1-23.

³³ Eugene P. Odum, “Ecology and the Atomic Age,” *The ASB Bulletin* 4 (2), June 1957: 27-29.

³⁴ Joel B. Hagen, *An Entangled Bank: The Origins of Ecosystem Ecology*, (Rutgers University Press, 1992), especially Chapter 6 “Ecology and the Atomic Age.”

earlier in the U.S. and the U.S.S.R. By the early 1960s radiometric stations were scattered along the Italian peninsula and managed by different institutions.

3.2. Radioprotection and Radioecology In Italy

By the early 1960s radiobiologists reached a better understanding of the processes of accumulation of radionuclides in different biological organisms living in various environments.³⁵ The main results of this inquiry led to an important change in the paradigms of radioprotection regulations, until then mostly shaped around the principle of the maximum admissible dose, according to which under a certain threshold of radiation exposure, at a given time, human beings would not be harmed. While the threshold principle continued to be monitored, the discovery of bioaccumulation processes revealed that bio-organisms and tissues do not have the same propensity to capture and retain radionuclides dispersed in the environment and consequently to affect human health through the local food chain and water sources. Thus, radio-surveillance systems had to focus not only on accidental discharges and radioactive contamination emitted during routine operations, but also on bioaccumulation phenomena over time.³⁶ For this reason, since the beginning of 1960s Italy's CNEN Center for the Study of Marine Environmental Contamination at Fiascherino (Lerici) and other institutions like CAMEN routinely conducted radio-surveillance campaigns, initially including four fixed monitoring stations along Italy's coastal lines--La Spezia, Venice, Taranto, and Naples—to which, in later years, more sampling sites were added (Figure 3.6).³⁷

³⁵ During the 1960s, one of the emergent analytical parameters in radioecology became the “concentration factor.” It was developed by Ukrainian marine radioecologist Gennady G. Polikarpov in his 1964 doctoral dissertation *Radioekologiya Mosrkikh Organizmov by Atomizdat*, translated into English in 1966. Polikarpov defined the concentration factor as “The capacity of an organism to accumulate radioactive substances [...] expressed by the ratio of its radioactivity to that of the aqueous medium or the preceding food link to which the radionuclide was concentrated” cit. 27. Polikarpov's scholarship attained international recognition since the early 1960s when bioaccumulation factors in marine and terrestrial radioecology became closely studied processes also in the United States. In September 1961 the first National Symposium on Radioecology took place at the University of Colorado, Fort Collins, under the auspices of the American Institute of Biological Sciences, and sponsored by the divisions of Biology and Medicine of the U.S. Atomic Energy Commission. See Schultz, V. and A. W. Klement, Jr., *Radioecology: Proceeding of the First National Symposium on Radioecology held at Colorado State University, Fort Collins, September 10-15, 1961*, (Reinhold Publishing Corporation, New York & American Institute of Biological Sciences, Washington D.C., 1962).

³⁶ Dr. Arrigo Cigna graciously clarified this aspect during an interview in February of 2012.

³⁷ One of the first reports on the activity of the Italian marine radio-surveillance network is Argiero, L., Del Corso, G., Manfredini, S., and G. Palmas, “Controllo sistematico della radioattivit  lungo le coste italiane. Organizzazione delle reti di prelievo di campioni d'acqua e fauna marina. Tecniche e dati di misura. Programma di studi e ricerche”, *Minerva Nucleare*, Vol. 7, n. 7, July 1963: 261-267.

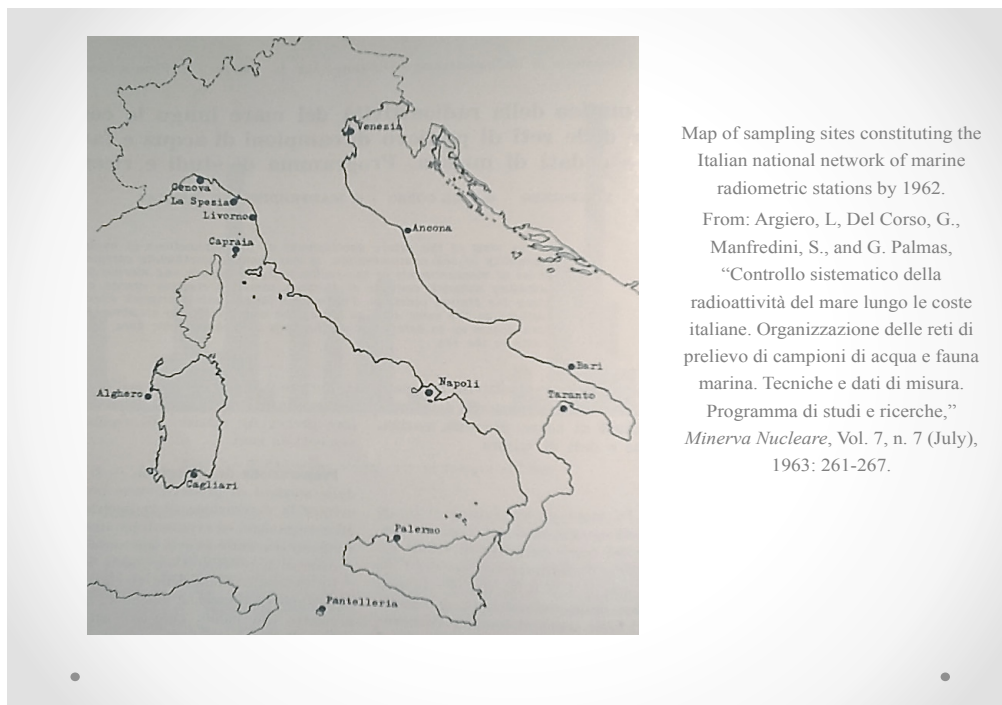


Figure 3.6. Map of sampling sites constituting the Italian national network of marine radiometric stations by 1962.

The Italian legislation required that the study of the environments surrounding nuclear plants be one of the preliminary steps for their authorization. Preliminary, or preparatory, radioecological campaigns were also prerequisites for the elaboration of any radiosurveillance system and related external emergency plans.³⁸ CNEN and ISS experts conducted specific radioecological campaigns around civilian nuclear sites, including power plants, experimental facilities, uranium enrichment laboratories, experimental reactors, and so forth. In marine environments impacted by the presence of nuclear installations (or simply exposed to the effects of fallout contamination due to atmospheric experiments) CNEN and ISS radioecologists and radioprotectionists, like their colleagues in other countries, collected samples of water, sediments, algae and plants, fish, nutrient particles, and other bio-accumulators in order to assess the levels of anthropogenic radioactivity present in a defined geographical area and to

³⁸ The first complete legislation regulating the pacific employment of nuclear energy in Italy was the Decree of the President of the Republic n. 185, 1964 (D.P.R. n. 185, 1964), followed by subsequent modifications and updates in 1971 and 1977. Despite the fact that IAEA regulations prescribed specific exposure limits and safety protocols, at the beginning of the 1970s regulatory regimes concerning nuclear plants siting varied nationally. For a comparative analysis from an Italian perspective see Amaldi, U., Campos Venuti, G., Frullani, S., Maiani, L., and E. Tabet, "Criteri di scelta dell'ubicazione delle installazioni nucleari," in *Annali dell'Istituto Superiore di Sanità*, n. 7, 1971: 626-646.

disentangle it from the so-called “natural background.” By the beginning of the 1970s, radioecology was an integrated interdisciplinary field studying bioaccumulation processes in species living in given ecological systems, meteorological and ecological parameters influencing processes of dispersion, and the interaction of local communities with the environment around nuclear installations.³⁹ To this end, every radio-ecological campaign was also focused on the study of “critical groups”—that is, that portion of the local population potentially more exposed to radio-contamination, either by external contact, inhalation, or by ingestion. For example, if the local economy around a nuclear site was primarily agricultural, then farmers were targeted for study. Socio-economic factors—such as land use—and dietary habits, were important variables included in the inquiries. In Italy, radio-ecological programs followed standard protocols and therefore were similar for all the nuclear installations. The exception was that each ecosystem presented particular geo-morphological and environmental characteristics affecting dispersion processes. Especially until the end of the 1970s, when the divisions of Security and Radioprotection of CNEN and the Radiations’ Laboratory of the National Institute of Health (ISS) were still counting on limited personnel, very frequently the same research teams conducted radioecological campaigns across the nation, acquiring vast experience at all sites.⁴⁰ Italian legislation conferred to CNEN the power to certify and to control radio-surveillance systems organized by the licensees, although ISS as technical consulting agency of the Ministry of Health, had its share of responsibilities for the sanitary aspects of radioprotection, including food contamination, and work exposure.

³⁹ The process of multidisciplinary integration into the field of marine and continental radioecology became the benchmark of this (now established) scientific sector also in Italy. This is evident from the reports of the First National Symposium on Radioecology held at the University of Parma in 1970: *Atti del primo convegno sullo stato di avanzamento della radioecologia in Italia, organizzato dall’Istituto di Zoologia dell’Università degli Studi di Parma e dall’Associazione Italiana di Fisica Sanitaria e Protezione contro le Radiazioni, 5-6 Novembre, 1970*, (University of Parma Press, 1971).

⁴⁰ In 1974 the divisions of Security and Radioprotection became an independent department inside CNEN called DISP (Dipartimento Sicurezza e Protezione). It had its own budget and its director was directly reporting to the Ministry of Industry. This institutional arrangement allowed DISP to play its role of independent licensing agency and to develop, through its Technical Commission, the guidelines of all the emergency plans for all the nuclear installations present in Italy. The independency of DISP was key in order to ensure that the agency that was promoting the research and the development of nuclear power in Italy was not also the controller of the licensing process and the radioprotection programs. Although its formal institutional house was inside the CNEN, DISP had the same function of the NRC in the United States. By the end of the 1980s, DISP personnel surpassed the number of 500 units, including engineers, physicists, technicians, and employees. I am grateful to Engineer Giovanni Naschi, former director of DISP from 1974 until its dissolution in 1994 for his detailed explanation. Personal interview with the author, Rome, May 2013.

Radioecological campaigns were either preparatory or confirmatory. Preparatory campaigns were intended to study the ecological and meteorological characteristics of a site before the installation of a nuclear plant or facility. Their goal was to assess the so-called environmental receptivity, that is, the congruence of the ecological and socio-economic features of a given site with the presence of a nuclear installation that would make it susceptible to contamination. Thus, nuclear plants were framed as the integration and interaction of socio-economic, ecological, and technological elements. Radioecologists had to assemble this complex information through a triangulation of data gathering, including the technical characteristics of the reactors and the type and amount of radioisotopes discharged by the installations during their routine activity. It was a precise condition for the authorization of any nuclear site that the licensee provided this information, explained and formally illustrated in two main documents: (1) the safety report and (2) the environmental impact assessment along with the discharge formula (that is, the type and quantity of radionuclides released in the environment). In Italy a specialized group of experts within the Security and Protection Department of CNEN (commonly known as “Technical Committee”) was in charge of evaluating the validity and the completeness of these documents and had the authority to deny license authorizations and/or to interrupt the operations of the installations in case of incongruences.⁴¹ In addition to the preliminary assessment of the receptivity of a site, CNEN and ISS performed “confirmatory” radio-ecological campaigns in order to evaluate the environmental impact of nuclear plants’ controlled discharges over time and to provide information for emergency plans’ updates.⁴²

3.2.1. Radioecological Routines: Safety in Expert Hands

In little less than twenty minutes, a video documentary titled *Atomo in Mare* (Atom at Sea) describes the activity of a group of scientists from the Laboratory for the Study of Marine

⁴¹ A detailed description of the siting regulations in Italy compared with other countries in the context of the 1970s can be found in Amaldi, Ugo, Gloria Campos Venuti, Salvatore Frullani, Luciano Maiani, and Eugenio Tabet, “Criteri di Scelta dell’Ubicazione delle Installazioni Nucleari,” in *Annali dell’Istituto Superiore di Sanità*, n. 7, 1971, Pp. 626-646.

⁴² For a critical discussion of the state of the art of radioecology and radioprotection in Italy during the 1970s, see Arrigo Cigna and Osvaldo Ilari, “The role of the radioecological protection in the environmental preservation in Italy,” *Proceedings of the Regional Study Group Meeting on Radiological and Environmental Protection*, Istanbul, Turkey, 20-24 November, 1972, Pp. 194-218. The paper has been republished by CNEN with the same title as a technical report: *RT/PROT (76) 12*, CNEN, 1976.

Contamination of CNEN in Fiascherino during one of their radiometric campaigns.⁴³ The film, recorded and edited between 1961-2, is part of several educational initiatives undertaken by CNEN to create a “nuclear culture” in Italy. It explains to non-experts the rationale for marine radiometric campaigns as part of the necessary measures that all countries had to take to protect their populations from the affects of radioactive fallouts caused by atmospheric tests.

The documentary starts with an animated cartoon. The H Bomb appears on the screen and the countdown begins: nine, eight, seven, six... The initial part of the soundtrack is meant to surround the spectators with mechanical terror, as they watch cartoon images capturing the sequences of a nuclear detonation followed by the appearance of the typical mushroom. A stridor of electric sounds accompanies the dispersion of the fallout transported by yellow clouds circulating through the atmosphere far away from an unspecified ground zero. Yellow flakes of radioactive material fall into the sea where plants and algae absorb them through processes of bioaccumulation. After ingesting the contaminated algae, a naïvely drawn fish becomes yellow and a fisherman, unaware of what had been going on so far underwater, catches it and eats it. Now the man becomes yellow too. Conclusion: we are all at risk of radioactive contamination.

A rapid frame transition shifts the attention of spectators from the animated cartoon to crude film footages of Japanese scientists measuring radioactivity on fishing boats in the aftermath of the infamous 1954 Castle Bravo Test.⁴⁴ The narrator describes the dramatic consequences of the U.S. experiments in the Bikini Atolls, where atmospheric fallout contaminated the waters frequented by hundreds of Japanese fishing boats thousands of miles away from the test site and months after the detonations.⁴⁵ The juxtaposition of the abstract animated cartoon is given new meaning against this powerful historical referent in the images of real events happened on the opposite side of the globe: risk is ubiquitous.

In contrast to the general, overarching, and overwhelming threatening consequences of thermonuclear explosions, the director of *Atomo in Mare* orchestrates a rapid shift to the peaceful Mediterranean Sea, where, as the narrator’s voice reassures, “so far no relevant increase of the

⁴³ The film is available at the ENEA Web TV page in the section “Film Historical Archive:”

<http://webtv.sede.enea.it/index.php?page=listafilmcat2&idfilm=169&idcat=30>

More on the history of the laboratory and its mission here...

⁴⁴ About this particular operation, see Barton C. Hacker, *Elements of Controversy: The Atomic Energy Commission and Radiation Safety in Nuclear Weapons Testing 1947-1974*, (University of California Press, 1994), especially Chapter 6, “Operation Castle,” pp. 131-158.

⁴⁵ On March 1st 1954 after the Castel Bravo Test, the entire crew of the fishing boat was invested by the radioactive wave following the nuclear test at the Bikini Atoll. See Barton Hacker, cit., and the documentary *Atomic Cafe*.

levels of radioactivity has been found in the water and in the fish.” The Gulf of La Spezia metonymically represents the Mediterranean scenario where CNEN scientists worked to protect Italians from unwanted radioactive exposure caused by “fallout contamination from nuclear experiments, accidental discharges of radioactive material into the sea, and possible accidents involving nuclear propelled submarines. In all of these events CNEN experts are able to assess the concrete menace under which Italians live in the nuclear era.” By showing why and how Italian scientists performed routine radio-ecological campaigns, *Atomo in Mare* makes non-expert audiences aware of the risks of the nuclear era. At the same time, its script and images are intended to reassure. The third part of the documentary visually brings the spectators to the docks of a small harbor near Fiascherino, in the region of Cinque Terre, where, on a day flooded with sunlight, a small team of CNEN radioecologists is taking to sea for a programmed expedition. A fishing boat follows the mobile laboratory at a short distance. It will catch samples of fish that will complement the collection of specimens to be analyzed inside specialized laboratories.

The video presents radioecological campaigns as consolidated and coordinated procedures transforming elements of the marine environment into samples, biological and chemical parameters that allow scientists to go back and forth from the field to the lab and vice-versa through operations of reduction and amplification.⁴⁶ Sampling areas appear as fixed points on an established map guiding the routine operations of the laboratory personnel. Every operation is scheduled on a time blog, scrupulously supervised and coordinated by the director of the expedition. Nothing is left to improvisation. Indeed the site of La Spezia was a permanent station of the network of marine radio-surveillance since 1960.⁴⁷

In juxtaposition to the ordered work of Italian radioecology depicted in *Atomo in Mare*, documents reveal that CNEN experts faced extreme difficulties in transforming La Maddalena

⁴⁶ Here I use Bruno Latour’s analytical insights on “Circulating Reference.” He suggests that the conservation of specimens is not simply the way in which scientists guarantee evidence for the truth of a statement, but “rather it is our way of keeping something constant through a series of transformations.” Specimens and inscriptions stored in a laboratory are “traces that establish a reversible route that makes possible to retrace one’s footsteps as needed,” they are “references” of the reversible processes of transformations that scientists perform in order to reduce and amplify on manageable scales the characteristics of the phenomena they study. See Bruno Latour, *Pandora’s Hope: Essays on the Reality of Science Studies*, (Harvard University Press, 1999), cit. pp. 70-71.

⁴⁷ See S. D’Amato (Ed.), “Rapporto Annuale sulla radioattività ambientale in Italia,” Vol. 2 “Reti Locali,” *CNEN-RT/DISP-AMB/117/79*, 1976: 313-322; Boeri G. C. and F. Giorcelli, “Le Reti Nazionali per il Rilevamento della Radioattività Ambientale in Italia,” *CNEN-RT/DISP (81)*, 1981; Argiero L., G. Del Rosso, S. Manfredini, and G. Palmas, “Controllo Sistematico della Radioattività del Mare lungo le coste Italiane. Organizzazione delle reti di prelievo di campioni di acqua e di fauna marina. Tecniche e dati di misura. Programma di studi e ricerche,” *Minerva Nucleare* Vol. 7, n. 7, July 1963: 261-267; Cigna, Arrigo, “Forty Years of Anthropogenic Radionuclides in Surface Seawater. Italian and Japanese Data,” *Ocean Science Journal*, Vol. 41, n. 4, December 2006: 261-290.

into a research site. In what follows, I argue that these challenges were rooted in the blind spots produced by the regime of military secrecy surrounding the operations of the U.S. submarines and organizational problems of the Italian nuclear program in general.

3.3. Divide and Research: Radioecology in La Maddalena

Preparatory radioecological campaigns aimed to generate a synthetic representation of the environmental characteristics of the sites where a nuclear plants or facility operated. By nature of their scope they are assemblages of specialized knowledge: interdisciplinary projects that require the subdivision of the environment into separate elements and phenomena to analyze, amplify, and reassemble to provide an inclusive and detailed picture of a given eco-system.⁴⁸ Dividing and reassembling environmental elements was the method that allowed radioecologists to elaborate a coherent and integrated representation of La Maddalena that was used for the organization of the radiosurveillance system.⁴⁹

The first expedition of CNEN experts started in the summer of 1975. Dr. Aldo Brondi, Director of the Laboratory for the Study of Marine Environmental Contamination from 1975 to 1978, was responsible for the mineralogical and geological area of the research. A graduate of the University of Pisa with a specialization in petrography, he began his career inside CNEN in 1957 as a “uranium hunter” in the Italian Alps and later collaborated with ENI (Ente Nazionale Idrocarburi) on various, similar projects in Australia. At the beginning of the 1970s he became interested in marine geology, working on the stratigraphic composition of Italian coastal lines and focusing, in particular, on the processes of radioisotopes sorption and diffusion in alluvial and marine sediments. During the 1970s Brondi took part in a group of Italian geologists (mostly working at CNEN) who shaped a new field of studies looking at correlations between marine geomorphology, coastal morphology, sediment grain size, and the distribution of radionuclides in marine environment. They advocated a holistic methodology--which they called the “global approach”--to study pollutants’ dispersion and sedimentation in marine systems. This line of inquiry presupposed a typological classification of coastal-lines, river basins, and marine

⁴⁸ Latour, *Pandora's Hope*, cit. p. 58, 61.

⁴⁹ I could reconstruct the process through which Italian radioecologists performed environmental studies in La Maddalena thanks to the documentation made available by the ENEA Center for the Study of Marine environment in Lerici, La Spezia (previously named CNEN Center for the Study of Marine Environmental Contamination). I want to thank Dr. Roberta Delfanti, director of the center, and especially Carlo Papucci for granting me access to the archival material and for their kind assistance and explanations during several research visits. I also would like to remember Dr. Aldo Brondi, who graciously helped me at the beginning of my research in the summer 2010.

environments according to their geo-morphological and bio-typical characteristics. In conjunction with an accurate knowledge of hydrological dynamics and the behavior of radioisotopes, typological classifications were intended to enhance the capacity of CNEN (and other public authorities) to predict radio-contaminants' patterns of dispersion into the environment and to intervene efficaciously.⁵⁰ This area of study was particularly relevant for its immediate applications in the field of radioprotection.⁵¹ The final goal of this long-term research project was to create an integrated geo-morphological and bio-typical map of Italy in order to predict and extrapolate models of the dispersion of contaminants into the environment on a national scale.

Dr. Brondi and his colleagues from the CNEN Center for Environmental Geology presented their preliminary data about La Maddalena on November 12, 1976 at the gathering of the Italian Geological Society. Maps of the mineralogical composition of the marine platform, granulometry, and sediments dispersion illustrated the main characteristics of the Archipelago.



Figure 3.7. Map of Mineralogical Sampling Sites

⁵⁰ For a synthetic illustration of the “global approach” promoted by CNEN/ENEA geologists see Brondi, A. and O. Ferretti, “Efficacia ed applicazione di concetti mesotipologici come elementi per un approccio globale ai problemi ambientali”, in *Acqua-Aria*, n. 5, 1986: 451-459. For a more technical explanation of concepts and methods applied in the “global approach” see Anselmi, B. et Al., *Studi sui parametri geologici rilevanti ai fini della determinazione della contaminazione del territorio nazionale*, Rapporto Tecnico: Comitato Nazionale Energia Nucleare, CNEN RT/PROT (79) 14, Roma, 1979.

⁵¹ As most nuclear plants are installed nearby sources of water (usually lakes, rivers, and along the marine coastlines), knowing the geological and hydrological variables impacting the processes of radionuclides' dispersion has clear implications for siting policies, control of routine discharge operations, and radio-ecological sampling and surveillance.



Some moments of one of the radio-ecological surveillance program performed in the 1980s by the personnel of the Center for the Study of Marine Environment of ENEA, Lerici. The U.S. Navy base in the background.

(Archive ENEA Center for the Study of Marine Environment).

Collection of Algae and Sediments



Figure 3.8. Radioecologists at work in La Maddalena (1980s)

CNEN personnel analyzed these variables to assess the degree and directions of the dispersion of possible radio-contaminants into the marine environment via the transportation of sediments. Between the summer of 1975 and the spring of 1977, teams of marine biologists, geologists, meteorologists, and mathematicians traveled to La Maddalena to figure out sampling sites, marine fauna and flora, currents, climatic conditions, and the socio-economic conditions of local people. They tested their technical skills against the environmental elements of this unknown site and adapted to them with a certain degree of uncertainty, creativity, and informed speculation.



Il battello-laboratorio «Odalisca» operativo dal 1963 al 1978.

Figure 3.9. The stroller “Odalisca,” one of the first laboratory ships used by the personnel of the Center for the Study of Marine Contamination of CNEN for their radioecological surveys.⁵²

In order to make La Maddalena a stabilized network of radiometric stations, radioecologists divided the Archipelago into a bi-dimensional grid of marked coordinates individuating meaningful points of data extraction, which often overlapped with local toponyms and knowledge of the place. In order to transform the local environment into readable and transportable information, CNEN radioecologists employed instruments and materials that made

⁵² Courtesy of Doctor Roberta Delfanti, Director of the Center for the Study of Marine Environment of ENEA (Fiascherino, La Spezia). The Odalisca served in La Maddalena during the first cycle of CNEN’s radioecological campaigns from 1975 to 1977.

the invisible visible.⁵³ Aerostatic balloons with anemometers, rhodamine B and fluorometers, current meters, microscopes, chemical separations, and spectrometric analysis: all amplified La Maddalena by transforming samples and measurements of invisible microorganisms and environmental elements and into standardized parameters.



Figure 3.10. On the left: an exemplar of *Pinna Nobilis*, a typical mollusk of the archipelago of La Maddalena, now a protected species. On the right: an exemplar of *Spirographis Spallanzani*, a polychaete worm living on sandy bottoms in the Mediterranean Sea. They were both sampled as bio-indicators to measure the concentration of radioactive isotopes in the archipelago.

For its scope, depth, and length, Brondi's study could be compared to a preparatory radioecological campaign, except for the fact that it was planned after a full two years since the U.S. Navy arrived in La Maddalena. The next section illustrates the difficult start of the radiosurveillance program due to the regime of military secrecy surrounding the operations of the U.S. nuclear submarines and the organizational limits this posed for Italian experts.

3.4. Technopolitical Compromise: Military Security and Public Safety in La Maddalena

The belated response of national political institutions to the “problem of La Maddalena” was, in their admission, a reaction to the alarming campaign organized by the anti-base front. Since Italy lacked a specific regulation for nuclear military ports, Italian experts (CNEN and

⁵³ Bruno Latour, *The Pasteurization of France*, (Harvard University Press, 1993); Michelle Murphy, *Sick Building Syndrome and the Problem of Uncertainty*.

ISS) instrumentally treated the U.S. Navy base in analogy with civilian nuclear plants.⁵⁴ Immediately after the arrival of the U.S. naval units in September 1972, CNEN radioprotection experts included La Maddalena within the larger national radioprotection program. But the base continued to be an anomaly. For one, the U.S. Navy installed without any preliminary study of the environmental receptivity of the site. Even more problematic, however, was that, in distinction to other nuclear plants, ISS and CNEN personnel did not have any precise information about the technical characteristics of the nuclear reactors propelling the submarines. This was a matter of military secrecy to which only the Italian Ministry of Defense and CAMEN would have access.⁵⁵ Concerning this aspect, the document of the Ministry of Health concluded with a reassuring statement: “With this occasion this ministry informs you [ISS and CNEN scientists] that a request was forwarded to the Ministry of Defense in order to acquire all the data and useful information that it already possesses or will collect about the technical characteristics of the submarines’ reactors and their modalities of operation.”⁵⁶

The transmission of technical data, however, never officially took place. During their research activities, Italian radioecologists had to constantly navigate the halo of secrecy and informality surrounding this contentious point.⁵⁷ Consider the recollections of Dr. Eugenio Tabet, one of the first ISS experts involved in the initial stages of the radiosurveillance program:

At the beginning we faced a situation that recalled Ionesco’s theatrical work. We asked CAMEN to give us the technical details of the U.S. submarines’ reactors, but their response was never direct and clear. In order to get started we had to hypothesize that the reactors propelling the submarines were pressurized water reactors (PWR) with a power of 70MW or so. CAMEN’s answer was that we were probably not too far from the truth.⁵⁸

⁵⁴ Italian regulation for the peaceful use of nuclear energy was organically introduced in DPR n. 185, 1964. The legislation about nuclear ports was drafted only in 1979, after La Maddalena. Before then, the presence and transit of nuclear naval units, both civilian and military in Italian harbors was evaluated on a case by case basis with protocols tailored on the characteristics of the naval units and an emergency plan was crafted on each occasion (see section 3.5. below).

⁵⁵ This debate was already at the center of a techno-political polemic raised not only by the Communist Party but also by qualified scientific organizations and divisions inside ISS and CNEN. See the “Declaration of the personnel of the Division Security and Control and the Division of Protection and Security of CNEN, Rome, November 20th, 1972.” (Private Archive, Carlo Papucci, Lerici).

⁵⁶ Ibidem.

⁵⁷ The limits of ISS and CNEN campaigns were clear also to the local population, constantly (at least partially) informed by local newspapers: “Limitata in partenza l’indagine del CNEN sull’inquinamento atomico,” *Tutto Quotidiano*, 19 July 1975, p. 12.

⁵⁸ Eugenio Tabet, personal interview, Rome, January 12th 2012.

When designing the radiosurveillance program for La Maddalena, Italian experts had to make assumptions about crucial aspects of the U.S. Navy submarines' operations. Based on the hypothesis that the reactors propelling the submarines were Pressurized Water Reactors (PWR) of a certain power, they identified some typical radionuclides that in case of routine discharges and in anomalous circumstances, like accidents, would be dispersed in the surrounding environment. In analogy with what would have happened with a typical PWR plant like the one installed at Trino Vercellese in 1964 (in Piedmont, North West Italy), the radioactive elements of concern could be divided into fission products, namely Iodine 131 and Cesium 137, and activation products, in particular Cobalt 60 and Manganese 54.⁵⁹ Thus, the main goal of the radiosurveillance program was to detect the presence of those elements in order to assess the environmental and sanitary impacts of the U.S. Navy presence and operations in the archipelago.

The task was complicated. Given the lack of any radioecological information prior to the U.S. Navy base installation, Italian experts were not able to calculate and identify the possible patterns of radiocontaminants dispersed into the environment. Direction, strength, and intensity of the winds and marine currents, levels of natural background radioactivity, presence of particular bio-accumulators, socio-economic characteristics of the site were all blank variables. For these reasons the radiosurveillance system put in place at that stage was over-dimensioned (many sampling points) and did not have a baseline for the levels of environmental radioactivity (that is, the natural and anthropogenic radioactivity present in the environment before the U.S. Navy base started to operate) to which further measurements could be compared. In the technical report they sent to the Minister of Health, ISS experts warned him that: “[the lack of basic information] makes the radioecological study particularly urgent in order to assess the environmental and sanitary impact of the installation as soon as possible.”⁶⁰

Before the official initiative of the Minister of Health, CNEN had already included La Maddalena among the sites forming the national network of marine radiosurveillance. Thanks to this zealous initiative the Continental Contamination Laboratory of Casaccia (one of the most important CNEN facilities, located near Rome) since November 1972 CNEN's personnel started to measure the levels of radioactivity of various samples coming from La Maddalena. From that

⁵⁹ Of the first type (fission products) are elements created by the reactions inside the core of the reactor, while the second ones (activation products) are formed by the irradiation of the materials containing the reactor and those of the primary cooling circuit.

⁶⁰ AA.VV., “Indagine Ambientale nell'intorno della base nucleare navale situate nell'isola de La Maddalena,” APPENDIX 1, internal document, ISS, probably Summer/Fall 1974 (Salvatore Sanna, *Private Archive*).

date on, central institutions (CNEN, ISS, and CAMEN) repeated the analyses every six months, although they not always applied identical sampling methods and radiometric procedures.⁶¹ This monitoring system guaranteed only a minimum threshold of radio-ecological surveillance. In 1975 the situation was still problematic and the program established under the auspices of the Ministry of Health was far from being completed.

During his intervention at the first national conference on “US Nuclear Bases, Local Populations, and the Environment: The Case of La Maddalena,” organized by *Gruppo Ambiente* in September 1975, Dr. Tabet denounced the serious deficiencies in the implementation of the radiosurveillance program.⁶² Not only did the lack of basic technical information regarding the U.S. reactors forced ISS and CNEN to design a very large network of sampling stations, but the scarcity of radioecological expertise in Sardinia made it necessary for the central radioprotection institutions--whose personnel furnished technical equipment, methodological assistance, and radiometric measurements in Rome--to intervene directly. This meant that specimens collected in La Maddalena had to be sent to Rome, prepared and treated in the ISS and CNEN laboratories, and finally examined. The entire process required months and the scarce personnel of the central expert institutions could not continue the service *ad infinitum*, as clearly stated in the initial guidelines prepared for the Minister of Health in 1974.⁶³

Further complicating data collection was the time separating the moment of samples collection from the final radiometric analyses was too long for the data to be significant in case of an accidental event. This level of analysis, called “Second Level Network,” was, in fact, intended to trace the processes of radionuclides accumulation in the environment over an extended period of time, but was not designed to identify and respond in real time to an accidental discharge. For this reason, ISS and CNEN technicians designed a so-called “First Level Network” that would allow radiometric measurements h24 with a network of automatic radiometric stations connected to monitors for the immediate transmission and visualization of

⁶¹ G. C. Boeri and F. Giorcelli, *Le Reti Nazionali per il rilevamento della radioattività ambientale*, cit. pp. 29-31. The role of CAMEN in the radio-surveillance system of La Maddalena was somehow independent of the coordinated strategy implemented by ISS and CNEN, although it participated with the other two institutions to the systematic inter-comparisons of data starting in the late 1970s. It is not possible to establish with certainty to what extent CAMEN had direct supervision of the annual radiometric reports that the US Navy was performing in La Maddalena, like in any other facility both in the US and overseas (for example in Japan, among other countries). The US Navy published its data in official bulletins and shared them with other US institutions as part of a larger network of radiometric and radio-ecological monitoring stations across the country.

⁶² The Conference took place in Rome on September 24/25, 1975.

⁶³ *Ibidem*, cit.

radioactivity levels. In case of anomalies and according with their magnitude, local personnel would first alert local and regional authorities and, if required, start the procedure of emergency. To complement the monitoring system, qualified personnel would conduct monthly radiometric measurements through gamma spectrometry on specimens collected and analyzed in a laboratory to be located in La Maddalena. According to the initial project, technical personnel in Sardinia should have administered this part of the radio-surveillance system, but at that time the lack of expertise at the local level and the bureaucratic obstacles at the regional and provincial levels delayed its full implementation for another eight years.⁶⁴

Following the intervention of Dr. Tabet, Mario Mittempergher, then director of the Radiation Department of CNEN, lamented the state of uncertainty in which radioecologists and radioprotectionists had to work in La Maddalena. They had to adapt to the unusual situation by selecting a large number of sampling sites and using a remote point situated on the north western corner of the major island as a control case, the so-called point zero (point 10 on Fig. 3.8.), where supposedly the U.S. submarines would not transit and no currents coming from the bay of Santo Stefano (points 2 and 9) could transport radionuclides.

⁶⁴ The monthly radiometric measurements began only in 1978, while in installation of a local laboratory for the continuous monitoring of radioactivity levels happened in 1979.

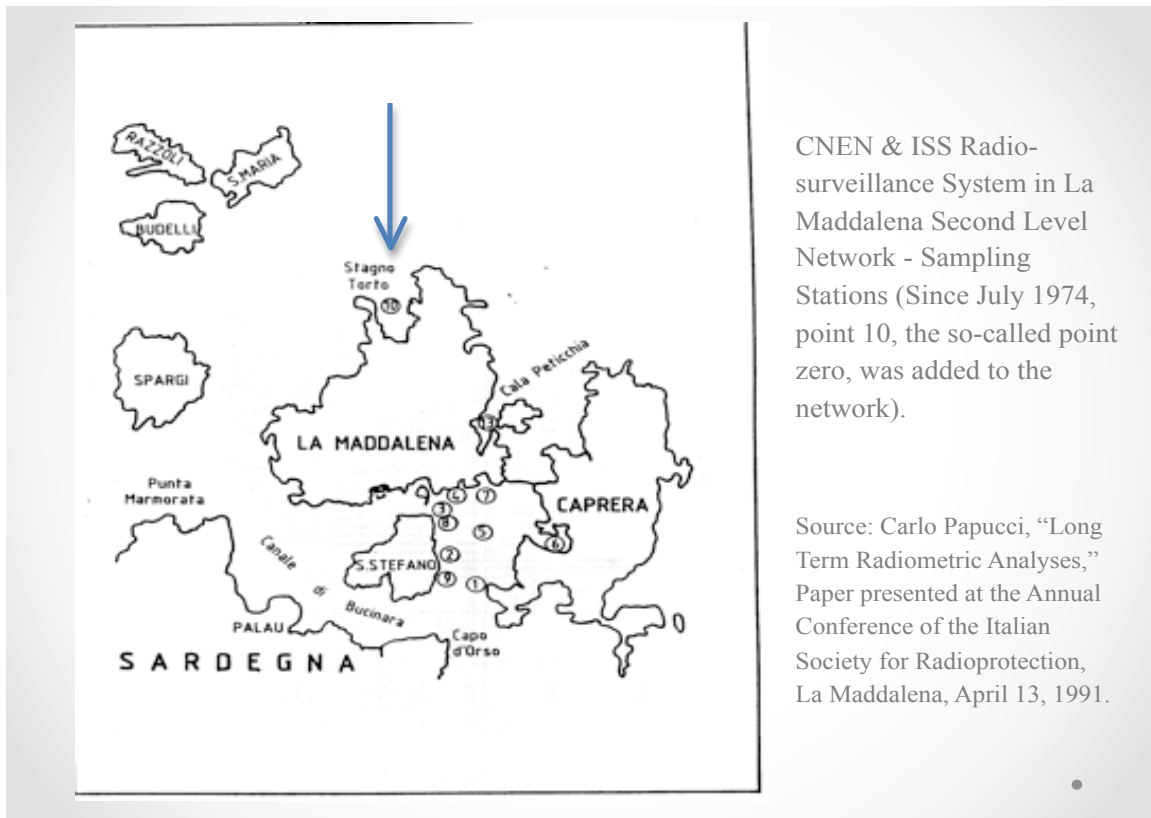


Figure 3.11. CNEN & ISS Radio-surveillance system in La Maddalena: sampling sites.

Tabet and Mitterpergher detailed the contradictions and the obstacles that ISS and CNEN experts encountered in La Maddalena because of the special conditions of the site. While Italian experts institutions attempted to preserve, to different degrees, their independence from political pressures, they could not avoid taking into consideration the obvious political and technical implications that military secrecy had for their work. Concerned with the primary objective of their institutional role, ISS and CNEN proceeded to design and implement the radiosurveillance system around the U.S. Navy installation, incorporating these uncertain elements into their research strategy. The entire radiosurveillance system was based on a fragile compromise between security needs (embodied by the military secrecy of the U.S. Navy) and safety protocols. In the following sections, though, I show that two more obstacles impeded the complete application of national and international nuclear safety regulations in La Maddalena.

3.5. Missing Files

During the first months of research, I relied on the online catalogue of ENEA to retrieve official documentation of the environmental studies the agency conducted in La Maddalena. Among other publications, a paper by Dr. Giuseppe Buffoni et al. titled “Uno studio dei contaminanti in mare nell’area de ‘La Maddalena’” (A study of contaminants’ dispersion at sea in the area of La Maddalena) captured my attention.⁶⁵ I added the title and its location to the list of items to borrow from the library of the ENEA research center of Casaccia (near Rome, one of the first centers built by CNEN in the mid-1950s). Few librarians work there with little funds and in precarious conditions. The library of Casaccia probably has not known major restorations and reorganizations since the 1980s, and fits the stereotype of the decadent Italian nuclear past. Fenced and guarded, the center still contains the relics of the Italian nuclear research program. Only one experimental reactor (of the three previously active) is still working and serves as pedagogical tool for physics students coming from various universities around Rome. More problematic is the nuclear waste and radiological material still stored inside steel silos, waiting for a definitive collocation in the not yet built national storage site, whose location Italian authorities, after twenty years, are still in the process of deciding.

I first arrived in Casaccia in January 2012 for my archival research. The personnel of the library, including the director welcomed me warmly and invited me to make any requests that would ease my research. All went smoothly, until I run into Giuseppe Buffoni’s study of the dispersion of contaminants in La Maddalena. The catalogue indicated that the library owned one copy, which I could borrow for up to a month. The assistant librarian looked frustrated and puzzled when he came back from his first round on the stacks: “It should be there, but I could not find it.” Embarrassed, but determined to solve the problem, he told me that he would need more time: “Come back tomorrow and in the meantime I’ll try to get this paper out. It must be here, no doubts.” The next day the librarian proactively reached me at the entry door and apologetically explained that the paper was missing. The director of the library emerged from her office to meet us in the corridor just in front of the main entrance and reassured me that she had already sent a request to all ENEA libraries to see if by chance they had another copy of Buffoni’s study. After a few days, I received an official response that the report was missing. I interpreted the episode

⁶⁵ Buffoni, G., C. P. Gasparini, and A. Zattera, “Uno studio dei contaminanti in mare nell’area de ‘La Maddalena’,” ENEA RTI-INN (92) - 22, 1992.

as a sign of the stereotypical fallacies of Italian public bureaucracy, so I decided, as I had done for other ENEA reports, to contact directly the authors.

I found Giuseppe Buffoni through a standard Google search. A long list of scientific publications appeared on my screen, and several email addresses. To my surprise and excitement he replied almost immediately and gave me his phone number. I called: “Yes, it’s me. I have the report you are looking for and many others. I can send everything to you or we can meet.” Several weeks later, I was traveling to the Center for the Study of Marine Environments of ENEA, in Liguria, where Buffoni worked for almost two decades. He was still living in La Spezia, near the research center, and decided to join Carlo Papucci and myself for a day of recollections and explanations of their work in La Maddalena. I first met Carlo Papucci in his office, where we discussed the material he could retrieve from his archive when he opened a folder from which he extracted Buffoni’s missing study: “Is this the paper you were looking for?” “Yes—I replied—can I make a copy?” “Hmm, better if you make just a copy of the cover and the introduction. I’ll give you the rest once Giuseppe arrives here and gives you his permission.” For the first time since we started our collaboration, I felt that Carlo was preoccupied about something and that he was not telling me everything about that paper. He just mentioned that Buffoni’s study “created some problems in the past” and that it was better if Buffoni himself told me about it.

The next day, Buffoni arrived at the center, welcomed as an old friend. A first class physicist specialized in nuclear reactor physics and calculation problems, he began work at the CNEN shortly after his graduation, first on computational modeling and later, after moving to La Spezia, on numerical models of thermo-hydrodynamics and transport-diffusion processes. During our conversation he did not talk very much. Habituated to express concepts through formal numerical models, he tried to explain me his work by drawing on paper.

After responding to a preliminary set of questions about his background and scientific activity at CNEN/ENEA, he grabbed a thick folder containing a bunch of documents, including old works on La Maddalena. The missing file was finally in my hands, but far more interesting was the story behind the document. Buffoni passed on to me a series of letters: “All you need to know about this report is written there.” An internal communication sheet dated 23 November 1984 recited: “History of the technical report *Analysis of a hypothetical nuclear accident in the*

Archipelago of La Maddalena by Buffoni, Gasperini, and Zattera.”⁶⁶ In it Buffoni addressed professor Metalli, a radiation pathologist and director of the radioprotection division of ENEA, to ask him why the report, completed in 1982, had not been published yet. The first thing that struck me about the 1984 letter was the title of the study. The paper as publicly catalogued by ENEA does not mention the words “nuclear accident” at all. Instead it refers to the generic category of “contaminants.” The history of the original report is telling of the complexities of Italian nuclear bureaucracy but also of its internal contradictions. It shows the concrete effects of the discretionary powers that CNEN/ENEN division directors and cadres exercised in cases like La Maddalena. “After July 1982 the work was ready [for publication] ... I thought that the procedures for the publication as RTI (Internal Technical Report) had already started ... but now [end of 1984] I come to know that they have not and that after sending the report to Metalli and Mittempergher [then director of ENEA] ... the publication will not take place for reasons of opportunity.”⁶⁷ Buffoni wondered what happened in the meantime to make the director of ENEA veto the publication after it had already received a go from his departmental director. He mentioned that, according to ENEA’s regulations on publishing, the report could be classified and its circulation restricted if necessary but a veto on publication was absurd “considering that its existence is known also outside the agency and that there could be requests of information. This anomaly might be noticed outside [the agency] and I am wondering if it would not be better to have at least something, even classified, rather than nothing.” After twenty years from its official publication, I was asking myself the questions that Buffoni addressed to his superiors. What is the logic of hiding something that is official and purportedly public and catalogued as a contribution to ENEA’s scientific production? Was it not sufficient to delete the alarming words “nuclear accident” from the title of the study? What did the officials of ENEA’s censorship hope to accomplish by putting an empty box on the shelves?

Buffoni’s study reappeared in official documents only in 1991, when a team of civilian and military experts collaborated for a major update of the radiosurveillance network of La Maddalena and for the relocation of the monitoring stations closer to the U.S. Navy base. On that

⁶⁶ “Storia del rapporto tecnico ‘Analisi di un ipotetico incidente nucleare nell’Arcipelago de La Maddalena’ di Buffoni, Gasparini, Zattera. ENEA, Comunicazione interna, 23 November 1984. *Personal Archive Giuseppe Buffoni*.

⁶⁷ *Ibidem*, p. 2.

occasion, Carlo Papucci wrote a note to the director of the ENEA Center for the Study of Marine Environment, suggesting that:

[In order to locate the monitoring stations in the appropriate positions] It would be extremely helpful to consult the dispersion models of the Santo Stefano bay [...]. It would be of utmost importance to access, officially, the study that Buffoni, Gasperini, and Zattera elaborated at this center. The study, for various reasons, has never been published. It would be time to do so, with the agreement of the authors and the direction, so that our team could use that information for our work.⁶⁸

In the case of Buffoni's missing file, ENEA's director and some of his colleagues used their influential position inside the agency to delete the alarming words "nuclear accident" from the title of the 1982 report, to considerably delay its "publication," and to ultimately transform "the file" into a spectral archival presence. The act of depleting the document of potentially alarming evidence, however, produced a multiplication of traces.

3.6. Compartmentalization: The Dual System of Radiosurveillance

The Italian legislation on the "peaceful uses of nuclear energy" (the Presidential Decree n. 185, 1964) did not contain explicit norms for the regulation of the military applications of nuclear technology. Italy has never had real plans to acquire or develop nuclear technologies in the military sector. Nonetheless, as described above, similar to other European countries, in Italy the CNEN and CAMEN officially managed a radiosurveillance system to monitor the effects of nuclear fallout from military atmospheric experiments (until 1963) and industrial emissions. The role of military institutions in this field, though, has never been openly stated, as if the lack of a military nuclear program automatically justified leaving the military applications of nuclear power outside formal nuclear regulations. For example, Italian legislation lacked general norms about safety measures at military nuclear ports—that is, those ports where the anchorage and the traffic of nuclear ships were allowed. Like in the case of the arrival of the U.S. nuclear ship Savannah, for civilian ports Italian authorities prepared specific emergency plans in analogy with the prescriptions followed for inland nuclear plants.⁶⁹ This was not the case for military nuclear

⁶⁸ "Nota per la direzione. ARCIPELAGO DE LA MADDALENA: Rete di Monitoraggio in continuo della radioattività ambientale," March 13, 1991 [signed Carlo Papucci]. *Archive ENEA Center for the Study of Marine Environment*.

⁶⁹ This was done in accordance with the Presidential Decree N. 185 of 1964, which still remains, with subsequent modifications, the main Italian nuclear regulatory instrument in the civilian nuclear field. External emergency plans elaborated during the 1960s and 1970s for the protection of the population living in the proximity of nuclear ports can be found in the archive of the *Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA)*—former

ports. In ports like Taranto (in Puglia), La Spezia (Liguria), and Gaeta (Campania)—where the circulation and anchorage of U.S. Navy nuclear ships was quite frequent—it would have been impractical to follow normal authorization procedures. The effectiveness of U.S. military strategies depended heavily on secrecy and time; as such, the movement of nuclear ships was not communicated far in advance to Italian military authorities, much less to civilian agencies. The presence of U.S. forces in Italy was regulated with the secret Bilateral Infrastructure Agreement stipulated between the Italian and the U.S. government in 1954. It is likely that the use of Italian military ports became part of the agreement with later updates, probably through the concession of a general authorization to operate nuclear ships in Italian territorial waters.⁷⁰ For this reason, CAMEN included military ports in the national radiosurveillance network and conducted periodic radiometric measurements that guaranteed the application of basic radioprotection standards without interfering with U.S. military strategies.⁷¹ This arrangement, however, was not formally regulated. Exclusive military competence over radioprotection and radiosurveillance at nuclear military ports was the result of the state of anomie in which Italian legislation left this field of nuclear regulation. Only in 1979, on the basis of the experience accumulated with the case of La Maddalena, the Italian government, in consultation with CNEN, finally decided to fill this normative gap.⁷² Thus, La Maddalena was a point of reference for the extension of nuclear safety norms to all nuclear ports and military nuclear ships.

Dipartimento Sicurezza e Protezione del CNEN (CNEN-DISP)—in Rome. I thank Dr. Lidia Pucciarelli and Dr. Silvia Scarpato, respectively former and current curator of the archive, for their assistance and clarifications. See note 83 on the nuclear ship Savannah.

⁷⁰ Here I am entering the terrain of the “conjectural,” as Carlo Ginzburg would put it, in the sense that the secrecy of the agreement in question prevents me from asserting with total confidence that the Italian government gave U.S. nuclear ships a general authorization to operate in its territorial waters. I can speculate that this is likely so, though, because in various conversations I had with them, retired U.S. Navy servicemen who were stationed in La Maddalena told me that one of the advantages of “La Madd” was that there nuclear submarines could come and go as they pleased without having to request formal authorization to the Italian Navy. I would assume that this was common practice, except for ports where the intense traffic of other ships would require supplementary safety provisions. See Carlo Ginzburg, “Morelli, Freud, and Sherlock Holmes: Clues and Scientific Methods,” *History Workshop* n. 9, Spring 1980: 5-36.

⁷¹ I will come back to this aspect of the Italian radiosurveillance program in the next chapter. A detailed description of CAMEN’s radiosurveillance protocols along Italian coastal lines can be found in various reports. See, for example, Luigi Argiero (Major, Director of CAMEN’s Radioprotection Laboratory) et Al., “Controllo sistematico della radioattività del mare lungo le coste italiane. Organizzazione delle reti di prelievo di campioni di acqua e fauna marina. Tecniche e dati di misura. Programma di studi e ricerche,” *Minerva Nucleare* 7 (7), July 1963: 261-267.

⁷² See “Presupposti tecnici per il piano di emergenza esterna relativo alla sosta di unità navali militari a propulsione nucleare nei porti italiani,” *Documento DISP | Navi nucleari (1979) 1 del C.N.E.N.*, Roma, May 1979. *Archive ISPRA*. The document has been updated in 2000 and in 2005. See Lidia Pucciarelli, “Presupposti tecnici Presupposti tecnici per il piano di emergenza esterna relativo alla sosta di unità navali militari a propulsione nucleare nei porti italiani – Revisione 2000,” *DOC. NUC/NAVI NUCLEARI (2000) 1*, May 25, 2000. The document has a very useful

The new regulation, however, did not substantially alter the technopolitical compromise between military security and public safety. Rather, the evidence I gathered for the case of La Maddalena suggests a continuation of the separation between civilian and military competence over radiosurveillance programs--what I call Italy's *dual nuclear regulatory regime*. In particular I will illustrate how, even after the launching of the radiosurveillance program by CNEN and ISS, CAMEN (and later, its successor CISAM) maintained a degree of control over the system, independently from civilian agencies. To safeguard its autonomous control over nuclear radiosurveillance in La Maddalena, CAMEN put in place a shadow radiometric network, with monitoring stations directly managed by its personnel and by the Italian Navy. I argue that the presence of the dual system of radiosurveillance is yet another the elements of the technopolitical compromise between military security and safety protocols that Italy assumed as a U.S. ally during the Cold War.

During the second half of the 1970s, on several occasions, local and national newspapers reported quotes from official press releases of the Ministry of Defense and Italian military authorities indicating that a system of radiosurveillance controlled directly by military personnel was already in place in La Maddalena. For example, after the accident of the submarine Ray in September 1977 (see Chapter 4), the Italian minister of defense announced that the accident was under control due to the monitoring system managed by the Italian Navy.⁷³ Given the ambiguity with which the actors involved in the environmental monitoring of La Maddalena often described the organization of the service, it is difficult to assess what military authorities exactly meant by "radiosurveillance system" (monthly sample analyses-first level, semestral sample analyses-second level, or continuous radiometric monitoring-zero level?). From official CNEN and ISS reports, we can discern that CAMEN collaborated with the two civilian expert institutions since 1972, when they began extracting monthly and bi-yearly sample analyses of

historical introduction with a contextual explanation for the rationale and the origins of the current regulations. To my knowledge, the most updated version of the document on the elaboration and approval of external emergency plans in Italian nuclear ports is by Ing. Paolo Zeppa, *Doc. EME-PIA/2004/02 – Revisione 1*, Rome, February 2005. *Archive ISPRA*, Rome.

⁷³ "Il ministro della difesa rassicura. Misteri e perplessità rimangono," *Tutto Quotidiano*, 25 September, 1977, p. 1,9;

"Affidato ai soli militari il controllo della radioattività nella base atomica," *L'Unione Sarda*, November 4, 1977.

"Nessun pericolo per La Maddalena," *L'Unione Sarda*, 25 September, 1977, p. 2.

"Non c'è radioattività alla base della Maddalena," *L'Unità*, 1 October, 1977.

"La Maddalena non rischia pericoli da radiazioni," *Il Tempo*, 1 October, 1977.

"Dal ministro della Difesa il sindaco della Maddalena per le navi nucleari," *La Stampa*, 1 October, 1977.

specimens from the archipelago. But did the Italian Navy install its own continuous monitoring system independently from civilian expert authorities?

I could find only indirect, and sometimes contradictory, traces of its existence. In one report issued in June 1980 Gian Nicola Cabizza, the first director of the local laboratory of La Maddalena, mentioned that the false alarms signaled by the aerial monitoring station of La Maddalena were also appearing on the monitors of the Italian Navy.⁷⁴ In 2004, during the audit organized by the Environmental Committee of the Italian Senate after the Hartford accident (see Chapter 6), Armando Benedetti, a technician of the Inter-force Center for the Study of Military Applications (CISAM, previously known as CAMEN), explained that the Italian Navy controlled a network of three monitoring stations, designed and managed by military authorities, but he did not specify when they were installed. He only mentioned that one of the stations was “positioned directly on the pier where the submarines are moored.”⁷⁵ More recently I received confirmation from a former Italian Navy officer that the monitoring system of the Italian Navy existed and was activated between September 1986 and September 1988. According to the officer, the Navy decided to put its own radiosurveillance system in place because it did not want to deal with the uncertainties and the bureaucratic complexities of the Province of Sassari. He remembers that officers and technicians of CISAM went periodically to La Maddalena for maintenance operations: “They usually asked for the assistance of our workers [of the arsenal] and for technical equipment [...]. I can tell you that one monitoring station was certainly installed on the U.S. Navy pier in Santo Stefano, and another one in Stagnali, on the island of Caprera, just in front of the U.S. base. I do not know if there were other stations, though.”⁷⁶

The dates suggested by the Italian Navy officer correspond with those from other documents. In November 1985 the Office of Environmental Affairs of the Province of Sassari sent a 15-page report to the president of the Province with a detailed description of the state of the art of the radiosurveillance service of La Maddalena:

⁷⁴ Gian Nicola Cabizza, “Compendio dei controlli sulla radioattività ambientale alla Maddalena effettuati c/o il Laboratorio Provinciale di Fisica delle radiazioni, dalla sua entrata in funzione ad oggi. Sintesi delle precedenti comunicazioni mensili,” June 20, 1980. *Archive of the Province of Sassari*.

⁷⁵ “Seguito dell’indagine conoscitiva sulla situazione ambientale dell’Arcipelago di La Maddalena: audizione del Direttore del Centro interforze studi ed applicazioni militari (CISAM).” Legislatura 14° - 13ª Commissione permanente “Territorio, Ambiente, Beni Ambientali” Senato della Repubblica - Resoconto stenografico n. 384, December 16, 2004: pp. 11-12.

⁷⁶ Private communication with the author. June 21, 2014.

The radiometric stations [purchased in 1979] delivered to the laboratory of La Maddalena in 1982 have not been installed yet due to technical problems (delays in the connections with electric and phone cables) and for the veto of military authorities on their installation near the U.S. Navy pier, which the experts deem crucial for the effectiveness of the radiosurveillance system.⁷⁷

A year later, the radiometric stations in the proximity of the U.S. Navy base were still inactive. During a meeting held in La Maddalena in November 1986, twenty-six participants, representing military, civilian, and expert institutions from the local to the governmental level, decided to solve once and for all the “technical problems” impinging on the activation of the monitoring system.⁷⁸ The report of the event, titled “Civilian Monitoring Network of the Archipelago of La Maddalena,” implicitly indicates a distinction from non-civilian monitoring systems.⁷⁹ Indeed, as the document clarifies, military authorities gave civilian agencies permission to install three monitoring stations near the U.S. Navy pier (but much further away from the original points indicated by CNEN and ISS experts) on the condition that military personnel maintain exclusive control over them. Thus, the personnel of CISAM (the expert military agency on nuclear applications) and the Italian Navy obtained their own radiosurveillance system (of three stations), nested inside the larger radiometric network managed by the Province of Sassari.

Among ISS and CNEN experts the impression was widespread that the unofficial duplication of radiosurveillance systems was strongly upheld by military authorities. On November 1977, after the USS Ray accident (see Chapter 4), military and civilian authorities organized the umpteenth conference to discuss the delays and problems in the implementation of the radiosurveillance program in La Maddalena.⁸⁰ Carlo Papucci, who attended the meeting with other CNEN personnel, wrote a report for CGIL-Ricerca in which he underlined the tendency by

⁷⁷ Provincia di Sassari - Ufficio Ecologia, “OGGETTO: Controllo sulla radioattività nello archipelago di La Maddalena - Relazione informativa,” Sassari, November 11, 1985. *Archive Province of Sassari*. Cit. p. 6.

⁷⁸ “Verbale di riunione del giorno 25 Novembre 1986 - ARGOMENTO: Rete Monitoraggio Civile Arcipelago di La Maddalena,” November 25, 1986 [no folder]. *Municipal Archive of La Maddalena*. A list of participants and their signatures appear at the end of the document. Twenty-six persons attended the meeting, including the mayor of La Maddalena Antonio Fonnesu, Dr. Floriana Manca, new director of the local laboratory, a representative of the central government, various representatives of the Region of Sardinia, and of the Province of Sassari, technicians of the company who fabricated and installed the radiometric stations, military personnel, and experts from CNEN, ISS, and the ministry of health and defense. These data give a sense of the complexity of the decision-making process, involving the coordination of all the administrative levels and often contrasting interests represented around the table.

⁷⁹ I found the document inside a random box abandoned in the attic of the Municipal Palace of La Maddalena.

⁸⁰ “Perché dobbiamo tenerci una base pericolosa? La Maddalena: Convegno sul controllo della radioattività ambientale nell’arcipelago,” *Tutto Quotidiano*, November 9, 1977.

military authorities to keep an exclusive control over military nuclear affairs: “[...] the emergency plan has been made by the [Ministry of] Defense, the radiosurveillance system is managed by the military. ISS and CNEN have been working for two years only to cover up the problems during the difficult times [i.e. controversial debates during which local institutions and the public needed reassurance about the efficacy of the radioprotection program].”⁸¹ He concluded that what happened in La Maddalena was not new (because it happened elsewhere) but was in open contradiction with official legislation. According to Papucci, this was even more evident for radioprotection programs at nuclear ports, where military authorities had a real conflict of interest for being at the same time the controller and the controlled: “This raises serious doubts as to whether the protection of civilians is really among their [military authorities] priorities.”⁸² While CNEN maintained its sphere of competence over the radiosurveillance of civilian nuclear ships approaching and mooring at Italian ports, for Papucci and colleagues, nuclear powered military ships continued to be off limits.⁸³ This did not exclude collaboration between the personnel of CAMEN / CISAM and those of ISS and CNEN. In fact, even in La Maddalena the exchange of information during data inter-comparisons, sampling, and specimen collection was frequent. The collaboration, though, was limited to specific areas of the research and never formally regulated.

As Papucci suggested, the opacity of the radiosurveillance system of La Maddalena was not unique. Parallel systems of radiosurveillance (even if not necessarily structured like that of La Maddalena) existed in all those situations in which military authorities perceived that national defense interests prevailed over the respect of the protocols established by the Italian law.

In his historical genealogy of the state of exception, Giorgio Agamben argues that it is exactly the ambiguity regarding the intra/extra juridical status of the emergency executive

⁸¹ Carlo Papucci, “‘Caso Maddalena’ e intervento del sindacato: situazione al Novembre 1977,” November 8, 1977. *Private Archive Carlo Papucci*.

⁸² *Ibidem*, cit. p. 4.

⁸³ In part, this was due to the fact that the United States concluded a “free pass” agreement with Italy (and with other European countries) according to which nuclear powered submarines did not need to require permission to Italian authorities each time they approached Italian ports. A retired U.S. Navy sailor stationed in La Maddalena during the 1980s has confirmed this during a personal interview. He mentioned that in La Maddalena the transit of nuclear submarines was facilitated by the fact that the U.S. Navy did not permission to enter the bay of Santo Stefano each time a nuclear submarine approached the archipelago. This clearly made the refitting and refurbishing operations more agile. Probably, Italian military authorities knew at least in part the frequency of nuclear powered ships transits at nuclear ports, but certainly this was an information that both the American Navy and the Italian Navy did not want to share with civilian authorities. In 1988, for example, Sardinian newspapers cited unofficial sources made available by pacifist movements reporting that: “only in 1985 La Maddalena hosted a total of 832 units.” From: “La Maddalena un ‘record nucleare’,” *La Nuova Sardegna*, June 4, 1988.

decrees that makes them such powerful (and abused) instruments of law production by Western governments.⁸⁴ The state of exception is not the product of an objective lacuna in the juridical order, but the suspension of the law justified by its inapplicability in a concrete (exceptional) circumstance. The executive power thus creates a fictitious lacuna through which it justifies its decision to intervene by temporarily suspending the rule of law.⁸⁵

Unlike nuclear states where the military applications of nuclear power are exceptionally subtracted from common public scrutiny for security reasons, the Italian nuclear regulations left the military field virtually unregulated. Civilian agencies (CNEN and ISS) could intervene in La Maddalena only by analogy with inland nuclear plants, but this was an informal, ad hoc arrangement. In Italy military agencies could appropriate an unofficial competence over nuclear activities of military relevance exactly for the absence of a national legislation regulating (in general) the military uses of nuclear energy and (in particular) safety protocols at nuclear ports.⁸⁶ Until 1978 the Italian legislation did not assign CAMEN any explicit competence in the area of radiosurveillance.⁸⁷ In fact, contrary to what happened for CNEN and ISS, CAMEN was not

⁸⁴ Giorgio Agamben, *State of Exception*, Chicago University Press, Chicago, 2005. See especially pp. 16-18 and 50-51.

⁸⁵ “Far from being a response to a normative lacuna, the state of exception appears as the opening of a fictitious lacuna in the order for the purpose of safeguarding the existence of the norm and its applicability to the normal situation. The lacuna is not within the law [*la legge*], but concerns its relation to reality, the very possibility of its application. It is as if the juridical order [*il diritto*] contained an essential fracture between the position of the norm and its application, which, in extreme situations, can be filled only by means of the state of exception, that is, by creating a zone in which application is suspended, but the law [*la legge*], as such, remains in force.” Cit. p. 31, emphasis original.

⁸⁶ Until 1979 Italy did not have an ad hoc legislation on radioprotection and emergency plans for nuclear ports. When civilian nuclear ships (like the U.S. Savannah and the German Otto Hahn) were expected to approach Italian nuclear ports (Naples, Livorno, Genova, Trieste, and Taranto, for example) ad hoc emergency plans were designed and implemented by expert agencies (CNEN and ISS), the prefectures, and military authorities. Only after, 1979 when the Technical Committee of the Security and Protection Department (D.I.S.P.) of CNEN and ISS issued the external emergency for La Maddalena, the Italian government decided to regulate safety procedures of all nuclear ports, based on the model provided by La Maddalena. A detailed description of the history of the legislation on nuclear safety at Italian ports can be found in: “Presupposti tecnici per il piano di emergenza esterna relativa alla sosta di unità navali militari a propulsione nucleare nei porti italiani,” Agenzia Nazionale Protezione Ambiente (A.N.P.A.), DOC. NUC/NAVI NUCLEARI, (2000) 1. *Archive Istituto Superiore per la Ricerca e la Protezione Ambientale (I.S.P.R.A.)*, Rome. For a concrete example of how radioprotection and environmental monitoring worked at Italian nuclear ports during the 1960s, the documentary *Nave senza Fumo* produced by CNEN provides a great historical example. The documentary is available in the online catalogue of E.N.E.A.: <http://webtv.sede.enea.it/index.php?page=listafilmcat2&idfilm=173&idcat=30>

⁸⁷ Only in 1978 CAMEN was officially assigned this competence in analogy with other nationally accredited institutions, like CNEN and ISS. See: *Legge 23 Dicembre 1978, n. 833: Istituzione del Servizio Sanitario Nazionale*. See in particular, article 6, section 1, points v) e z), concerning the competences of state agencies, regarding the organization of the health services attributed to military forces.

even instituted by law approved by the parliament.⁸⁸ The center started its activity around the mid-1950s with a small number of specialized personnel working under the supervision of nuclear physicist Tito Franzini, inside the Naval Academy of Livorno.⁸⁹ In 1961, the construction of an open pool experimental reactor (the RTS-1, more commonly known as “Galileo”) in the new site of S. Piero a Grado (between Pisa and Livorno, in Tuscany) made the center an important incubator for research projects and experiments in the fields of material testing, radiocontamination detection and defense, and nuclear propulsion.⁹⁰ Until recently, the Ministry of Defense had exclusive regulatory competence over the activities and organization of CAMEN and apart from rare exceptions it has done so through ministerial decrees, which have “protected” the military institute from the scrutiny of the parliament and the “interferences” of civilian authorities.⁹¹ CAMEN, thus, responded only to the Ministry of Defense and the military hierarchies. The first parliamentary law addressing the center was passed in 1962 (without even mentioning CAMEN) to authorize the Ministry of Defense to hire external personnel with nuclear expertise.⁹²

The ambiguous status of CISAM continues, despite the fact that more recent legislation explicitly requires that military agencies and centers conform to European Union directives in the fields of environmental radiosurveillance and radioprotection.⁹³ Problems of transparency

⁸⁸ This in fact was the situation lamented by Italian members of parliament on various occasions. For example, during a 1977 audit of the undersecretary of defense Caroli (Christian Democrat) in the Committee on National Defense of the Italian Senate, Senators Bernardini, Tomelli, and Veronesi underlined the state of disorganization and scarce resources under which CAMEN was operating. During his counter reply, in particular, Senator Bernardini complained that: “The question of secrecy cannot restrict our right to be informed, for the simple reason that secrecy cannot exist when we are concerned with the problem of radioprotection of civilians [...] Before concluding I also want to remember that to day there is no [formal, by law] constitutive act for C.A.M.E.N.” *Senate of the Republic, VII Legislature, Defense Committee*, “14th Resoconto Stenografico Seduta di Mercoledì 4 Maggio 1977,” pp. 84-86.

⁸⁹ See Leopoldo Nuti, *La Sfida Nucleare*, pp. 64-66.

⁹⁰ A concise history of the center can be found in Amerigo Vaglini’s book, *Il nucleare a Pisa: quaderno di memorie storiche sul C.A.M.E.N., Centro applicazioni militari energia nucleare, 1955-1985*, (Pisa, ETS, 2009). Other “traces” about C.A.M.E.N.’s history, developments, and shortcomings, came be found in parliamentary acts. See, for example, the declarations of Italian deputy Giuseppe Nicolai during a question time addressed to the minister of defense Gui on January 23, 1969: *Atti Parlamentari della Camera dei Deputati, V Legislatura, Discussioni*, p. 4092. Cited in Nuti, *La Sfida Nucleare*, p. 65.

⁹¹ In 1985, a major reorganization of C.A.M.E.N. (which then changed its name into C.R.E.S.A.M. - Centro Ricerche e Studi Applicazioni Militari) happened through another ministerial decree (Decreto del Ministro della Difesa 13 Luglio, 1985). The same thing happened again in 1994, when C.R.E.S.A.M. became C.I.S.A.M. (Centro Interforze Studi per le Applicazioni Militari), through another decree of the Minister of Defense (Decreto del Ministro della Difesa 28 Aprile, 1994).

⁹² *Legge 29 Settembre 1962, n. 1483*: “Autorizzazione ad assumere personale laureato per ricerche e studi nel campo dell’energia nucleare e istituzione presso il Ministero della difesa, di un ruolo di personale tecnico di concetto per l’energia nucleare.” *Gazzetta Ufficiale*.

⁹³ *Decreto del Presidente della Repubblica n. 90 del 15 Marzo 2010*.

continue. For example, in 2013 members of the Italian parliament and environmentalist movements in Tuscany lamented CISAM's lack of transparency about the decommissioning of its experimental reactor (following the 1987 referendum) and the procedures for the disposal of its radioactive waste.⁹⁴ In her official response to the question time act, Minister of Defense, Roberta Pinotti, confirmed that: "[Other ministries] have not been involved in the authorization process [...] because the special norms applicable to the sites of the Ministry of Defense did not require it, as stated in the decree of the Prime Minister n. 183 of June 24, 2005."⁹⁵ During the decommissioning of CISAM's reactor, civilian authorities intervened only marginally.

The legislative anomaly concerning CAMEN / CISAM is twofold. On one hand, the extra-parliamentary nature of the Italian regulation of military nuclear activities protected the agency from public scrutiny and guaranteed a *de facto* compartmentalization of military and civilian nuclear sectors. On the other hand, the legislative vacuum concerning safety regulations at nuclear ports (at least until 1979) nominally left this field under the responsibility of civilian agencies, who could intervene in analogy with inland nuclear plants, but gave substantially more room for CAMEN / CISAM to maneuver in the shadow. The case of La Maddalena sheds light on the existence of two parallel radiosurveillance systems in Italy, which rarely intersected: a civilian system, officially regulated and under public scrutiny, and a military system, operating in the shadow thanks to a *de facto* protected regulatory regime managed by the Ministry of Defense and the military hierarchies.

La Maddalena also sheds light on an additional aspect of the technopolitical compromise between public safety and military security during the Cold War. The exceptional status of radiosurveillance at nuclear ports (until 1979) and of the military applications of nuclear technology in Italy created an unregulated space over which military authorities could exercise

⁹⁴ Senator Bottici, et Al., "Atto di sindacato Ispettivo n. 4-01202, Seduta n. 141 del 26 Novembre 2013," *Senato della Repubblica, Atti Parlamentari*. Available at: <http://www.senato.it/japp/bgt/showdoc/showText?tipodoc=Sindisp&leg=17&id=728578>.

⁹⁵ See: *Decreto del Presidente del Consiglio dei Ministri*, n. 183 24 Giugno, 2005. Available at: http://www.difesa.it/Legislazione/Norme_in_rete/Pagine/urn_nir_parlamento_decreto_ministeriale_2005-06-24_183_07_11_200501_06_2011_15_08_38.aspx. See in particular Article 4. See also: Minister of Defense, Roberta Pinotti, "Risposta all'interrogazione n. 4-01202, Fascicolo 67, 16 Dicembre 2014," *Senato della Repubblica, Atti Parlamentari*. Available at: <http://www.senato.it/japp/bgt/showdoc/frame.jsp?tipodoc=Sindisp&leg=17&id=826234>. For a detailed description of C.I.S.A.M.'s procedures for the decommissioning of its nuclear reactor, and in particular the problem of substantial lack of external control over the activities of the center, it is worth reading Senator Granaiola's question to the Minister of the Environment: "Al Ministro dell'ambiente e della tutela del territorio e del mare, Seduta n. 141 del 26 Novembre 2013." *Senato della Repubblica, Atti Parlamentari, Resoconto Stenografico, Allegato B*, pp. 280-282. Available at: <http://www.senato.it/service/PDF/PDFServer/BGT/728587.pdf>.

de facto an exclusive competence. Thanks to the lack of official acts, protocols, and parliamentary scrutiny, this invisible radiosurveillance system could work in the shadow, fulfilling its mission discretely, in collaboration with the U.S. objectives.

There were two dimensions of the effectiveness of the shadow radiosurveillance. First, maintaining the dual system guaranteed independence of military authorities *de facto* from the administrative supervision of CNEN and ISS. Second, ambiguity surrounding the shadow system helped shoulder its authority, in the sense that its existence could be mentioned in times of crisis, like after the Ray accident, to assuage public anxieties about the possible environmental and health consequences of unforeseen events. Within expert circles its existence was a public secret, something that everybody knew but was not able to speak about. It revealed itself at times of crisis or during emergency situations, and then withdrew again from public attention.

3.7. After Chernobyl: Anti-nuclear Escalation and the State of Exception in La Maddalena

In 1987 the Italian government announced the end of the national nuclear program. The decision followed the result of a referendum held a few months following the Chernobyl disaster. Environmentalist movements, and large sectors of the left (including the PCI), campaigned to abrogate three laws concerning nuclear plant siting and the activity of the public electric company (ENEL) in the nuclear sector.⁹⁶ The governmental decision to phase out the four

⁹⁶ In particular the three laws established that: (1) The state had the authority to individuate the sites for the construction of future nuclear plants and to enforce its decisions regardless of regional and local opposition; (2) The municipalities that hosted coal and nuclear power plants received an economic reward; (3) The Ente Nazionale Energia Elettrica (ENEL), the state owned national electric company, could invest and make agreements with foreign partners in the nuclear sector, including technological design and construction of nuclear plants. The referendum was not exclusively on nuclear matters. Two questions concerned the so-called civil liability of the judiciary, that is, whether public prosecutors, examining magistrates, and judges should be financially liable towards the parties involved in a trial in case it was proved that they made mistakes. For a political analysis of the referendums and their consequences for the Italian political system see David Hine, "The Italian Referendums of 8/9 November 1987," *Electoral Studies* 7 (2), 1988: 163-178. So far, the literature on the 1987 Italian "nuclear" referendum has been dominated by communication studies focused on the media coverage of the Chernobyl disaster and on survey data preceding and following the vote. See, for example, Cantone, Marie Claire, Giancarlo Sturloni, and Giancarlo Brunelli, "The Role Played by Stakeholders in the Public Debate that Brought Italy Out of the Club of Nuclear Energy Producers," *Health Physics* 93 (4), 2007: 261-266. Among Italian nuclear experts and advocates of the nuclear industry the opinion is widespread that the post-Chernobyl referendum determined the phasing-out of the national nuclear program. Often they attribute the governmental decision to shut down nuclear plants to the irrational fears provoked by the Chernobyl disaster. This study instead tries to demonstrate that that interpretation is quite simplistic and does not take into account the long-term economic, political, and organizational deficits that impinged upon the functioning of the nuclear program. An interesting reading of the 1987 referendum can be found

nuclear plants operating on the national territory inspired a large anti-nuclear front in Sardinia to promote a regional referendum against the permanence of the U.S. Navy base in La Maddalena.⁹⁷ The consultative vote could not determine any legislative change as such, but it mobilized strong symbolic and political significance for large sectors of the Sardinian constituency: anti-nuclearists, environmentalists, Communists, Sardinian autonomists, intellectuals, and younger generations inside the Socialist party and the Christian Democrats formed a bipartisan alliance backed by the Regional administration.⁹⁸ In June 1988, the organizers commented enthusiastically on the first results of their campaign. In La Maddalena alone, they collected more than a thousand signatures.⁹⁹ After they collected the requisite signatures to organize the referendum, the Regional administration made an official announcement that the consultation would take place in December.¹⁰⁰ The referendum became a symbol of Sardinian and national sovereignty, with clear international consequences: “The regional law that introduced [in Sardinia] the possibility to celebrate consultative referendums was primarily done for the problem of La Maddalena, which has become an issue of national and

in Paolo Ceri, “The nuclear power issue: a new political cleavage within Italian society?,” *Italian Politics* Vol. 2 (1988) 71-89.

⁹⁷ “Obiettivo La Maddalena. Parte una campagna dei pacifisti contro l’atomo nelle basi militari,” *L’Unione Sarda*, January 3, 1988; “Per dire no alla base. Dal 21 marzo la raccolta delle firme per il referendum,” *L’Unione Sarda*, March 4, 1988; “La base USA a La Maddalena ‘Violazione costituzionale’,” *L’Unione Sarda*, June 7, 1988.

⁹⁸ At that time, the President of the Region of Sardinia was Mario Melis, a long-term exponent of the Sardinian Action Party (Partito Sardo D’Azione). The party was a branch of the Partito D’Azione, a small republican party led by young intellectuals particularly active during the liberation movement against the Fascist dictatorship. Contrary to what happened in the rest of Italy, after the liberation of Italy the party maintained a significant presence (also from an electoral point of view) in Sardinia especially for its autonomist positions (but not independentist). The election of Mario Melis as president of Sardinia was directly supported by the Communist Party and with the external votes of the Socialist Party, and the Republican Party. During the Melis administration (1984-1989) the Region of Sardinia took the radiosurveillance service of La Maddalena under its responsibility, delegating the management of the local laboratory to the U.S.L. of Sassari. The transfer was announced by the Regional assessor of public health in polemic with the Provincial administration: “Via gli USA dalla Maddalena,” *La Nuova Sardegna*, March 17, 1988. .

⁹⁹ “La Maddalena un ‘record nucleare’,” *La Nuova Sardegna*, June 4, 1988.

¹⁰⁰ The three questions admitted by the regional electoral commission were clearly targeting the U.S. base of La Maddalena: (1) “Are you opposed to the presence of foreign military bases in Sardinia, established after bilateral international agreements that have not been subjected to parliamentary approval, and that offer logistic and refitting support also to nuclear ships and submarines carrying nuclear weapons?” (2) “Would you agree to a legislative proposal by the regional council [...] to prohibit the transit and the mooring of nuclear ships carrying nuclear weapons at national ports?” (3) “Would you support a legislative proposal by the regional council to institute consultative referendums for all international treaties and agreements that according to the Constitution [art. 80] require parliamentary approval?” From: “Per dire no alla base Usa,” *L’Unione Sarda*, March 4, 1988; “Referendum sulla base atomica,” *La Repubblica*, March 22, 1988; “Questo il testo degli interrogativi all’esame dei giudici romani,” *L’Unione Sarda*, January 24, 1989.

international importance. This is the peak of a battle for peace and for the protection of the environment,” said one of the promoters.¹⁰¹

The campaign for the anti-nuclear referendum was, in this instance, a clear political mobilization against the U.S. Navy base.¹⁰² La Maddalena became, once again, the epicenter of Sardinian politics and the target of national and international eco-pacifist movements, including Greenpeace.¹⁰³ The Italian government, guided by Christian Democrat Ciriaco De Mita, became aware of the political consequences of the initiative (and the spillover effect that it could have on Sardinian politics and Italian diplomacy) and decided to appeal the regional decree instituting the referendum in the Constitutional Court. According to Rome, the consultation could not take place because a regional constituency did not have the right to vote over the status of a military installation that was legally established through an international bilateral agreement.¹⁰⁴ The Constitutional Court case raised by the central government provoked a profound fracture inside the Sardinian administration. Socialists and Christian Democrats aligned with their national leaders and distanced themselves from the Communists and the Sardinian Action Party’s proposal to fight the government in court.¹⁰⁵ President Mario Melis accused the socialist allies of acquiescing and subordinating to the colonial logic of the Italian government: “This is not about foreign policy. This is about the right of the Sardinians to express themselves. It is [...] a battle against the restrictive interpretation of the Sardinian autonomy and the Italian constitution.”¹⁰⁶

¹⁰¹ This is the opinion of Andrea Pubusa, professor of public law at the University of Cagliari, Communist regional deputy, and “father” of the regional law that in 1987 introduced the institute of the consultative referendum in Sardinia. Quoted in “La base Usa alla Maddalena ‘violazione costituzionale,’” *La Nuova Sardegna*, June 7, 1988.

¹⁰² “Tre siluri contro la ‘base Usa’: I sardi alle urne per La Maddalena. Le votazioni a Dicembre o a Marzo,” *La Nuova Sardegna*, October 12, 1988.

¹⁰³ “E Greenpeace prepara un ‘assalto’ alla base Usa,” *L’Unione Sarda*, January 6, 1988. The spectacular initiatives of Greenpeace in La Maddalena became frequent and later on were emulated also by Italian movements, like Legambiente. One of them is still remembered by the local residents and several U.S. Navy sailors stationed in La Maddalena during that period. On June 25, 1988, Greenpeace activists symbolically assaulted the U.S. Navy tender in Santo Stefano on board of a rubber boat towing a wooden yellow submarine with the phrase: “Nuclear Free Sea.” See: “Assalto alla ‘Cable.’ Incursione di Greenpeace nella base Usa di Santo Stefano,” *La Nuova Sardegna*, June 25, 1988.

¹⁰⁴ “I ‘siluri’ contro la base Usa bloccati dal veto romano,” *La Nuova Sardegna*, October 10, 1988.

¹⁰⁵ It is worth noticing that at the national level the Socialist Party (PSI) adhered to the anti-nuclear campaign promoted by the Greens and co-determined the governmental decision to put the civilian nuclear program to an end, but the position of the party on La Maddalena remained contradictory. The regional PSI secretary, Antonello Cabras, justified his position with some difficulty: “We cannot say no to the American base, but we say no to nuclear power.” “Nuclear no, base Usa si,” *L’Unione Sarda*, November 4, 1988; “Il Psi dà ragione al governo,” *La Nuova Sardegna*, October 31, 1988; “Giunta alla prova dei referendum. A confronto le due anime della maggioranza,” *L’Unione Sarda*, November 2, 1988.

¹⁰⁶ “Psd’Az contro il Psi. E Melis conferma il ricorso alla Corte,” *L’Unione Sarda*, October 31, 1988.

The legal dispute placed the referendum in a stand-by until the Constitutional Court could release its verdict, but the political conflict exacerbated. In December *L'Unione Sarda* published the results of an opinion poll commissioned by the agency Abacus. The results were striking: if the regional referendum were to be held, 68% of Sardinians, on average, would have voted against the permanence of the U.S. nuclear base of La Maddalena.¹⁰⁷ After numerous deferrals, in early March 1989 the Constitutional Court ruled in favor of the Italian government and decided that the regional referendum could not be admitted because it violated the principle of “exclusive competence of the State over foreign affairs and national defense.”¹⁰⁸

By excluding Sardinians from democratically expressing their political orientations towards the U.S. base, the sentence reaffirmed one hierarchical order of the Italian state: national interests came before the interests of a single region. This was not new to Sardinia, where the Italian state had already imposed the presence of the 60% of its military installations and training camps, a colonialist tradition that continues today.¹⁰⁹ With this decision the Constitutional Court reestablished Sardinia’s subordination to the exploitative and hegemonic policies of the state. Further, by brandishing the constitutional order, the Court sanctioned the existence and the legitimacy of a state of exception concerning nuclear matters. In fact, in 1987 the residents of La Maddalena could vote in favor or opposition to the civilian nuclear program, but in 1988 they could not have a say in regards to living alongside a base for nuclear submarines.¹¹⁰ With the missed referendum about La Maddalena, the contradictions of Italy’s relationship with nuclear power during the Cold War reached their peak. As Leopoldo Nuti explains, while Italy renounced the use and development of nuclear power for military purposes, its pro-NATO political elites perceived the American deployment of nuclear weapons on Italian territory as a

¹⁰⁷ “L’Isola non ama i missili. I sardi bocciano la base americana,” *L’Unione Sarda*, December 12, 1988; “Tanta paura del nucleare. No di sessantotto sardi su cento alla base della Maddalena,” *L’Unione Sarda*, December 12, 1988.

¹⁰⁸ “Sentenza Corte Costituzionale N. 256, 1989,” *Gazzetta Ufficiale* 24/05/1989 n. 21.

¹⁰⁹ On this topic, see Fernando Codonesu, *Servitù militari modello di sviluppo e sovranità in Sardegna*, (CUEC Editrice, 2013).

¹¹⁰ The formalistic explanation and objection that the national referendum had direct abrogative effects on actual laws whereas the Sardinian referendum was only consultative in my opinion is not convincing. First, if the Italian government wanted to maintain the civilian nuclear program, even after the results of the national referendum, it could do it by simply proposing some legislative changes. In 2010 the Berlusconi government launched the idea of a national nuclear renaissance by changing old and proposing new laws in parliament. See for example Fabrizio Iaccarino, “Nuclear Renaissance in Italy,” *Nuclear Law Bulletin* 3 (1), 2010: 65-78, and Alessandro Tonetti, “Localizzazione e consenso nel programma di rilancio del nucleare in Italia,” *Giornale di Diritto Amministrativo* N. 1, 2011: 5-18. Second, if the referendum in Sardinia could not have any direct legislative effect, why impeding its celebration? These questions are obviously rhetorical ones.

guarantee for national defense and higher international status.¹¹¹ If Italy could not achieve military nuclear capabilities directly, it could serve, with substantial returns, as a logistical platform for the Mediterranean. La Maddalena was an integral and crucial component of Italy's strategic alliance with the United States and its status could not be challenged.

At the same time, the lack of explicit legislative regulation of the military applications of nuclear energy did not preclude an active military interest in nuclear matters. Indeed, the anomic sphere carved around the military applications of nuclear energy allowed military authorities to act more freely within the Italian nuclear regulatory regime.

3.8. Conclusion

Enhanced by the challenges and opportunities of nuclear contamination in the atomic era, bio-ecological studies developed internationally as an integrated, interdisciplinary field of research applied to human safety and ecosystems preservation. In Italy, radioecology followed disciplinary protocols and practices developed in the United States and in the Soviet Union. By the end of the 1950s, scientists were able to monitor the fluxes of radioactive fallout from atomic tests from a network of radiometric stations across Italy and its surrounding seas.

While the Cold War enhanced the work of radioecologists globally, in La Maddalena, the presence of a U.S. Navy installation for atomic submarines transformed the archipelago into a radiosurveillance site. There, the work of Italian radioecologists encountered severe limitations. In 1975, when Italian radioecologists started their studies, they had to adapt their routine protocols to the distinctive political and environmental features of the archipelago. The U.S. Navy and the Italian government refused to provide Italian scientists with information about the technical characteristics of the reactors propelling the nuclear submarines. Without official documentation normally available to civilian nuclear plants, ISS and CNEN personnel had to modify their research designs and practices. To compensate for the lack of technical information about potential radiocontaminants, they had to multiply their monitoring efforts by enlarging the scope of their research and to incorporate elements of uncertainty into their protocols.

Conducting radioecological campaigns in marine environments was particularly challenging. Dis-organization, and conflicts among expert agencies, military authorities, and central, regional, provincial and local political-administrative authorities during the

¹¹¹ Leopoldo Nuti, *La Sfida Nucleare*.

implementation of planned interventions for the archipelago, revealed the systematic contradictions of the Italian nuclear regulatory regime during the Cold War. These shortcomings were in part the product of particular regulatory and diplomatic arrangements that allowed the deployment of U.S. nuclear ships and weapons in Italy to operate outside the supervision of civilian radioprotection agencies. I used Giorgio Agamben's "state of exception" to show how Italian regulatory provisions—and their strategic lack under certain circumstances—conferred an exceptional status to military applications of nuclear technology. This led to the establishment of a shadow bureaucracy, excluded from the supervision of civilian agencies, which I described through two primary examples.

First, in Italy, the military applications of nuclear energy were not incorporated into the formal regulation established by public authorities. Thanks to this legislative gap, the Ministry of Defense *de facto* maintained exclusive control in this field. The result was the tacit and informal establishment of a *dual radiosurveillance system*, one military and one civilian, sometimes overlapping in very idiosyncratic ways, like in the case of La Maddalena. In the archipelago the existence of a radiosurveillance network directly managed by the military authorities, in addition to the civilian one, emerged only in times of crisis or accidents to reassure the local population that everything was under control. Instead of making the radiosurveillance service more efficient and reliable, the invisible military network created conflicts with the civilian monitoring system and waste of resources. In addition to this, the radiosurveillance network controlled by civilian authorities was always limited for the vetoes that military authorities, who for security reasons precluded the installation of monitoring stations in the proximity of the U.S. Navy base.

The exceptional status of the nuclear base of La Maddalena was sanctioned once more in 1988 when the Italian government, backed by a sentence of the Constitutional Court, blocked the regional referendum on the U.S. Navy base, arguing that a regional constituency could not have a say on matters concerning national security and defense. The permanence of a base for nuclear submarines in Italy—by then a denuclearized state—made once again evident the contradictory nature of the Italian nuclear regulatory regime and the unstable nuclear ontology of the U.S. submarines. Once again, for clear political and strategic reasons, Italian authorities considered the nuclear base of La Maddalena different from civilian nuclear plants.

The materials covered in this chapter suggest that active strategies of knowledge removal and concealment cannot be understood exclusively through the category of the secret. The

production of ignorance, intended as “knowledge sequestration,” is a multifaceted phenomenon involving silence, deception, duplicity, opacity, ambiguity, and the proliferation of bureaucratic apparatuses. I have argued that the shadow radiosurveillance network that the Italian Navy and CAMEN built in La Maddalena exemplifies the duplicity that the Italian state, whose logic resides in the possibility of remaining hidden (and therefore autonomous), but capable of being brought into the open in times of crisis and distress to assuage public anxieties

With time, a secret that is no more can be left aside, forgotten. Its persistence beyond the very circumstances that justified its creation makes visible the obstinate survival of secrecy (as a mental and bureaucratic form) in spite of the obsolescence of its content. Take the example of Buffoni’s study: its title, initially containing the words “nuclear accident,” has been modified to avoid public alarm, and in the end the document has been hidden, swollen into the bureaucratic belly of ENEA, only to reemerge as a spectral archival presence, devoid of its efficacy, an inert trace of routine filing practices.

Chapter 4

Italian Nuclear Bureaucracy and the Production of Ignorance

4.1 Radioecology with Missing Data

From 1972 to 1975, leftist parties, environmental groups, and CNEN and ISS experts unanimously lamented the lack of a preparatory radioecological study prior to the installation of the U.S. Naval Support Activity. According to them, this deficiency made the radioprotection program in La Maddalena less effective and reliable. In the short-term it prevented radioecologists from assessing whether the presence of nuclear submarines increased levels of radioactivity, compared to the pre-installation background levels. In the long-term, it would inhibit the preparation of an accurate emergency plan. These concerns were practical. In presenting their arguments for why a radioecological study was necessary, CNEN and ISS experts explained that La Maddalena was anomalous in comparison to other Italian nuclear sites, where radiosurveillance regulations were implemented. But this argument was only partially true. Official radioecological reports from other Italian nuclear sites frequently denounced the lack of preliminary environmental studies and the difficulties of arriving at a precise determination of radio-contaminants' diffusion models. For example, in the final report of the campaign conducted around the nuclear plant of Latina--along the coastal line of Lazio, a few kilometers south of Rome--in April 1979, CNEN personnel premised that:

During the programming phase of the sampling design, the scarcity of meteorological data did not allow the precise individuation of the prevalent directions of winds in the area, and for this reason a 'dense geometric' criterion for the choice of the sampling sites has been followed for a radius of 2 kilometers around the nuclear plant, privileging points near farms, rural houses, and small urban centers.¹¹²

CNEN radioecologists adopted the "geometric method" when the lack of precise ecological data--such as geo-morphological, sedimentological, meteorological, bio-typical, and hydrological characteristics of the site--did not allow them to create models predicting the

¹¹² *Relazione sulla campagna radioecologica attorno al sito della centrale elettronucleare di Latina, Aprile 1979*, CNEN – RT/DISP (81) 9, 1981, cit. p. 72.

processes of radionuclides dispersion into the environment. The geometric method consisted of subdividing the areas for radioecological campaigns into homogeneous grids of coordinates whose density could be increased or decreased according to the research needs.¹¹³

How was it possible that by the end of the 1970s CNEN radioecologists did not have complete ecological data for a site that was operating since the early 1960s? While reading radioecological reports from other sites, like Garigliano and Caorso, I realized that Latina, in fact, was not an isolated case of negligence, nor was dealing with uncertainty and scarcity of environmental data a novelty for CNEN radioecologists.¹¹⁴ In part this is not surprising. As explained in Chapter 3, radioecological surveys are not instantaneous pictures of the ecological status of a given eco-system, but dynamic representations that require continuous updates and integrations because both demographic and ecological data around a nuclear site changes over time. On the other hand, the systematic lack of information emerging from CNEN radioecological reports seems to indicate the presence of a form of “institutionalized ignorance” that has to do with the organizational and epistemological characteristics and shortcomings of Italian regulatory agencies.¹¹⁵ Dr. Carlo Polvani, head of CNEN Radioprotection Department, explained the cause of this structural problem in the lack of a uniform national siting policy:

The Italian legislation [...] reflects the status quo of the 1960s, when siting requests were extremely sporadic. The law leaves to the entrepreneur the initiative to propose a site for the construction of a nuclear plant and requests that public authorities evaluate its appropriateness. But this procedure does not allow for choosing the best sites from an environmental point of view. [...] What is worse is that siting choices are made independently from one another without a global view of the problem, on the basis of shortsighted evaluations.¹¹⁶

Complaining about the lack of a centralized decision-making process, Polvani denounced what had become accepted praxis in the Italian nuclear program: the construction of plants and

¹¹³ This is evident in confirmatory campaigns' reports regarding the nuclear plant of Latina and Garigliano.

¹¹⁴ See for example *Relazione sulla campagna radioecologica attorno al sito della centrale elettronucleare di Caorso, Giugno 1977*, CNEN – RT/DISP (78) 11, 1977; Attilio Sacripanti and Giuseppe Fameli (Eds.), *Centrale nucleare del Garigliano: Campagna radioecologica di controllo del territorio, Settembre-Ottobre 1980*, CNEN – RT/DISP, 1981.

¹¹⁵ Here I refer to Scott Frickel's work on the production of ignorance and his (and others') contribution to a new political sociology of science that asks “how, where, and why ignorance, once produced, becomes institutionalized beyond science.” Scott Frickel, “Not here and Everywhere: The Non-production of Scientific Knowledge,” in Daniel Lee Kleinman, Kelly Moore (Eds.), *Routledge Handbook of Science, Technology, and Society*, Routledge, 2014: 263-276, cit. p. 263.

¹¹⁶ Carlo Polvani, “L'ubicazione degli impianti nucleari e la protezione della popolazione,” in *La Scelta dei siti per gli impianti nucleari: Atti del Convegno organizzato al Centro Ricerche Nucleari della Trisaia nei giorni 15-16 Settembre da CNEN, Regione Basilicata, Associazione Italiana di Fisica Sanitaria*. CNEN, Roma, 1973, cit. p. 33.

facilities in places selected on the basis of political and economic considerations, rather than after detailed pre-classificatory ecological campaigns.¹¹⁷ During a personal interview in February 2012, Dr. Arrigo Cigna confirmed that preparatory campaigns were not performed on all the Italian nuclear sites:

Yes, you are right. This does not mean that radiosurveillance programs were not efficient or were absent. To the contrary, once the installations were ready to start, all the systems were up and running with, I want to say, great accuracy. But if you ask me whether the choices of the sites were based on previous studies of ecological receptivity, the answer is that only a couple of them were performed before the construction: one case that I remember well is Montalto di Castro, which, as you may know, was never activated due to strong local opposition and by virtue of the referendum of 1987 after the Chernobyl accident.¹¹⁸

Nuclear siting was not the only area that showed lack of coordination and adequate investments. For example, in addition to the exceptional difficulties imposed by military secrecy, more “typical” obstacles made the implementation of the radiosurveillance program for La Maddalena particularly challenging and ultimately inefficient.

During his intervention at the national conference of Gruppo Ambiente on September 1975, Carlo Papucci, one of CNEN radioecologists working in La Maddalena, called the audience’s attention to various organizational problems that were delaying radio-ecological studies. As an expert—and also a member and active representative of CGIL Ricerca, the Communist Party union of workers and specialized cadres employed in research institutions—Papucci offered an insider’s perspective of the material and the scientific limits of CNEN:

[...] The first aspect concerns the current lack of expertise on physical oceanography, which we should try to acquire by involving other research centers. [...] The second problem regards the concrete possibility to implement this ambitious radioecological program within a reasonable amount of time. Some of our structures cannot respond

¹¹⁷ For a general discussion of the conflicting political and economic interests that shaped the scattered structure of the Italian nuclear program see: Curli, Barbara, *Il Progetto Nucleare Italiano (1952-1964: Conversazioni con Felice Ippolito)*, (Rubettino, 2000); Paoloni, Giovanni, “Gli Esordi del Nucleare in Italia,” in Castronovo, Valerio (Ed.), *Storia dell’Industria Elettrica in Italia Vol. 4: Dal Dopoguerra alla Nazionalizzazione 1945-62*, (Laterza, 1994): 383-408; Giovanni Paoloni, *Energia, Ambiente, Innovazione: Dal CNRN all’ENEA*, (Laterza, 1992); Mario Silvestri, *Il Costo della Menzogna: Italia Nucleare 1945-68*, (Einaudi, 1968). Two specific studies on nuclear siting and the political relevance of the different industrial projects of ENI, and CNEN are Barbara Curli, “Energia Nucleare per il Mezzogiorno. L’Italia e la Banca mondiale (1955-1959),” *Studi Storici* 37 (1), January-March 1996: 317-351, and Mauro Elli, *Atomi per l’Italia. La vicenda politica, industriale e tecnologica della centrale nucleare ENI di Latina 1956-1972*, (Unicopli, 2011).

¹¹⁸ Dr. Arrigo Cigna, Personal Interview with the author, Cocconato d’Asti, February 2012.

adequately to such a tight schedule considering that we lack means and materials in key sectors.¹¹⁹

Originally planned as a yearlong cycle of seasonal campaigns, totaling four and starting in May 1975, the radioecological study of La Maddalena was delayed for months. As Carlo Papucci underlined, the scientific program requested by the Ministry of Health required coordination between various research institutions and equipment that the CNEN Center for the Study of Marine Contamination alone could not provide. For this reason, in May 1976 CNEN undersigned a collaborative agreement with the Oceanography Research Center of CNR (National Research Committee).¹²⁰ The joint venture with the CNR not only complemented the skills of CNEN personnel; it also provided the program with new and desperately needed resources. Documents concerning the preparatory activity for the radioecological campaign in the summer of 1976 show that the scale of the program was extraordinarily complex and vast in comparison to the operations routinely performed by the two research centers. Current meters were scarce, to the point that they had to be rented or borrowed from other institutions. CNEN personnel adapted a fishing boat, called *Odalisca*, into an efficient floating lab but it needed a licensed crew, which was finally recruited after several attempts and months of delay.¹²¹

After two years of uncertainties and tense political debates to have La Maddalena recognized as a nuclear site, Carlo Papucci and his colleagues were still struggling with bureaucratic and organizational obstacles that limited their capacity to do their job. Undermined by the halo of secrecy that the U.S. Navy and various sectors of the Italian government imposed on La Maddalena, the credibility of the entire program of radiosurveillance was already under

¹¹⁹ Carlo Papucci, "Intervention of Carlo Papucci / C.G.I.L.-Ricerca." Carlo Papucci, *Private Archive*.

¹²⁰ Letter sent to the President of CNEN, Prof. Ezio Clementel, by CNR Oceanography Center of St. Terenzo (Lerici), on May 10, 1976. (Doc. CNEN Prot. n. 3887 M-C-1, 10/5/76 [non-catalogued] - Archive ENEA Center of the Study for Marine Environment - Former CNEN Center for the Study of Marine Contamination, Lerici, Italy.).

¹²¹ A letter handwritten by Papucci in May 1976, probably addressed to other union members or to a newspaper, makes evident the situation of stall in which CNEN personnel found themselves: "The laboratory is ready to do the campaign planned for this spring but supposedly bureaucratic obstacles impede its actual implementation. The boat of CNEN is appropriate and equipped to go [to La Maddalena] but at this time it is not operative because there is no crew governing it. The decision to recruit an external crew needs to be taken by the executive offices. The most urgent risk is that the planned spring campaign is delayed until next year with the consequent postponement of the entire scientific program. The problem must be solved now, in a very short time." (Handwritten document, Carlo Papucci, *Private Archive*).

the severe scrutiny of local commentators.¹²² Placed within a broader national historical context, this chapter argues that the limits of the radioecological campaigns of La Maddalena reflected more generally the limits of the Italian nuclear bureaucracy.

4.2 Italian Nuclear Bureaucracy

The Italian general law on the peaceful uses of atomic energy, the presidential decree n. 185 of 1964 (D.P.R. 185, 1964) and following updates, established that the Ministry of Health was primarily responsible for the radioprotection of workers and public safety at nuclear sites. In Italy two fundamental aspects of radioprotection--radio-surveillance and emergency plans--were administered and supervised at the provincial level by the Provincial Commissions on Radioprotection and by the Prefects. The Provincial Medical Officers of Health chaired the Commissions composed by two doctors (of whom at least one must have been a specialist in radiology), one health physicist or suitably qualified expert, and a medical inspector nominated by the Directors of the Labor Inspectorate of each Region.¹²³ Prefectures, which, like in France, represent the authority of the government in each province, were responsible for drafting and approving the external emergency plans required for each operating nuclear installation on the national territory (both power plants and reprocessing plants, including storing facilities). With the institutionalization of the Regions in 1970 and the national health system reform of 1978, health services (including radioprotection) were delegated to the regional authorities.¹²⁴ In this new institutional frame, the Region of Sardinia became also responsible for the radiosurveillance program of La Maddalena, but for reasons of proximity, continuity with the previous plans, and political opportunity, the regional authorities decided to leave to the actual management and supervision of the service to the Province of Sassari.¹²⁵

¹²² For example on July 19, 1975 the local newspaper *Tutto Quotidiano* reported on the state of uncertainty and frustration surrounding the radioecological campaigns in the archipelago: “Limitata in partenza l’indagine del Cnen sull’inquinamento atomico.”

¹²³ D.P.R. n. 185, 1964, section 89. For a synthetic view of the norms and regulations of the Italian nuclear program and activities together with those of other European countries, Canada, U.S.A., and Japan, see *Nuclear Legislation Analytical Study: Regulations Governing Nuclear Installations and Radiation Protection*, Organization for Economic Cooperation and Development (O.E.C.D. European Nuclear Energy Agency), 1969, 1972, and following years.

¹²⁴ *Legge 833/78, Istituzione del Servizio Sanitario Nazionale*, December 23, 1978. This process of decentralization started with the institution of the Regions in 1970 and with following regulations, in particular: *Decreto Presidente della Repubblica n. 4, 14 Gennaio 1972* and *Decreto Presidente della Repubblica n. 616, 24 Luglio 1977*.

¹²⁵ The Region of Sardinia is one of the five autonomous regions of Italy (together with Sicily, Valle D’Aosta, Trentino Alto Adige, and Friuli Venezia Giulia), Autonomous regions have more legislative and administrative

As discussed in chapter two, in 1974 the political campaign that judge Amendola and various anti-base groups carried out, broadcast on the local and national media, provoked alarmed debates over the risks of radiocontamination in La Maddalena. In the month of June of the same year, the Ministry of Health requested that experts of ISS and CNEN design a radiosurveillance program for La Maddalena. The document, which was issued a few months later, prescribed a preliminary radioecological study to be conducted by ISS and CNEN experts. The data gathered through detailed radioecological, climatological, oceanographic, and demographic studies would allow experts and civilian authorities to design and implement the external emergency plan and to install a network of fixed monitoring stations for the continuous surveillance of radioactivity levels in the archipelago.¹²⁶

On May 28, 1977 the City Council of La Maddalena petitioned the Region of Sardinia to build a radiosurveillance laboratory in the archipelago. Through a fund made available by the Ministry of Health, the Province of Sassari would cover the costs of constructing the new building and the purchase of technical equipment, and would be responsible for hiring the laboratory personnel.¹²⁷ Inside the laboratory a set of monitors would constantly visualize the signals emitted by radiometric stations installed around the U.S. base and in the towns of La Maddalena and Palau. A year earlier, the Council of the Province of Sassari approved a detailed draft of the budget and of the contract for the installation of an air monitoring station in La Maddalena in partial compliance with the radiosurveillance plan suggested by the National

powers. Italian constituents gave these regions more autonomy given their multiethnic and multilingual composition, and their frontier or peripheral political and geographical position. The first Italian regulation of nuclear energy use and production, the presidential decree n. 185 of 1964, already delegated to the autonomous regions the administrative organization of radioprotection, but until the regional reform of 1970 and the reform of the national health service of 1978, radioprotection and radiosurveillance remained *de facto* a prerogative of central expert institutions. For this reason, as it is clear in the case of La Maddalena, the implementation of a more decentralized administration of radiosurveillance services encountered numerous practical obstacles.

¹²⁶ An external emergency plan was required for all the nuclear plants operating in Italy. At the provincial level, the prefect was the authority with the final word on its design and implementation in case of accidents. In military installations, but especially in nuclear ports, military authorities were in charge of an internal emergency plan, with instructions for the manoeuvres required of the military personnel in case of accidents. In Italy, where the regulation of nuclear ports was not yet formally legislated, the emergency plans were adapted case by case and in accordance with the civilian authorities. This, in fact, was a peculiar setting that became more formally regulated only after 1979. La Maddalena was the first case of nuclear port for which a formal external emergency plan was drafted and approved.

¹²⁷ In line with the reform of the national health system of 1975, according to which each Italian Province should create a local presidium called “Presidio di Prevenzione Sanitaria” responsible for the administration of the services related to public health, including radio-protection.

Committee on Nuclear Energy (CNEN) and the National Health Institute (ISS) in 1975.¹²⁸

Between 1975 and 1977 the Province of Sassari, delegated by the Region of Sardinia's department of health and environmental protection, and an ad hoc committee of experts from CNEN, ISS, and the Ministry of Health, managed the programming phase.

The ad hoc committee of experts nominated to design and supervise the installation of the radiosurveillance network was chaired by the President of the Province (or one delegate), and included two experts from the provincial laboratory of hygiene and prophylaxis, a secretary from the province of Sassari, three experts—one ISS and the others delegated by CNEN—and a bureaucrat from the Ministry of Health.¹²⁹ The rationale behind the diverse composition of the committee was to include all the administrative levels involved in the process. According to the original ISS and CNEN experts' design, five beta/gamma aerial monitoring stations should have been installed in the following points: one in La Maddalena, two in the island of Caprera (Stagnali and Sailing Center) in the area facing the U.S. Navy installation across the bay of Santo Stefano, one in Palau, and one on the pier of Santo Stefano, in the proximity of the U.S. Navy tender.¹³⁰ In addition to the beta/gamma aerial stations, two fixed gamma spectrometers should have been installed on the U.S. Navy pier of Santo Stefano for the continuous monitoring of the seawater. The stations would pump water inside a spectrometric chamber with filters capable of retaining and detecting radionuclides. A cable transmitter linked to the local laboratory would send the data to a monitor, which would enable the personnel of the laboratory to visualize the results and have an almost immediate measurement of the levels of radiation. Three levels of radioactivity concentration were set up to determine the corresponding levels of alert in case of releases and accidents. For concentrations in line with the natural background (routine analysis level) no action would be required, but acoustic signals would activate an immediate manoeuvre of pre-alarm for releases above the natural threshold and an emergency plan would be activated in case of serious accidents. The two monitoring stations for the seawater were installed only in

¹²⁸ “Verbale di deliberazione del consiglio provinciale, deliberazione n. 85. OGGETTO: Richiesta contributo ministero della sanità per rete di controllo per la tutela dell'ambiente da irradiazioni ionizzanti nel comprensorio isole di La Maddalena,” September 16, 1976. *Archive Province of Sassari*.

“Una convenzione per controllare la radioattività a La Maddalena,” *La Nuova Sardegna*, September 17, 1976, p. 4.

¹²⁹ The criteria for the composition of the special committee for the design radiosurveillance system of La Maddalena emerge clearly from the transcripts of the meetings. See for example, “Commissione Speciale per la Programmazione e Realizzazione di una Rete di Monitoraggio contro I Pericoli delle Radiazioni Ionizzanti,” Verbale n. 1, October 11, 1978. *Archives Province of Sassari*.

¹³⁰ “Capitolato Programma sul Sistema di Monitoraggio da Installare nell'Arcipelago di La Maddalena,” 1978 (no date), *Archives of the Province of Sassari*.

1987 because the Italian Navy, probably after the veto of the U.S. Navy, denied access to the area.

Level	Administration	Agencies	Activities	Dates of implementation
National	<u>Ministry of Public Health</u>	CNEN-ENEA	❖ Preliminary Radioecological campaigns (CNEN-ENEA Radiosurveillance Divisions and CNR Marine Division))	1975 - 1977
		- Division of Marine radiosurveillance		
		- Division of Continental Radiosurveillance	❖ Design of Radiosurveillance system (DISP and Other Divisions)	1975 - 1979
		- Radioprotection division (DISP)	- First level (Monthly)	Starts 1978
		ISS	- Second Level (Semester)	Starts 1972
		- Radiation Laboratory	- ø Level (Continuous)	Starts 1986
		CNR Marine Division	❖ Design of Emergency Plan (DISP)	1975 - 1979
Regional	<u>Assessor of Public Health</u>	Regional Health System - Radioprotection division	❖ Administration of Radiosurveillance system - Technical advisory board (Only administrative, but no direct involvement with radiosurveillance management until 1990)	1975 and thereafter
Local	<u>Provincial Administration</u>	Laboratory of Hygiene and Prophylaxis Province of Sassari	❖ Management of local radiosurveillance (local laboratory and personnel)	1979
			- First Level (Only specimen collection)	1975
			- First Level (Geiger counters and aerial monitoring station)	1978
			- ø Level (Continuous radiosurveillance monitoring system)	1986
Local	<u>Prefecture</u>	Prefect of Sassari	❖ Public safety - Approval and implementation of emergency plan	1979 and further revisions

Figure 4.1. Expert Agencies Intervening in La Maddalena and Multilevel Radioprotection Governance

4.3. The Logic of Emergency

The construction of the local laboratory and the beginning of its activities took more than four years (1975-79). During this time three events contributed to accelerating the process. After the local elections of February 1976 for the first time the Christian Democrats (DC) and the Socialist Party (PSI) formed an organic coalition with the ambition of changing the administration of La Maddalena. The new mayor, Gavino Canopoli, was close to the Christian Democrats, but his personality and his background made him more independent from the strong

control that the central party and some sectors of the local church traditionally exercised on local administrators. A lawyer and retired Navy officer, Canopoli was considered an apt person to lead La Maddalena towards a more promising economic future, not exclusively dependent on the hegemony of the Italian Navy. Like the rest of Sardinia, La Maddalena hosted a large number of military installations that precluded the possibility to use land and resources for complementary forms of economic development based on tourism, for example. In this context, the U.S. installation not only added to the constraints of the historical military presence on the archipelago, it also generated potential sources of radiocontamination. Ten years after the first center-left experiment at the national level, La Maddalena seemed ready to move beyond its destiny of Cold War military outpost.

Canopoli was the first mayor to openly insert the U.S. Navy presence within his political agenda. As he stated on March 10th, 1976 before the newly elected city council:

As administrators of La Maddalena we reserve the right to express our opinion about all the decisions concerning the permanence of the U.S. Navy installation, especially in relation to its economic, political and social consequences and to solicit those institutions who are responsible for it to proceed without further delays with the construction and the management of the program of environmental protection. [...] The most urgent problem that we face is the lack of a radiosurveillance network and an emergency plan. [...] On this occasion and without receiving any formal communication [from the central political and expert institutions] we affirm that if the implementation of the radiosurveillance service will be procrastinated any further this administration will adopt all the possible measures to guarantee the safety of this community. [...] We agree with the recent position expressed by the Region of Sardinia: if the central organisms of the state continue to be unresponsive to this problem, it will be necessary to adopt energetic political actions to remove the U.S. installation for nuclear submarines.¹³¹

The direct participation of the PSI in the local administration was the tangible sign of a real change afoot in the local political strategy vis-à-vis the military authorities and the problems regarding the U.S. installation. Canopoli's political position towards the U.S. Navy was also the result of a general state of agitation that mounted after ISS and CNEN announced on February 1976 the discontinuation of their monthly radiosurveillance analyses, the so-called "first level surveillance."¹³² The news seemed to take everybody by surprise, but the plan submitted to the

¹³¹ Verbale di deliberazione del Consiglio Comunale, n. 5, March 10, 1976: "Dichiarazioni programmatiche del sindaco," cit. pp. 9-10. *Municipal Archive La Maddalena*.

¹³² "La Maddalena: sospeso il controllo sulla radioattività nella base USA," *L'Unità*, 22 February, 1976. "La nave atomica USA lasciata senza controlli," *Paese Sera*, 6 March 1976. "L'isola col cuore atomico," *Il Messaggero*, 6 March 1976.

Ministry of Health in 1974 had already planned the suspension of the service after two years in order to give local authorities full control over the system.¹³³ The Region of Sardinia, who, according to the protocol, should have managed the radiosurveillance service starting in 1976, did not predispose the necessary program and lacked organization, scientific structures, and applied experts. More importantly, at the origin of this situation was the unsettled question of who, among central and local institutions, should have taken the ultimate responsibility for the radioprotection around the U.S. base. Regional deputy and Secretary of Sardinian Communist Party Mario Birardi made clear that:

The problem is not of economic nature [...]. The issue has political relevance: the central government cannot ask the Region to pay for a decision that it made unilaterally [i.e. conceding to the U.S. the install its base in La Maddalena]. The Region of Sardinia was and still is completely opposed to the USA installation for nuclear submarines, therefore it cannot assume responsibility for the surveillance of radioactive contamination, but should pursue the objective of getting rid of the base.¹³⁴

A few weeks after his election, mayor Canopoli found himself in the crosshairs of this dispute, which risked leaving his community without adequate protection. His protest was loud and appeared in national newspapers: “This situation is absurd [...]. Frankly, we don’t care whose responsibility this is, but if there are no guarantees for the safety of this community the base must go.”¹³⁵ The U.S. Navy was an interested observer of this ‘Italian style’ bureaucratic drama and when possible deployed its diplomatic capacity to smooth out political claims, influence the press, and calm the anxieties of the Maddalenini. During a conference hosted on May 10 on the Howard Gilmore (the U.S. Navy tender ship anchored in Santo Stefano), and on the aircraft carrier Saratoga (momentarily operating in the Mediterranean), commodore Burkhalter and other Navy officers illustrated to Italian journalists the “scrupulous” systems of radiosurveillance that the nuclear Navy activated at all ports visited by its fleet around the world.

¹³³ CNEN and ISS experts, including Arrigo Cigna and Gloria Campos Venuti, restated this condition during a meeting with the personnel of the Region of Sardinia held on December 18, 1975 at the National Health Institute in Rome. On that occasion, discussing the results of the preliminary radioecological campaigns conducted in La Maddalena and the data that the Region of Sardinia was able to collect on local epidemiology and meteorology, professor Campos Venuti lamented that Sardinian authorities were still in grave retard with the organization of the local network of radiosurveillance. Given the situation, Campos Venuti warned that if the Region did not intervene immediately, the radiosurveillance of the archipelago would not be guaranteed. “Seconda riunione per il coordinamento dello svolgimento dell’indagine ambientale a La Maddalena,” Rome, December 18, 1975, Istituto Superiore di Sanità. *Transcripts. Archives ENEA Center for the Study of Marine Environment*, Lerici.

¹³⁴ Birardi’s declaration was reported during an interview for the Communist newspaper *L’Unità*: “La Maddalena: sospeso il controllo sulla radioattività nella base USA,” 22 February, 1976.

¹³⁵ “L’isola col cuore atomico,” *Il Messaggero*, 6 March 1976.

With more than twenty years of experience, the commodore assured, “our operations have never caused even the smallest accident.”¹³⁶

Despite its diplomatic efforts both at the national and at the local level, 1976 was a complicated year for the U.S. Navy command of La Maddalena. Distrust towards public authorities and doubts about their objectivity circulated in the media. Three weeks after the press conference that the U.S. embassy organized on the Howard Gilmore, the newspaper *L'Unione Sarda*, published the story of three babies born with cranioschisis in La Maddalena within seven months.¹³⁷ The families who experienced such traumatic loss timidly advanced the hypothesis that the cause of the malformations could be related to the presence of the U.S. nuclear submarines. This episode obviously generated a debate involving expert and public authorities: from CNEN radioecologists, to local doctors, microbiologists, and obviously local administrators (see chapter 5). If the new political climate and the controversial status of the radiosurveillance system increased attention to the environmental risks of the nuclear submarines' operations, the first accident officially reported by the U.S. Navy command of La Maddalena revamped the sort of political debates in vogue two years earlier, when judge Amendola launched his media campaign against the base. On September 20, 1977, the nuclear submarine USS Ray hit a rock in an unspecified area south of Cagliari (see Figure 4.1.) during underwater operations. The news appeared on local and national papers only three days after the damaged submarine approached

¹³⁶ Five of the major Italian national newspapers sent their journalists to the press conference organized by the American diplomacy to counter the alarmist climate created around the suspension of the radiosurveillance service by Italian expert institutions. Apart from the article appeared on *Corriere della Sera*, in which the journalist reconstructed the problematic history of the radiosurveillance system of La Maddalena, also reporting an ample interview with mayor Canopoli and vice-mayor Tamponi, the press coverage resulted extremely positive to the U.S. cause. “Così si vive al ‘sito’ Nato fra i sottomarini nucleari,” *La Stampa*, 11 May 1976. “La popolazione della Maddalena teme l’inquinamento radioattivo,” *Corriere della Sera*, 11 May 1976. “Pretestuose le polemiche sulla presenza USA a La Maddalena,” *Il Giornale d'Italia*, 12 May 1976. “Immutata la radioattività nell’arcipelago della Maddalena,” *Il Tempo*, 12 May 1976. “Atomi innocui alla Maddalena,” *Il Resto del Carlino*, 13 May 1976. At the end of May U.S. Ambassador John Volpe expressed his satisfaction on a cable to the office of the Secretary of State: “[...] Mission considers both goals to have been fully attained. The coverage on La Maddalena exceeded our best expectations; In the future it will be difficult for Italian journalists to sustain a charge of nuclear pollutions or secret strategic weapons at that site. Moreover, we now have on public record a volume of favorable material for possible use if and when the advent of NPSS Nimitz, California, or South Carolina begin to generate controversy in Italian media – End Summary.” The only negative note concerned the local press, which Volpe accused of being politically prejudiced: “Sour notes: 12. For local political reasons two of the three Sardinian newspapermen wrote (Reffel A) snide or inaccurate stories, including one accusation of nuclear missiles. However, articles have not been picked up by mainland press, probably due to the small size of the papers concerned and to their remoteness. Volpe.” *Cable 1976 ROME08532*, “La Maddalena and Sixth Fleet Visit for Italian Journalists” May 25 1976, 18:45 (Tuesday), available at https://www.wikileaks.org/plusd/cables/1976ROME08532_b.html

¹³⁷ “Nascite anormali a La Maddalena,” *L'Unione Sarda*, May 28 1976, p. 3. I will examine this episode further in the next chapter.

the U.S. Navy pier in Santo Stefano.¹³⁸ It is not difficult to imagine the resonance of the event among the Maddalenini, who, for the first time, had concrete proof that an accident could happen, regardless of the meticulous measures that both the U.S. Navy and the Italian authorities promised they would take.

Despite reassurance by military and sanitary authorities that nothing serious had happened to the nuclear parts of the submarine, public distrust towards military and civilian institutions grew to unprecedented levels. The Communists and the Socialist Party organized a petition against the permanence of the U.S. Navy in the archipelago and requested that the mayor call an extraordinary session of the City Council to discuss the condition of the radiosurveillance program.¹³⁹

The grounding of the USS Ray had serious repercussions on the political life of La Maddalena. Only on October 18, 1977 the City Council convened in the *municipio* for the insistence of the PCI and the PSI. During a tense debate the opposition parties presented two distinct but convergent motions in which they invited the assembly to take position against the permanence of the U.S. Navy in the archipelago and to petition the central government for the immediate removal of the base. The Christian Democrats, on the contrary, voted for a more diplomatic solution, proposing the creation of an ad hoc parliamentary committee to study the case. Despite a general agreement on the intolerable re-bouncing of responsibilities between central and regional institutions and the incredible delays of the radiosurveillance program, the vote of the Council reproduced the traditional Cold War political cleavage between pro-Americans and anti-Americans.¹⁴⁰ The Ray accident shook the alliance between the local DC and the PSI, and in December the socialist members of the city government decided to resign from the administration.

¹³⁸ “Dubbi sulla sicurezza della base atomica. Chiesto l’allontanamento,” *Il Messaggero*, September 24, 1977; “La Maddalena: la popolazione non vuole fare da cavia,” *Avanti!*, September 24, 1977; “Forse il sommergibile USA controllava un’unità russa,” *Corriere della Sera*, September 24, 1977; “La base per i sommergibili atomici costituisce un pericolo permanente,” *L’Unità*, September 24, 1977.

¹³⁹ “La giunta chiederà al governo di tutelare la salute dei maddalenini,” *La Nuova Sardegna*, September 25, 1977; “L’intera cittadinanza contro la base USA,” *La Nuova Sardegna*, September 27, 1977; “Dubbi sulla sicurezza della base atomica. Chiesto l’allontanamento,” *Il Messaggero*, September 24, 1977; “Via la base: troppo pericolosa,” *Paese Sera*, October 8, 1977.

¹⁴⁰ Verbale di deliberazione del Consiglio Comunale, n. 22, October 10, 1977: “Incidente al Sommergibile U.S.A. ‘RAY’.” *Municipal Archive La Maddalena*.



Figure 4.2. Map of Sardinia - The red arrow illustrates where, according to the official reports, the Ray accident allegedly took place. La Maddalena is on the northeastern corner of the map.

Mayor Canopoli acknowledged the political crisis opened by the PSI and resigned too. After three difficult months, during which the DC attempted to recuperate the political alliance with the Socialist Party, the city council formally accepted the resignation of Canopoli and approved the formation of a new alliance between Christian Democrats and the Social Democratic Party (PSDI).¹⁴¹ The Ray accident redefined political alliances inside the city council and moved the political atmosphere back to when socialists and communists fought together

¹⁴¹ Verbal di deliberazione del Consiglio Comunale, n. 12-14, March 31, 1978: “Dimissioni del Sindaco,” n. 16-17, May 15, 1978: “Presenza Atto Dimissioni del Sindaco” and “Elezione del Sindaco,” and n. 19, July 18, 1978: “Dichiarazioni Programmatiche.” *Municipal Archive La Maddalena*.

against the U.S. Navy presence and the Christian Democrats governed the archipelago with the support of a conservative coalition. If, on a national level, Italy was moving toward a “historical compromise” between PCI and DC, in La Maddalena the U.S. Navy presence kept the Cold War alive and well.

4.4. The Local Laboratory

By the end of 1977 the Laboratory of Hygiene and Prophylaxis of the Province of Sassari became more involved in the radiosurveillance operations in La Maddalena. With funds from the Ministry of Health, it acquired basic instruments for the chemical treatment of the biological samples to be sent to Rome for the monthly spectrographic analysis (always conducted by ISS and CNEN). The agreement between the Provincial administration of Sassari and the Ministry of Health was valid only for two years (1977-1979), after which time the radiosurveillance service would depend on the stipulation of a new agreement between the two institutions.

The first disbursement of the Ministry of Health could only cover the installation of one aerial monitoring station in the middle of the urban center of La Maddalena and to purchase a couple of medium intensity mobile radiometers. Thus, the first monitoring system put in place corresponded only partially to the initial plan.¹⁴² Only at the end of 1978 did the Province issue a call for applications to select the personnel for the laboratory of La Maddalena, which started working in 1979 under the direction of the Provincial Laboratory of Hygiene and Prophylaxis. In late December, after stipulating a new contract with the Ministry of Health, the Provincial administration of Sassari approved the budget for the second phase of the radiosurveillance program, but more time went by before it became operative.¹⁴³ After almost eight years since the establishment of U.S. base, La Maddalena was formally radiosurveilled, but only one year later funding problems and bureaucratic complications risked interrupting the work of the laboratory.

4.4.1. The “Cabizza Affair”

In 1978 Gian Nicola Cabizza was teaching mathematics and physics at high schools in Sassari. He had recently graduated with an experimental thesis on the spectroscopy of solid

¹⁴² Laboratorio Chimico Provinciale di Sassari, “Servizio di controllo sulla radioattività ambientale nell’Arcipelago di La Maddalena - Relazione Tecnica,” 28 August, 1975. *Archive of the Province of Sassari*.

¹⁴³ “Convenzione tra il Ministero della Sanità e l’Amministrazione Provinciale di Sassari per lo svolgimento di studi e ricerche attinenti al controllo della radioattività nell’arcipelago di La Maddalena (prov. Sassari). Relazione n. 2,” Sassari, 20 June 1980. *Archive of the Province of Sassari*.

matter. He read an advertisement in the Sardinian newspapers that the Province of Sassari was hiring technical personnel for the radiosurveillance laboratory of La Maddalena. The position was appealing to a young physicist with a yearly teaching contract, and the job did not seem complicated because it required routine operations and standard laboratory procedures, easy to perform for somebody with his background. The advertisement also specified that the selected personnel would be offered qualified training by national agencies such as CNEN and ISS.¹⁴⁴

In February 1979 Cabizza signed a temporary contract with the Province of Sassari.¹⁴⁵ The agreement between the Ministry of Health and the Province of Sassari stipulated that the funds for the laboratory were limited and contingent upon the implementation of a biannual plan of radiosurveillance. The goal was to complete the radiosurveillance network with the installation of fixed monitoring stations measuring the levels of radioactivity around the U.S. Navy base. The agreement was renewable, contingent on mutual consent.

Contrary to Cabizza's expectations, his work in La Maddalena was not easy. After receiving the funds of the Ministry of Health, the Province of Sassari built the local lab in La Maddalena and equipped it with a monitor linked to a beta/gamma filtration chamber and a couple of portable gamma spectrometers that Cabizza and the electro-technician Mr. Spanu could use in their radioecological activities around the archipelago. It was an itinerant job. Spectrometric surveys were to be conducted at least in principle, from a truck and a motor-powered boat purchased by the Province with the rest of the equipment. In the event, the boat was inoperable and Cabizza had to request assistance from the Italian Navy for the sampling procedures at sea. The young physicist started working in La Maddalena in April 1979, only after testing and calibrating the instruments. His early reports suggest that the Province of Sassari and the Provincial Laboratory of Hygiene and Prophylaxis were not able to supply Cabizza with necessary materials: the equipment was faulty, and the laboratory needed constant assistance from ISS and CNEN experts. The only continuous monitoring stations in place at this time consisted of a mobile chamber for measuring the intensity of atmospheric exposition installed on the rooftop of the laboratory and an aerial pump for the filtration of atmospheric particles for

¹⁴⁴ Personal interview. Sassari, April 23, 2012.

¹⁴⁵ "Verbale di deliberazione della giunta provinciale, n. 109 del 20 Febbraio 1979. OGGETTO: Richiesta di autorizzazione spesa registrazione ed acquisto valori bollati per n. 3 convenzioni con personale esterno per incarichi professionali connessi al controllo della radioattività ambientale nell'arcipelago di La Maddalena." *Archive of the Province of Sassari*.

Gian Nicola Cabizza, personal interview with the author, Sassari, May 2012.

total beta spectroscopy. The portable gamma spectrometer was not working yet and had serious problems “to the point that even during the first tests we had to replace certain parts [...]. Later, in collaboration with the technician Spanu, we could understand what the faulty parts were but could not intervene because we did not have new ones.”¹⁴⁶

One year later, in June 1980, the activity of the laboratory was still limited “due to the technical problems with the installation of the instruments and the lack of the necessary equipment for our daily activities.” The biological samples that Cabizza and colleagues collected in the archipelago for the gamma spectrometry had to be sent again to Rome, where ISS and CNEN experts could perform the analyses with the appropriate instrumentation. Moreover, the only monitor in the lab was experiencing calibration problems, and electric power oscillations caused faulty emergency signals.¹⁴⁷ Despite numerous declarations of good faith and collaboration by provincial institutions and requests coming from most of the political sectors of La Maddalena, the activities of the laboratory, especially its monthly reports, were not publicized (an aspect analyzed further below).¹⁴⁸ This opacity generated a state of uncertainty around the accuracy of the analyses. Local newspapers described routine technical troubles as alarming events.¹⁴⁹ Conscious of the crucial importance of providing information to the public, Cabizza organized guided tours with local students, to explain the activity of the laboratory.¹⁵⁰ In his official reports to the Province of Sassari, and in more informal correspondence with various ISS and CNEN experts, he often lamented the scarcity of resources and the lack of proper instrumentation, for which he suggested possible solutions.

¹⁴⁶ Gian Nicola Cabizza, “Relazione sul controllo della radioattività presso l’arcipelago di La Maddalena,” 19 April 1979, cit. p. 1. *Archive of the Province of Sassari*.

¹⁴⁷ Gian Nicola Cabizza, “Compendio dei controlli sulla radioattività ambientale alla Maddalena effettuati c/o il Laboratorio Provinciale di Fisica della radiazioni, dalla sua entrata in funzione ad oggi. Sintesi delle precedenti comunicazioni mensili,” Sassari, 20 June 1980. *Archive of the Province of Sassari*.

¹⁴⁸ For example the provincial counselor Giuseppe Deligia, former mayor of La Maddalena, in 1976 asked “[...] if it was possible to make the entire population periodically informed about the data produced by the personnel [of the future laboratory]; Silence at times provokes unjustified alarms among the population.” “Verbale di deliberazione del Consiglio Provinciale, n. 85 del 16 Settembre 1976. OGGETTO: Richiesta contributo ministero sanità per rete di controllo per la tutela dell’ambiente da irradiazioni ionizzanti nel comprensorio isole di La Maddalena,” cit. p. 9. *Archive of the Province of Sassari*.

¹⁴⁹ This was the case in January 1980, when a city counselor of La Maddalena, Francesco Bardanzellu of M.S.I. (Movimento Sociale Italiano), made public some indiscretions coming from anonymous sources of the Italian Navy Command of La Maddalena, denouncing that in the previous months the signals of alarm of the monitoring stations (supposedly controlled by the Navy) went on. Bardanzellu then presented an official request to the mayor to clarify the episode with the military authorities. “Fughe di radiazioni a Santo Stefano?” *La Nuova Sardegna*, January 27, 1980. “Sarebbero tre le fughe radiattive: ci sarà un’inchiesta ministeriale,” *La Nuova Sardegna*, February 2, 1980. “I monitor hanno registrato solo radioattività naturale,” *La Nuova Sardegna*, February 10, 1980.

¹⁵⁰ Gian Nicola Cabizza, personal interview with the author, Sassari, May 2012.

The temporary arrangement that allowed Gian Nicola Cabizza to start his activities revealed its fragility within the year, when the Ministry of Health and the Province of Sassari had problems renewing their agreement. A series of staggering bureaucratic slippages underscored the precarious position of the laboratory personnel and put into question the continuation of the radiosurveillance service. The local correspondent of *La Nuova Sardegna* described the absurdity of this stall as an example of the Italian “bureaucratic grotesque.”¹⁵¹

In March 1980 the President of the Province of Sassari, Giovanni Maria Cherchi, a regional PCI leader, sent a note to the Ministry of Health asking for new funds to guarantee the continuity of radiosurveillance service in La Maddalena. After a few weeks the Ministry responded with an official explanation that the central administration noticed some fiscal anomalies and did not receive any report of the radiosurveillance activities conducted by the Province.¹⁵² The central administration made clear that, in light of the current situation, it could not issue another disbursement. The Province replied explaining that a banal overlook of the treasury office created problems to cash previous funds destined to the activities of radiosurveillance.¹⁵³ The purchase of the electronic monitors and the rest of equipment amounted to 395,000.00 lire (of the 400,000.00 disbursed by the Ministry), which was fronted by the provincial administration. President Cherchi asked the Ministry to issue a new payment so that the Province could guarantee the installation of the recently purchased equipment and the routine operations of the laboratory for the remainder of the year. The bureaucratic impasse persisted. The Ministry of Health maintained its position, also because in the meantime CNEN experts advanced doubts about the management of the radiosurveillance system by the provincial administration.¹⁵⁴

¹⁵¹ Gian Carlo Tusceri, “Chi paga i controllori della radioattività?” *La Nuova Sardegna*, August 30, 1980.

¹⁵² *Ministry of Health*, “OGGETTO: Svolgimento studi e ricerche attinenti il controllo della radioattività ambientale nell’arcipelago delle isole di La Maddalena,” Doc. N. 400.5/R-md/294, Rome, March 21, 1980. *Archive of the Province of Sassari*.

¹⁵³ “OGGETTO: Svolgimento studi e ricerche attinenti il controllo della radioattività ambientale nell’arcipelago delle isole di La Maddalena,” Letter to the Ministry of Health, General Directorate for the Services of Public Health, April 8, 1980. *Archive of the Province of Sassari - Prot. n. 11895*.

¹⁵⁴ For example, on December 20, 1979, Dr. Arrigo Cigna, Director of the Radioprotection Laboratories of CNEN, sent a telegram to Dr. Alamanni of the Provincial Laboratory of Hygiene and Prophylaxis, expressing his critique to the work performed in La Maddalena: “I confirm my previous critiques about your report concerning of La Maddalena. It is contrary to correct scientific principle of radioprotection and environmental studies. Arrigo Cigna.” Telegramma 7CRC SSZ555 CAB984 33, December 20, 1979. *Archive of the Province of Sassari*. Also Gian Nicola Cabizza mentioned this telegram during our conversation in April 2012, to provide another example of his negative working experience with the Province of Sassari due also to the unprofessionalism of some of its technical personnel.

After further requests met no response, President Cherchi announced publicly that the Province could not guarantee anymore the radiosurveillance of La Maddalena. On May 30, 1980 he sent a brief letter to Cabizza and colleagues communicating the decision to suspend the activities of the local laboratory. Exonerating himself from further responsibilities he wrote that closing the laboratory was the only possibility remaining for the provincial administration. Cherchi even had the audacity to appeal to the good conscience of the laboratory personnel: “I leave to you the decision whether or not to continue your work, without any obligation toward this administration.”¹⁵⁵ The fact that a well-known regional PCI exponent like President Cherchi showed such an inflexible conduct should not come as a surprise. As PCI’s regional secretary Mario Birardi (also from La Maddalena) explained three years earlier, the Communist Party reputed the central government responsible for the decision to allow the establishment of the U.S. nuclear base in La Maddalena.¹⁵⁶ The PCI strategically used the skirmishes between the provincial administration and the government to demonstrate once again the problematic consequences of that decision. The goal, in sum, was to remove the U.S. Navy base, not its slow incorporation into the archipelago’s life. Paradoxically, in the long run the Communist Party had more to gain by leaving the radioprotection problem unresolved so the position of the base would remain problematic.¹⁵⁷

Thus, only one year after his job started, Cabizza found himself in the middle of this tragicomic quarrel, with little job security and the future of the laboratory equally unsure. Cabizza and his colleagues decided to keep the lab open, hopeful that the Ministry of Health, the Region of Sardinia, and the Province of Sassari could find a reasonable solution in the near future. But the elections of June 8th put the provincial administration on stand-by until the new president and staff took office.¹⁵⁸ Three months passed without results. At the end of August an exasperated Cabizza decided to hold a press conference to denounce the immobility of public institutions. He proposed that the Region of Sardinia assume direct control of the program and

¹⁵⁵ “Letter to Dr. Gian Nicola Cabizza, Spanu Gianfranco, and Atzeni Salvatore. OGGETTO: Servizio controllo radioattività - Sospensione rapporto convenzionale,” Doc. Prot. n. 17775, Sassari, May 30, 1980. *Archive of the Province of Sassari*.

¹⁵⁶ See page 16, this Chapter.

¹⁵⁷ This was also the interpretation of one of the closest observers of the debate, the correspondent of *La Nuova Sardegna* Gian Carlo Tusceri: “Stanziati i fondi di gestione del laboratorio di rilevamento,” *La Nuova Sardegna*, November 22, 1980.

¹⁵⁸ In June 8-9, 1980 in Italy the elections for the renewal of the municipal and the provincial administrations were held.

that the local laboratory expand its activities by becoming a center for the more general environmental monitoring of northern Sardinia.¹⁵⁹

Cabizza's position became increasingly problematic. Without a stipend since early May, he reluctantly returned to his teaching position in Sassari, while traveling to La Maddalena twice a week to check on the laboratory activities. The Province considered his teaching position incompatible with the laboratory position, and once the funds from the Ministry of Health finally became available in late November, the provincial administration used Cabizza's presumed unavailability as an excuse to deny him the renewal of the contract. Given Cabizza's open denunciation of the political games that the Province and the government played at the expense of the radiosurveillance program and the lack of acquiescence he demonstrated for the technical and bureaucratic obstacles that impinged upon his job, local politicians perceived him as "troublemaker," whom they were gladly getting rid of.

In a last, desperate effort to mobilize local public opinion and to garner the attention of national expert agencies, Gian Nicola Cabizza sent a letter of resignation (mostly symbolic given that his contract ended in May) to the Region of Sardinia, ISS, CNEN, and the Ministry of Health. His decision was motivated, he wrote, with his "profound disagreement for the ways in which the Province [had] mismanaged the funds for the radiosurveillance program, [...] by not providing the necessary equipment of the correct functioning of the laboratory, [and by] not divulging the results of the analyses to the local authorities."¹⁶⁰ His appeal to change the radiosurveillance system remained inconsequential and was, in the event, too late.

After the summer, the new provincial administration, now governed by the Christian Democratic Party, made some moves to secure additional funds for the laboratory. The new provincial assessor for environmental affairs, and former mayor of La Maddalena, Giuseppe Deligia, likely communicated the urgency of resuscitating the laboratory through the right channels, to arrive to a favorable solution to the problem. The central government responded. By

¹⁵⁹ "Il controllo della radioattività può essere affidato alla Regione," *L'Unione Sarda*, August 29, 1980; "Chi paga i controllori della radioattività," *La Nuova Sardegna*, August 30, 1980.

¹⁶⁰ Gian Nicola Cabizza, "Lettera al Prof. Ennio Prozzo, Ministero della Sanità, Divisione Generale Servizio Igiene Pubblica," Sassari, December 30, 1980. *Archive of the Province of Sassari*. Cabizza had previously sent two letters with the same content, the first dated November 24, 1980 to the Province of Sassari, the Region of Sardinia, and the mayor of La Maddalena, and the second dated December 6, 1980 to Dr. Roberto Biancastelli of ISS, and to Dr. Franco Giorcelli of CNEN, who were members of the expert consulting committee for the management of the radiosurveillance network of La Maddalena. *Archive of the Province of Sassari*.

the end of November 1980 the Province of Sassari, with the funds from the Ministry of Health, had already hired professor Angelo Parodo as the new director of the laboratory.¹⁶¹

4.4.2. After Cabizza: Stabilization and Routine Malfunctions

A health physicist and faculty member of the University of Sassari, professor Parodo was a *barone*, a term used in the Italian academy to denote someone with power and influence. Thanks to the temporary contract signed with the provincial administration, Parodo asked to have two of his collaborators, Floriana Manca and Nicolino (Nicoló) Erre, informally employed as assistant researchers in the laboratory of La Maddalena.¹⁶² Both Manca and Erre, recent physics graduates, had collaborated with Parodo at the University of Sassari. Like Cabizza they held teaching positions in high schools, where they continued to work after their collaboration with the Province started. Due to their teaching jobs and academic commitments, they did not reside in La Maddalena. From the documentation concerning their stipends, it is evident that the Province paid Parodo's assistants through periodic reimbursements for their "research trips."¹⁶³ On average they went to La Maddalena six times every two months. Probably the Province did not deem their daily presence at the laboratory necessary because other personnel were hired for routine operations and maintenance.

In a letter sent to Carlo Papucci at the CNEN Center for the Study of Marine Contamination, Cabizza bitterly commented: "[It is curious that] the Province was not able to renew the contract of one physicist [Cabizza] and now it hires three! Manca and Erre also applied for the job [when Cabizza got it in 1979] and arrived second and third, behind me. Parodo instead never applied. All of them participated in the environmental study of the

¹⁶¹ "Il laboratorio non chiude," *La Nuova Sardegna*, November 26, 1980; "Le apparecchiature consegnate ai nuovi incaricati," *La Nuova Sardegna*, December 6, 1980.

¹⁶² "Servizio controllo radioattività La Maddalena - Approvazione schema di convenzione con il Prof. Angelo Parodo, docente di Fisica medica nella Università di Sassari," Verbale di deliberazione della Giunta provinciale N. 173 del giorno 13 Febbraio 1981. *Archive of the Province of Sassari - Doc Prot. N. 9939*.

¹⁶³ For example, receipts emitted by the Province of Sassari in favor of Professor Parodo, Floriana Manca, and Nicoló Erre throughout 1981 and 1982 make clear that the payments were issued as reimbursements for research trips to La Maddalena. In November 1982 Manca and Erre received a stipend of 2,360,000 Lire for their work in the months of September and October, including the reimbursement for six trips to La Maddalena: "Fattura N. 97 - Per l'espletamento dei controlli radioattività ambientale nell'arcipelago di La Maddalena nei mesi di Settembre ed Ottobre 1982," Sassari, 16 Novembre 1982, and similar documentation available in the *Archive of the Province of Sassari*. The Province emitted similar payments (but of different amounts) during the years in which Manca and Erre worked at the laboratory under the supervision of Parodo.

Province, amply critiqued by the national experts.”¹⁶⁴ In reality, the Province did not hire Manca and Erre. The temporary contract (one year of duration and renewable) signed by Parodo explicitly mentioned them as research assistants without direct remuneration. From this point of view, the new contract presented the same elements of uncertainty and precariousness that put Cabizza’s experience to an end. This time, however, the relationship between the provincial administration and the laboratory personnel seemed much improved—at least, this is how Manca and Erre perceived their experiences.

According to Nicoló Erre, working in La Maddalena was difficult because the archipelago was isolated from the rest of Sardinia. Back then, Sassari was the nearest city with research centers, a university, and qualified personnel who could supervise the activities of the laboratory.¹⁶⁵ Reaching Palau by car took up to two hours and then the ferryboat to La Maddalena could take from twenty to forty-five more minutes, depending on the frequency of the runs. In sum, the job in the archipelago was not appealing, but Erre and Manca continued to collaborate with Parodo until 1987, when the old professor decided to not renew his contract. That year, Floriana Manca became the primary responsible of the radiosurveillance service and the Province temporarily hired five more persons for the routine operations and management of the laboratory.¹⁶⁶ At the end of 1986, the installation of the electronic monitoring stations purchased by the Province in 1979 (and uselessly stored outside the laboratory since 1981) was

¹⁶⁴ “Letter to Carlo Papucci, January 7, 1980,” Carlo Papucci, *Personal Archive*.

Gian Nicola Cabizza corresponded frequently with Carlo Papucci during his time as director of the radiosurveillance laboratory. Carlo Papucci played an important role in the socio-technical controversies about the retards in the implementation of the radiosurveillance service, both as an expert and as a union activist. I will examine Papucci’s activities in more detail in the next chapter. Here I want to underline that in a situation of political and professional isolation, Cabizza could count on the technical and political support of Carlo Papucci. They corresponded about the technical problems given by the instruments with which the laboratory of La Maddalena was equipped. Cabizza asked Papucci practical advice on sampling procedures and instrument calibration, and shared with him the results of the spectrometric analyses that the laboratory started to perform in 1979. In a letter sent on September 16, 1980, for example, the young physicist illustrated the last results of the laboratory and the problems he was having with the Province of Sassari about the renewal of his contract: “Letter to Carlo Papucci, September 16, 1980.” Carlo Papucci, *Personal Archive*.

¹⁶⁵ Personal interview with the author. Sassari, October 2012.

¹⁶⁶ “Convenzione per contratto d’opera senza vincolo di subordinazione per prestazioni professionali connessi al controllo della radioattività ambientale nell’arcipelago di la Maddalena. Libero professionista Dott.ssa Floriana Manca [...],” Sassari, February 17, 1987 - *Archives Province of Sassari*; “Verbale di deliberazione della Giunta Provinciale di Sassari N. 558. Oggetto: Delibera G. P. N. 2554 del 30.12.1986 Reg. Es. Integrazioni e modifiche. Servizio controllo radioattività La Maddalena. Sorveglianza e funzionamento rete rilevamento in continuo dati,” *Prot. N. 12591, April 7, 1987. Archive of the Province of Sassari*.

finally completed.¹⁶⁷ Local newspapers celebrated the “event” with relief.¹⁶⁸ Until 1989 the Province remained directly involved in the management of the radiosurveillance program, when an ulterior reform of the Italian National Health System delegated the administration and organization of public health services *ad hoc* regional institutions—the so-called Local Sanitary Units (U.S.L.). At that point in time, the radiosurveillance laboratory fell under the direct administration of the U.S.L. of Sassari.¹⁶⁹ Finally, in 1993 Manca and Erre were hired as health physicists within the regional health system and their jobs at the laboratory were regulated with standard contracts for public employees.¹⁷⁰

After the “Cabizza affair” the radiosurveillance system of La Maddalena was not majorly improved. The new hires continued Cabizza’s work with the same “obsolete and fragile equipment” at their disposal, whereas the network of monitoring stations became operative only after the Chernobyl accident (six years later).¹⁷¹ As Nicolò Erre recalls: “When the radioactive cloud hit Italy we were totally unprepared. In fact we did not detect it until a few days later, when we checked the aerial station installed on the laboratory’s rooftop. If we had the electronic network in place we would have known immediately, because the alarm would have gone off.”

As mentioned earlier, the installation of the automatic monitoring stations was not easy. Complex bureaucratic procedures, endless meetings, and vetoes posed by the military authorities impeded a timely implementation of the radiosurveillance service. But even after its completion, the network presented numerous deficiencies.¹⁷² First, when the electronic system was finally ready to work, the software was obsolete and required extensive updates. After buying the sophisticated equipment in 1979, the Province stored it outside the laboratory without particular

¹⁶⁷ As documented in the newly stipulated convention the Province hired a biologist, a computer technician (Nicolò Erre was hired with this role), an electrical technician, a custodian, and a janitor. See note 57.

¹⁶⁸ “Adesso viviamo tutti più tranquilli, già in funzione la quinta centralina,” *La Nuova Sardegna*, February 12, 1987; “Il sommergibile è radioattivo? Ora lo sappiamo con certezza,” *La Nuova Sardegna*, July 29, 1987.

¹⁶⁹ “Radioattività, controllerà la Regione,” *La Nuova Sardegna*, January 21, 1988.

¹⁷⁰ Both Nicolò Erre and Floriana Manca reconstructed the history of their employment at the laboratory of La Maddalena during personal interviews with the author. The author interviewed Floriana Manca in Sassari in May 2012.

¹⁷¹ Floriana Manca described in this way the status of the equipment in place before the installation of the electronic network in 1987. Personal interview, Sassari, May 2012.

¹⁷² Gian Nicola Cabizza, now a member of the environmentalist movement *Legambiente*, returned to comment on the radiosurveillance system of La Maddalena after the news about the completion of the monitoring network appeared on the newspapers: “La Nuova [Nuova Sardegna] recently commented with enthusiasm that ‘now we can live in tranquility because the radiosurveillance system has been completed.’ But I want to alert the population that things are quite different from what they appear. [...] The most dangerous and least secure nuclear plant in Italy is still the foreign plant of La Maddalena.” Cited from “Quella nucleare della Maddalena è una centrale incontrollabile,” *La Nuova Sardegna*, March 29, 1987.

precautions. The deterioration of the material required substantial refitting and repair operations. Second, the calibration of the instruments was laborious; it needed to keep into account the baseline of the natural background in order for the stations to reliably measure significant variations in the levels of radioactivity. Finally, La Maddalena was revealed to be a very hostile environment for electronic devices. High temperatures in the summer made the natural radioactivity background rise significantly, requiring recalibrations). Strong winds, humidity, and the corrosive salinity of the seawater hit the monitoring stations quite hard. During the winter frequent sea storms and the violent washing of the archipelago's coasts submerged completely the water pumps (and their electronic apparatuses) of the radiometric stations installed around the U.S. base, provoking false alarms and damages whose repair necessitated lengthy suspensions of the monitoring activities.¹⁷³ Some technical reports issued between 1989 and the beginning of the 1990, listed in detail the number and types of malfunctioning episodes registered monthly. On February 1989, for example, some of the stations failed to transmit the signals for 44 hours; in March the station installed inside the Italian military arsenal did not transmit for almost 80 hours. Other frequent malfunctions were related to failures of battery recharge systems, high temperatures, water pump failures, and electric energy interruptions (very common in the rest of La Maddalena).¹⁷⁴ In sum, saying that La Maddalena was monitored sounds like a very optimistic account of the radiosurveillance system in place in the archipelago. Between 1987 and 1988 the local newspapers reported cases of malfunctions and denounced the disorganization of the laboratory numerous times, putting into question the reliability of the radiometric data.¹⁷⁵ On October 26, 1988, *L'Unione Sarda* published a reportage in which journalist Alberto Testa described the widespread alarm circulating among the local residents.¹⁷⁶

¹⁷³ Both Nicoló Erre and Floriana Manca described the difficult environmental conditions that disturbed the operation of the radiosurveillance network. These difficulties continued until the beginning of the 1990s, when a major update of the entire system, including the substitution of hardware and software, made the network more efficient, stable, and reliable.

¹⁷⁴ "CO.GE.MA. s.n.c., "Rete di Monitoraggio 'La Maddalena' - Relazione mensile," Sassari, March 3, 1989; "CO.GE.MA. s.n.c., "Rete di Monitoraggio 'La Maddalena' - Relazione mensile," Sassari, April 12, 1989.

¹⁷⁵ Indeed the local newspapers reported the episodes of false alarm and malfunction of the monitoring system on various occasions. See for example: "Se ci fossero fughe radioattive nessuno potrebbe intervenire," *La Nuova Sardegna*, March 15, 1988; "Radioattività, parla l'assessore provinciale Degortes: 'Se il controllo non funziona le colpe sono della Regione'," *La Nuova Sardegna* March 16, 1988; "Inchiesta della Procura sul laboratorio di Fisica," *La Nuova Sardegna*, June 14, 1988; "Sono falsi I dati sulla radioattività," *L'Unione Sarda*, June 14, 1988; "Ma il responsabile dell'igiene pubblica passa al contrattacco: 'gli apparecchi funzionano benissimo'," *L'Unione Sarda*, June 15, 1988; "Laboratorio nel caos: guasta la centralina dell'arsenale," *La Nuova Sardegna*, June 16, 1988; "La Maddalena, c'è un rischio continuo sui controlli per la radioattività," *L'Unione Sarda*, November 2, 1988.

¹⁷⁶ "L'arcipelago 'nucleare.' Timori e paura, nessun piano d'emergenza," *L'Unione Sarda*, November 26, 1988.

The article featured the stories of two fishermen who allegedly saw U.S. Navy personnel working around a damaged submarine trying to contain a major leak of chemical substances: “Since then, the seafloor of that polluted area is completely covered with a white powder that has killed all the marine vegetation, as if a bulldozer had passed over there.” The two men further suggested that the episodes of birth defects that “many local families experienced” could be explained only with the presence of the nuclear submarines. According to a local family physician it was “inconceivable that the regional health authorities had not yet investigated the causes of the extraordinary rates of cancer on this island.”

For Nicoló Erre, public alarms were exaggerated and unjustified, contributing to an “unfair image of the laboratory, which some Maddalenini already regarded with suspicion.”¹⁷⁷ Very often, he explained, the whistleblowers were members of the laboratory personnel (especially locals) frustrated with their working conditions:

They got paid with long delays and wanted to be hired permanently by the public administration. When complaining about their working conditions with family, friends, and journalists, they did not miss to cite those episodes, which the newspapers reported with great emphasis. This is how it worked.

The first network of monitoring stations installed in 1987 was a fragile envirotechnical system exposed to the merciless attacks of the natural elements and subject to the organizational fallacies of bureaucratic inertia. But the laboratory became also a target of public outcry when the political tension about the U.S. Navy presence escalated. One example is the battle for the regional referendum that anti-nuclearists, pacifists, and a large part of the left organized against the submarine base (see Chapter 3). During those moments of tension, even small malfunctions, or bureaucratic delays, reported with emphasis by the frustrated personnel of the lab, became sources of alarming rumors. A false alarm due to a connection failure, for example, could be easily interpreted as a radioactivity increase. When the directors of the lab tried to explain that nothing was wrong, local journalists replied with understandable skepticism. In turn, this reinforced the experts’ prejudice against the public. As Erre recalls, “I remember one time when professor Parodo sent a letter to *La Nuova Sardegna* trying to explain that false alarms should not be interpreted as real ones, but the journalist the next day changed his words and made up the

¹⁷⁷ Nicoló Erre, personal interview with the author, Sassari, October 2012.

story that the network was substantially inefficient. After that episode Parodo decided not to respond anymore because he thought it was just a waste of time.”¹⁷⁸

Parodo’s response to the uncontrolled rumors and interpretations of the malfunctions of the local laboratory points to the clear difficulties of expert institutions to communicate with the public. True, sometimes local journalists and Maddalenini, for various reasons, misinterpreted and dramatized even small problems, but in the past, apart from Cabizza, nobody campaigned to inform the public about the role and the work of the laboratory. Rumors proliferated in the context of secrecy and the innumerable contradictions that surrounded the radiosurveillance system. In La Maddalena the laboratory was almost unnoticed. First, it was built in a part of the island that the Maddalenini seldom accessed in their everyday routines. Second, the directors of the lab sent their monthly radiometric reports only to central authorities (Ministry of Health, CNEN, ISS, Province of Sassari, Region of Sardinia, and the Municipal administration). Local authorities, despite various requests and periodical declarations of good intentions, never established transparent procedures for divulging the data. Despite repeated alarming episodes, like the birth defects of 1976 and the USS Ray accident in 1977, the municipal administrations limited themselves to denouncing delays in the radiosurveillance system, but ultimately did not take their share of responsibility in more concrete forms, such as instituting an ad hoc commission of the city council. In sum, it is difficult to explain the behavior of the Maddalenini in light of the repeated failures and shortcomings of expert and public institutions.

In 1977, Professor Gloria Campos Venuti, director of the radiation laboratory at the National Health Institute (ISS), formulated her own sociological interpretation of this lack of urgency in addressing nuclear risk in the archipelago:

I cannot definitively judge the primary cause for the extreme slowness and only partial implementation of the entire program [of radiosurveillance], despite the efforts of the two institutions [ISS and CNEN (National Committee for Nuclear Energy)]. An accurate analysis of the situation could reveal the political and bureaucratic difficulties encountered in financing the entire plan, and the uncertainty of the region of Sardinia, on the one hand, and the Province of Sassari, on the other hand, to allocate the necessary structures, personnel, and competencies. I think above and beyond these obstacles lies, at the local level, a general distrust about the real guarantees that the entire program could provide for the protection and safety of the public. There is, perhaps, a difficulty in understanding the real health dimension of the problem and the concrete actions that can

¹⁷⁸ Nicoló Erre, personal interview with the author, Sassari, October 2012.

minimize the risks, regardless of the ideological struggles that different parties conduct around it.¹⁷⁹

Campos Venuti's comment manifests the frustrations experienced by expert institutions when interacting with both local and national politicians and with the residents of La Maddalena. This widespread lack of concern about risk, and the failure of public authorities to respond in a timely fashion to a concrete problem of public safety, created a myopic view of public safety in the archipelago and a culture of glacial response to alerts that would have a long lasting impact on the future structure and routine operations of the radiosurveillance program.

4.5. Bureaucratic Ignorance and the Politics of Resignation

On July 18, 1975 the *Odalisca*—the ship laboratory that CNEN used for its marine radioecological campaigns—arrived in La Maddalena. Local journalists expected new data and declarations from the team of radioecologists, who instead delivered a laconic ‘no comment’ and invited local newspapers to address specific requests of information to the press office of CNEN.¹⁸⁰ Typical of the reactions that the aura of secrecy and reticence of expert and military institutions provoked among the Maddalenini was the interpretation of Gian Carlo Tusceri, the local correspondent of *La Nuova Sardegna*, in the newspaper: “It is clear,” wrote Tusceri, “that within CNEN there are two groups, the researchers (those who, like Brondi, are here to collect the data for the radioecological survey) and the bosses (the elements of a pyramid that reaches the highest levels of political authority where science ceases to be science and becomes a subject to opinions based on the arbitrary will of the reason of the state)... From this it is possible to understand that in this complicated situation the public will never know how things really are, at least from the bosses.”¹⁸¹ The idea of the existence of two levels of governance inside expert agencies—one public and powerless and the other opaque and powerful—played a major role in the proliferation of local rumors surrounding the management of the radiosurveillance program of La Maddalena. The proliferation of conspiracy theories about the management of the radiosurveillance system was not the only effect of secrecy in La Maddalena. The idea that the

¹⁷⁹ Gloria Campos Venuti, “Sorveglianza ambientale a La Maddalena: relazione introduttiva,” in *Atti del XX Congresso Nazionale dell'Associazione Italiana di Fisica Sanitaria a Radioprotezione*, (Bologna 26-28 Ottobre, 1977), cit. p. 16.

¹⁸⁰ “Non sono stati resi noti i dati dei rilevamenti effettuati dall’*Odalisca*,” *La Nuova Sardegna*, July 19, 1975.

¹⁸¹ *Ibidem*, cit.

management of risk was an exclusive matter of expert, military, and central political authorities infused a widespread sense of resignation among the local population and among the local administrators. I will show with a concrete example how local administrators, some times, used this induced sense of hopelessness as an alibi to justify the complete delegation of the radiosurveillance problem to superior authorities and their consequent de-responsibilization.

In the fall of 2012 I was conducting fieldwork in La Maddalena. After several attempts to access the newly relocated municipal archive I was finally able to consult the documents. I had been working for several days inside the *municipio*, taking pictures and checking out folders. Something seemed off. For a place that had been dealing with radiological risk for over thirty years I found it strange that among the copious documentation archived by the municipal administration I could not retrieve any radiometric report issued by the local laboratory. I knew for a fact—after interviewing three directors of the lab—that the mayors received the monthly reports. And yet, apart from the debates of the city council I could not find any trace of radioactivity. One day, unexpectedly, one of the secretaries who helped me with my archival research called me in her office and showed me a folder: “Maybe this can be interesting to you. Inside here there are a bunch of documents about radioactivity. I saw them by chance and I thought that they could be important, so I put them inside my drawer. You know, we had that laboratory there, because of the base. Let me know if you want to take a look.” Inside the folder I found only the radiometric reports for the end of 1989 and the beginning of 1990, but it was enough to give me an idea of how the laboratory worked and the malfunctions that were registered each month. The excitement for that serendipitous discovery was equal to my puzzlement. When I interviewed the former mayors of La Maddalena they mentioned those reports without much emphasis and only after I explicitly asked them, as if that data were just part of a bureaucratic ritual without particular meaning. By reading them I had the impression that the actual documents were written with the exact same template. Very concise, almost brutal, definitely impersonal, and with the same happy ending: “The levels of radioactivity registered during this month are not relevant from a sanitary point of view. Best regards.” After all, that was the only thing that mattered to both the laboratory personnel and the mayors. But that mechanical editing of the reports and the superficial readings allowed by the succinct formulas used to communicate the end result—what actually mattered—come across almost as a tacit agreement, maybe unconscious, or generated by inertia.

Floriana Manca, director from 1987 to 2008, also testified to the fact that the municipal administration did not pay much attention to the monthly reports of the local laboratory. She told me that after the USS Hartford accident at the end of 2003, and the consequent controversy about its possible environmental consequences, “I suggested that we display the radiometric data outside the office of the mayor so that everybody could take a look at them. They answered: ‘what data?’”¹⁸² I objected that the laboratory personnel could take the initiative and make the data available to the local residents, but Dr. Manca explained that: “I worked for the Region, not for the municipal administration. I had to respond only to the authorities and my job was to give the data to a list of institutions.”

The politics of resignation is shaped by asymmetrical relations between experts, military, and political authority and the public but is also produced by inertial bureaucratic responses in which delegation of responsibilities and forms of technocratic mentality match and accommodate each other. The systematic exclusion of local institutions from the decision-making process concerning the radiosurveillance system of La Maddalena and the restricted access to radiometric data were not always the result of machinations of powerful entities—such as the U.S. Navy, the Italian State, and expert agencies—but sometimes corresponded to processes of self-exclusion. I will return to this theme in Chapter 6, in which I show how, after the Hartford accident in 2003, the extraordinary mobilization of local anti-base activists challenged these mechanisms of inertial disinterest for the radiosurveillance system and created new conditions for public participation.

4.6. Conclusion

Scott Frickel et al. argue that ignorance is not necessarily the product of secrecy or of purposefully deviant or bad science.¹⁸³ Rather, scientific protocols, standards, and epistemic traditions produce areas of “undone science,” which determine which risks are visible and which will remain invisible. In this chapter I discussed various examples of how the production of ignorance about the environmental conditions of the archipelago was intrinsic in the radiosurveillance program commissioned and implemented after 1974. I did so by looking

¹⁸² Personal interview with the author, La Maddalena, May 2012.

¹⁸³ See Scott Frickel and Michelle Edwards, “Untangling Ignorance in Environmental Risk Assessment,” in Soraya Boudia and Nathalie Jas (Eds.), *Powerless Science? Science and Politics in a Toxic World*, (Berghahn, 2014): 215-233.

simultaneously at the institutional arrangements of the Italian radiosurveillance system and the concrete process of its implementation in the archipelago, including the effects that limited access to information and frequent technical and bureaucratic malfunctions had on local politics and administrative practices.

Expert radioecologists of CNEN were aware of the agency's organizational problems and on various occasions, even publicly, tried to propose solutions. The first problem was that lack of preliminary radioecological data often forced Italian experts to adopt alternative (more dispersive and time consuming) research methodologies—like the geometric method of data gathering—during their confirmatory campaigns around nuclear sites. More concerning, yet, is that missing data about the environmental conditions of nuclear sites before the installation of nuclear plants prevented a thorough comparison with radioactivity levels after their establishment. In absolute terms, levels of radioactive contamination around nuclear sites have never reached (according to the available documentation) the limits imposed by Italian and international regulations, but the fact remains that one of the most important prerequisites for nuclear siting in Italy was constantly overlooked. Second, and more specific to La Maddalena, Italian agencies were not properly equipped for radioecological campaigns that required more personnel and instruments. Some of the radioecologists I interviewed recounted that the archipelago has probably been the most studied site in Italy, but it took more than two years to complete the radioecological surveys and after that the continuous radiometric monitoring of the local laboratory took almost ten more years to become fully operational.

The bureaucratic organization of the radiosurveillance program also suffered tremendously from the lack of coordination between different levels of administration (central, regional, provincial, local). The Italian nuclear bureaucracy was a very centralized administration organized around specialized research centers (continental contamination laboratories were in Rome, while marine contamination laboratories were in La Spezia, Liguria). Teams of radioecologists and radioprotectionists from CNEN and ISS conducted radiosurveillance campaigns around Italy. Radioecological expertise was highly centralized and not easily available at the periphery. Regions like Sardinia started to have their own research centers only

at the close of the 1980s.¹⁸⁴ In the meantime, CNEN and ISS had to supply expertise, instruments, and radiometric measurements. In a context such as the archipelago, the time separating the collections of biological samples and the laboratory analyses in Rome or in Liguria was considerable (sometimes more than a month). In these conditions the results were always out of synchrony with the real ecological situation of La Maddalena.

The design of the radiometric network followed standard procedures. Two problems, however, remained unresolved. The design of the radiometric system did not take into account the impact that the environmental conditions of the archipelago would have on the instruments. The radiometric stations were purchased in 1979 but were not installed until 1986. After seven years the equipment was already obsolete and needed major updates and repairs. Even after that, the false alarms and the malfunctions of the instruments did not allow continuous radiometric measurements.

¹⁸⁴ For example the Region of Sardinia formally instituted a regional radiosurveillance program only in 1988 (with the exclusion of La Maddalena) with the help of the Physics Institute of the University of Cagliari: “Radioattività ambientale, il controllo sarà fatto dall’università,” *La Nuova Sardegna*, September 9, 1988.

Part III

Risk, accidents, and political mobilization

Relying on Freud's definition of the uncanny, Joseph Masco argues that the military-industrial production of artificial radioactive materials after WWII introduced material, psychic, and sensorial alterations of individual and collective experiences of the natural environment.¹⁸⁵ He describes the "nuclear uncanny" as the sensorial disorientation produced by the invisible qualities of radioactivity and its dilated spatiotemporal effects:

Thus, for those living near nuclear facilities, radiation often becomes a means of explaining all manner of illness and misfortune—its very invisibility allowing its proliferation in the realm of the imagination. In this way radiation disrupts the ability of individuals to differentiate their bodies from the environment, producing paranoia. The nuclear uncanny is, therefore, a rupture in one of the basic cognitive frames of orientation to the world... This is perhaps the most profound effect of the nuclear age, as individuals either numb themselves from their own senses, losing themselves to the everyday threat, or are conditioned to separate themselves from their own senses, losing themselves in a space that is simultaneously real and imagined, both paranoid and technoscientific reality.¹⁸⁶

The nuclear uncanny is an elegant figurative device, but by using this category (and substantially similar descriptions of radiation as a special matter), scholars run the risk, ironically, to concur in the reification of "nuclear things as exceptional," and therefore requiring specific tools of social analysis. Empirical work on the ways in which experts and non-experts deal with the perception of radioactivity demonstrate that semiotic devices, bodily practices, and learning processes enhance and shape the capacity to pay attention to the signs of risk and to articulate their meanings by establishing nexuses between causes and effects.¹⁸⁷ These practices

¹⁸⁵ See Sigmund Freud, "The Uncanny." In *The Standard Edition of the Complete Psychological Works of Sigmund Freud*, translated by James Strachey, (The Hogarth Press and the Institute of Psychoanalysis, 1927), Volume 17: 219-54

¹⁸⁶ Masco, *The Nuclear Borderlands*, p. 32.

¹⁸⁷ See for example Joy Parr, Parr, "Working Definition of the Insensible: an embodied history of radiation protection in Canadian Nuclear Power Stations, 1962-92," *Comparative Studies in Society and History* 48 (4), 2006: 820-851; Olga Kuchinskaya, "Articulating the signs of danger: Lay experiences of post-Chernobyl radiation risks

require indeed massive efforts to map out radioactivity dispersion and effects in space and time. In sum they require a surplus of material orientation—quite the opposite of the disorienting effects supposedly provoked by the “nuclear uncanny.” Radiation is invisible to the degree that it cannot be perceived through the sense of smell or directly by sight. The fact that radiation levels can be assessed only through proper knowledge and instrumentation, or through delayed health effects, places non-experts in a dependent position, to rely on experts and public institutions for their safety. But it is also true that other toxic substances (or global phenomena such as climate change) require sophisticated tools, scales of observation, and knowledge of the causal links between what is experienced individually and collectively and the material forces at the origins of those manifestations to be made visible. Chapters 5 and 6 will analyze the perceptions of nuclear risk in the archipelago of La Maddalena.

Risk Society?

Over the past thirty years scholarly debates over technological risks and public perceptions of risk have been deeply influenced by Ulrich Beck’s theses on “risk society.”¹⁸⁸ Beck’s theses have inspired several critiques, mostly contesting risk society’s lack of historical accuracy and its arbitrary definition as an exclusively modern phenomenon related to the introduction of invisible global contaminants into the world by chemical and nuclear industries, among others.¹⁸⁹ While I do not reconstruct the history of these debates, in what follows I critically engage some of Beck’s central arguments to analyze the production and interpretation of nuclear risk in La Maddalena.¹⁹⁰

One of the most important implications of Beck’s theses is the problem of “relations of definition.”¹⁹¹ According to Beck, risk society is characterized by techno-scientific progress and its industrial applications, and, simultaneously, by the production of ubiquitous and often

and effects,” *Public Understanding of Science* 20 (3), 2011: 405-421; Atsuro Morita, Anders Blok, and Shuhei Kimura, “Environmental Infrastructures of Emergency: The Formation of a Civic Radiation Monitoring Map during the Fukushima Disaster,” in Richard Hindmarsh (Ed.), *Nuclear Disaster at Fukushima Daiichi*, (Routledge, 2013): 78-96.

¹⁸⁸ Ulrich Beck, *Risk Society: Towards a New Modernity*, (Sage, 1992).

¹⁸⁹ See for example Soraya Boudia and Nathalie Jas, “Risk and Risk society in Historical Perspective, *History and Technology* 23 (4), 2007: 317-331.

¹⁹⁰ See in particular Soraya Boudia and Nathalie Jas, “Risk and Risk society in Historical Perspective, *History and Technology* 23 (4), 2007: 317-331, and Brian Wynne, ““May the Sheep Safely Graze? A Reflexive View of the Expert-Lay Knowledge Divide,” in Lash, Scott, Bronislaw Szerszynski, and Brian Wynne (Eds.), *Risk, Environment, and Modernity: Towards a New Ecology*, (Sage, 1996): 44-83.

¹⁹¹ Ulrich Beck, *Risk Society*, cit. p. 23.

invisible risks on a global scale. These risks, moreover, escape sensorial perceptions and typical categorizations of time and space—based, in turn, on known definitions and forecasts. This conjuncture, Beck argues, creates a crisis of credibility for scientific knowledge and institutions. More importantly, it reabsorbs science into the political arena because the supposed epistemological superiority of science—to find solutions to techno-scientific problems—is placed in doubt. The definitions of risks—what risks are and how their effects can be measured and assessed—become contested. Lay people advance alternative ways of knowing through the collaboration of counter-experts and alternative forms of knowledge, which the technocratic establishment systematically rejects in the name of objectivity and methodological accuracy.¹⁹²

Radioactivity is the “invisible threat” par excellence. It is imperceptible without the technological mediation of detecting instruments—e.g., kinds of emitters and patterns of dispersion under different envirotechnical circumstances—and knowledgeable experts. In a situation in which citizens become aware of radiocontamination risks without having the means to detect and empirically apprehend its manifestations, the meanings of radiation cannot be generated and shared through general social conventions, but must rely upon given technical definitions or past images associated with radiation (and atomic power in general), perhaps produced by mass media, novels, movies, and so forth. In this scenario, epistemological divides between experts and non-experts play a crucial role in what Ulrich Beck has called “relations of definitions”—that is, asymmetrical power relations based on prescriptive technical definitions of invisible risks ascribed to scientific knowledge. The technocratic presumption of epistemological rationality as the exclusive domain of expert knowledge pushes back against citizens’ claims of subjective and contextual experiences of risk. They do not count as far as they do not conform to prescriptive models of scientific definition and articulation.

For Beck this is not easily solved, actually this is an inherent problem that does not seem to leave hope for reform. Regardless of the optimistic or pessimistic interpretations of Beck’s analysis, what should concern us here is primarily his argument about the “relations of definition,” that is lay/expert epistemic divides about risk. I take this aspect of Beck’s analysis seriously but I want to investigate its empirical plausibility. Almost all of the literature analyzing socio-technical controversies over risk is focused on lay/expert epistemic divides. Further, analyses of controversies between experts and non-experts over the health and environmental

¹⁹² Ibid.

effects of toxicants are in most cases synchronic studies of lay and professional ways of knowing.¹⁹³ Works on popular epidemiology, street science, and citizen science focus on controversies between experts—who deploy a set of explanations based on established methods, theories, and protocols—and non-experts, who raise questions and contest professional/expert knowledge based on their observations and direct experiences of the health and environmental effects of invisible pollutants. Laypeople’s direct experiences, evidence, and relationship with the surrounding environment—the cases explored by this literature suggest—differentiate and gives authority to non-expert ways of knowing because these are key elements to which experts seem to not have access to.

Science and Technology Studies provide a great deal of tools, models, and empirical cases to understand how experts come to construct scientific objects and their explanations, but often studies of socio-technical controversies represent non-experts as homogenous groups opposing the rationalistic, decontextualized, and exclusive definitions of scientific knowledge production. With time the accumulation of case studies proposing the same interpretative schemes have transformed the existence of lay/expert epistemic divides and alternative, conflicting forms of knowledge into an assumption rather than an empirical question. This focus on epistemological divides, I argue, limits our ability to understand how discourses and representations of risk are formed. What happens, for example, in a particular socio-historical context before risk even becomes an object for debate? Before paying attention to discourses of risk as displayed in public socio-technical controversies, and without any assumption about the existence of alternative forms of knowledge about risk, I want to look at the material processes that make meanings of risk possible in the first place.¹⁹⁴ For example, how do people living in radiocontaminated places identify and make sense of radiological risk?

¹⁹³ Just to give some examples of the most cited works, see Phil Brown, “Popular Epidemiology and Toxic Waste Contamination: Lay and Professional Ways of Knowing,” *Journal of Health and Social Behavior* 33 (3), Sep., 1992: 267-281; Brian Wynne, “Misunderstood Misunderstandings: Social Identities and the Public Uptake of Science,” in Irwin, Alan and Brian Wynne (Eds.), *Misunderstanding Science? The Public Reconstruction of Science and Technology*, (Cambridge University Press, 1996): 19-46; Alan Irwin, *Citizen Science: A Study of People, Expertise and Sustainable Development*, (Routledge, 1995); Jason Corburn, *Street Science: Community Knowledge and Environmental Health Justice*, (The MIT Press, 2005).

¹⁹⁴ A recent study that analyzes the formation of scientific discourses in socio-technical controversies is Rebecca Slayton’s *Arguments that Count: Physics, Computing, and Missile Defense, 1949-2012*, (The MIT Press, 2014).

Material signs of risk

In *Material Participation*, Marres explains that concrete strategies of material engagement provided by domestic devices allow citizens to participate in, and to make sense of, environmental preservation.¹⁹⁵ Giving various examples of how publicity campaigns and technological devices for domestic use invite and allow these forms of material engagement, Marres suggests that a shift is happening in public policy campaigns. Instead of insisting on the idea that citizens have to achieve a minimum basis of scientific/expert literacy in order to engage with issues such as climate change, pollution, energy waste, and so forth, policy-makers and companies promote the use of domestic technological devices that enhance the concrete possibility of citizens to do their share for the environment. Marres' argument is particularly relevant for how I frame the problem of public engagement in sociotechnical controversies in La Maddalena. Here I want to underline the relevance of Marres's suggestion that forms of material engagement offer ways of making more directly evident, or perceivable, sometimes abstract concepts, that are difficult to comprehend due to the lack of immediately available referents, either because the phenomenon is too large to be discretely apprehended by the limited scale of sensorial apparatuses, or because it is far remove from everyday experiences. What happens, for example, when an invisible force, such as radiation, introduces risk in a place where citizens have no direct experience—and little access to expert knowledge—of this physical phenomenon? How do experts engage with citizens and vice versa, to explain and understand how radioactivity works and impacts the environment and human health?

Consider, for example, how nuclear workers and communities living in contaminated areas make radiological risk visible, and therefore intelligible. In her account of Canadian nuclear workers' acquaintance with radiological risk, historian Joy Parr describes how, during the 1960s and 1970s, the Canadian nuclear industry implemented a series of theoretical and practical training programs through which nuclear workers achieved a practical knowledge of radiation hazards.¹⁹⁶ Parr argues that collaboration among experts, nuclear plant managers, and nuclear workers in the Canadian program successfully inculcated workers with a sense of individual responsibility for their radioprotection. Due to collaborative training with experts,

¹⁹⁵ Noortje Marres, *Material Participation: Technology, the Environment and Everyday Publics*, (Palgrave Macmillan, 2012).

¹⁹⁶ Joy Parr, "A Working Knowledge of the Insensible? Radiation Protection in Nuclear Generating Stations, 1962-1992," *Comparative Studies in Society and History* 48 (4), October 2006: 820-851.

workers developed what Parr calls “a somatic mode of attention”—that is, embodied knowledge of radiation hazards that allowed workers to enact prescribed radioprotection measures.¹⁹⁷ Parr argues that the Canadian model is comparatively more effective than the ones used by the French and American nuclear industries, where workers experience radioprotection routines as hierarchical impositions by experts and managerial cadres.¹⁹⁸ Of particular relevance to the current discussion is the fact that Parr’s phenomenological and historical analysis of workers’ encounters with nuclear hazards provides tools for understanding how “non-experts” come to know and deal with radiological risks through specific, repetitive material practices.

More recently, Olga Kuchinskaya has analyzed the ways in which communities in Belarus affected by post-Chernobyl contamination, experience radiation risk and its effects.¹⁹⁹ Puzzled by the apparent lack of awareness of radiological hazards by laypeople in their everyday routines, Kuchinskaya observes that, in the absence of opportunities for articulating the meanings of risk, non-experts are less likely to develop risk-conscious behavior. She argues that because radiation is not immediately observable—that is, without proper instrumentation and expert knowledge—laypeople rely on other forms and strategies of objectifying risk. She analyzes both scientific and bureaucratic contexts in which different definitions, objectifications, and representations of risk emerge. For example, during radiological tests that are exclusively focused on measuring the levels of internal radioactivity of the population, the use of scientific tools and instruments of visualization, together with expert explanations of their meaning, allow citizens of Belarus to learn how to think of radiation and its effects through lived experience. According to Kuchinskaya, these interactions between experts and laypeople in contexts of scientific examination and radiation assessment make risk visible and inspire risk-conscious behavior by establishing causal links between individual choices—for example, not eating mushrooms and boiling meat as a precaution—and the chances of being contaminated. Without these opportunities for risk articulation, citizens are more likely to use loose proxies, like

¹⁹⁷ Joy Parr borrowed the concept of “somatic mode of attention” from anthropologist Thomas Csordas, “Somatic Modes of Attention,” *Cultural Anthropology* 8 (2), May 1993: 135-156.

¹⁹⁸ On this particular point, see the book by anthropologist Constance Perin on the American nuclear industry: *Shouldering Risk: The Culture of Control in the Nuclear Power Industry*, (Princeton University Press, 2005).

¹⁹⁹ Olga Kuchinskaya, “Articulating the signs of danger: Lay experiences of post-Chernobyl radiation risks and effects,” *Public Understanding of Science* 20 (3), 2011: 405-421. See also Kuchinskaya’s new book *The Politics of Invisibility: Public Knowledge about Radiation Health Effects after Chernobyl*, (The MIT Press, 2014). To remain focused on the object of my analysis, here I am exposing only Kuchinskaya’s argument about the articulation of radiological risk by non-experts, reproduced also in Chapter 2 of her book.

bureaucratic definitions, administrative policies, and neighbors' behavior, and to interpret them—with variable degrees of distortion—as signs of the presence or absence of radiation.

As distant from radiological risk as it may sound, practitioners of Cuban folk-religion share the problem of making the invisible visible. In her analysis of the materialization of spirits in folk religious practices in Cuba, Kristina Wirtz shows how spiritual mediums rely upon material signs to make spiritual presences manifest. Similar to Parr's analysis of nuclear workers, training with experts help practitioners develop a sensorial orientation—which Wirtz calls “perspicience”—through which they interpret material signs, such as shivers, as an indication of the presence of spirits. These material signs can only be interpreted because (1) they are taken to be signs and (2) acquire an indexical meaning (the shivers signal the presence of spirits through possession) through a shared “semiotic ideology.”²⁰⁰

The common element running throughout the different literatures cited here is that the practitioners of folk religious rituals, workers in hazardous environments, and communities living in contaminated areas all learn how to read and pay attention to signs that render visible what is not directly perceivable. It is through their collaboration or affiliation with experts, moreover, that people educate their sensorial and cognitive understanding of the signs of otherwise invisible risks—or spiritual presences. Following Wirtz, we may think of all of these examples in terms of the importance of material signs for making visible what cannot be directly perceived by the senses. Monitoring instruments, colored badges, shielding equipment, practices of decontamination, calculated time and distance from the recognized source of risk, shivers, and other signs make radioactivity and spirits visible through their indexical value.

But how do people who do not know whether their environment is contaminated, and who are not trained and acquainted with working definitions of risk, objectify the presence of radiation? How do they make sense of the meaning and presence of radiological risk? “Semiotic ideology,” as defined by Webb Keane, is the set of “background assumptions about what signs are and how they function in the world.”²⁰¹ According to the Peircean theory of signs adopted by Keane, a sign needs to be taken as a sign and interpreted according to some shared assumptions about the world in order to assume some value (meaning). Keane argues that “such assumptions

²⁰⁰ Kristina Wirtz, “Spiritual Agency, Materiality, and Knowledge in Cuba,” in Paul Christopher Johnson, *Spirited Things: The Work of “Possession” in Afro-Atlantic Religions*, (Chicago University Press, 2014): 99-129.

²⁰¹ Webb Keane, “Semiotics and the social analysis of material things,” *Language & Communication* 23, 2003: 409-425, cit. p. 419.

help determine, for instance, what people will consider the likely role that intentions play in signification to be, what kind of possible agents (humans only? animals? spirits?) exist to which acts of signification might be imputed, whether signs are arbitrary or necessarily linked to their objects, and so forth.²⁰²

Thus, semiotic ideologies involve a certain degree of awareness or capacity to apprehend signs as objects of experience. In La Maddalena, though, only scientists and—to a lesser degree—U.S. Navy servicemen had established understandings of risk due to expert knowledge and routine radioprotection practices. In those cases we can talk of semiotic ideologies of risk, in that for those groups meanings of risks—together with their objectifications and representations—were stable objects of perception thanks to the aid of specialized knowledge, measuring instruments, and radioprotection protocols. But how did local residents who lacked expertise and experience of radiological risk make sense of it? La Maddalena differs from the cases examined by Parr and Kuchinskaya because it remains unclear if the archipelago was ever contaminated by radiation. Official data produced by Italian expert agencies and the U.S. Navy have always excluded that the presence of the submarines caused substantial increases of radioactivity to put the health of the local population in danger.

In the case of local residents, we can hardly talk of semiotic ideologies of risk because, in the first place, radiation to them was an abstract concept, which could only be grasped through some rough representations of its possible effects. Only through discrete physical manifestations attributed to its effects or explicit expert explanations (like in the cases described by Parr and Kuchinskaya) could radiation become an object of experience, and its presence or absence hypothesized and assessed. In sum in La Maddalena the representational economy of risk was uneven because shaped by the asymmetrical “relations of definitions” that, according to Beck, characterize risk society. In a place where access to information was limited (even for experts) and in which local residents lacked previous experiences and knowledge of radiation, expert radioecologists and U.S. Navy personnel shaped the available meanings of radiological risk. But that was not the end of the story. Despite their lack of specialized knowledge, local residents made hypotheses about the risks of radiocontamination based on observations of the environmental status of the archipelago, the behavior of U.S. Navy personnel, and the

²⁰² Webb Keane, “Signs Are Not the Garb of Meaning: On the Social Analysis of Material Things,” in Daniel Miller (Ed.), *Materiality* (Duke University Press, 2005): 182-205, cit. p. 191.

interpretation of unprecedented events such as episodes of birth defects. In 2003, after an accident involving a U.S. nuclear submarine in the waters of the archipelago, local residents mobilized to ask public authorities to assess the environmental consequences of the submarine grounding. Expert controversies over the interpretation of data and the adoption of different methods opened the radiosurveillance system of La Maddalena to unprecedented public scrutiny. My argument is that public reactions to accidental events should be analyzed by taking into account the cultural and historical conditions that concur to shape the ways in which experts and non-experts interpret accidents and assess their effects.

My analysis addresses how different definitions, objectifications, and representations of risk come into being both as results of expert epistemic traditions and research protocols and among non-experts living near nuclear installations. First, as noted above, the material imperceptibility of radiological hazards without proper instrumentation and expert knowledge creates an asymmetry between experts and non-experts to assess whether contamination has taken place. Second, risk, according to its technically agreed upon definition, is the product between the calculable probability of an accident taking place and the consequences of that event. As such, risk assessment requires an orientation towards the future, a projection of the possible effects of an event that has not yet taken place but that can still happen. As Parr and Kuchinskaya suggest, making something invisible visible, such as radiation, is challenging for people who do not have technical expertise and lack previous experiences with even a working definition of radiological risk. Kuchinskaya further argues that without opportunities for their articulation, laypeople in Belarus form meanings of risk on the basis of indirect observations of the surrounding environment, administrative definitions and practices, and the behavior of other people. In Chapters 5 and 6 I show how this worked in La Maddalena.

Chapter 5

The Meanings of Risk: A Semiotic Approach

5.1. Reading Signs, Making Hypotheses: Toward a Semiotic Approach to Risk

Even in a small and relatively insular community of ten thousand, such as La Maddalena, public understandings of risk were often contradictory. Not only opposing parties (pro and anti-U.S. base) diverged in their evaluations of risk. Individuals, at times, had contradictory thoughts about expert and U.S. Navy explanatory narratives. Rumors and gossip alimeted fears and uncertainties about contamination. Even now, almost seven years after the closure of the base, doubts remain. During interviews or informal conversations with me, local residents formerly employed at the base were ready to deny any concern about radiation exposure on the job or in the archipelago, but often inquired further: “You have collected data on this, right, so what did you discover? Did we have nuclear contamination or not?”

Other contradictions emerged as local residents interpreted material changes in the archipelago. For example, Giulio, a retired technician from La Maddalena, worked on the base for thirty years. He managed 40 employees who maintained a complex system of diesel electric generators for the U.S. Navy. Giulio and his wife Roberta, also an employee on the base, remember that in Santo Stefano “Everything was clean and organized. Safety rules were always respected and the sanitary conditions were regarded as an extremely important matter.”²⁰³ As many former Italian employees on the base, the couple talked about “the Americans” as diligent and respectful of the rules, in contrast with Italians “who do things always approximately.” In La Maddalena, they told me, the U.S. Navy introduced exemplar norms of environmental preservation that were simply unimaginable by Italian standards: “They taught us how to recycle, for example. We were simply dumping trash inside a hole and burning it!”²⁰⁴ When I asked what they thought of radiocontamination in the archipelago they argued that it was mostly a political

²⁰³ Giulio and Roberta are pseudonyms. Personal interview with the author. La Maddalena, September 2012.

²⁰⁴ Here Giulio was referring to the area known as Sasso Rosso, which until the beginning of the 1990s the local administration was using as land fill for the entire archipelago.

maneuver of the anti-base movements: “Look, sometimes during our lunch break in Santo Stefano we were allowed to take a walk around. They knew us very well and trusted us. We were watching the water at the pier... and you can’t imagine the spectacle! There were huge *orate* going around undisturbed—emphasized Giulio, an expert fisher—Do you think that fish would be there if the seawater was polluted or contaminated?”²⁰⁵

Yet, some experienced fishermen, like Carlo, who did not have access to Santo Stefano, scrupulously avoided fishing in waters close to the U.S. Navy base: “In general I do not think that the submarines were contaminating the islands. But honestly we did not fish in places where the currents were passing through Santo Stefano. You know what I mean? When in doubt, better to avoid problems.”²⁰⁶

Every two years, some U.S. Navy personnel moved away from the base, assigned to posts back in the U.S. or overseas. “Were they sent away because they could not stay anymore near the nuclear subs?” was a common question circulating in the narrow streets of La Maddalena. In reality it is usually the case that U.S. Navy personnel, especially those stationed overseas, are only exceptionally allowed to serve in one base for more than two years. Sometimes they can be reassigned to the same duty and place after some years, but the rule is that after two they will be relocated. What I am suggesting here is not that the “ignorant public,” lacking knowledge of nuclear technology, should have known or asked about the rules of U.S. Navy personnel’s duty rotation. The point is that living near a strategic base for atomic submarines and replete with obscure technological and organizational codes, leads people to formulate conjectures about “unusual,” “suspect,” and “incomprehensible” behavior and signs.

In all these examples there is a common element. People formulated hypotheses about the presence or absence of radioactive contamination through observations of the environment and the behavior of other groups. For example, some Maddalenini took the presence of U.S. Navy servicemen on the nuclear base as an index of the safety of that place. “Otherwise—some

²⁰⁵ Ibidem. In Italy *orate* (orate, plural) is the commonly used name for the species *Sparus Aurata*. They live in clear seawaters mostly on sandy floors. In La Maddalena, they are considered a very good fish and hard to catch without experience or professional fishing training. In my fishing experiences with fishermen from La Maddalena I could seldom see one caught. Local fishermen say that “you need to know the right places” and everyone knows “the perfect technique” to get you one. But most of all, catching fish requires a commanding knowledge of the environment and the capacity to read its signs, like a map. This (almost organic) relationship that locals have with the fish and the particular meaning that certain species have as environmental markers are particular important for understanding how local knowledge of the environment is constructed.

²⁰⁶ Personal interview with the author. La Maddalena, October 2012.

asked—why would the U.S. Navy put its personnel in danger?” Hypotheses about the presence of radiocontamination could also take the opposite direction based on similarly observed signs. Thus, the sudden departure of U.S. personnel from La Maddalena induced some Maddalenini to conjecture that after a certain amount of time American sailors had to leave because they were exposed to radiation—submarines, and other unknown materials. The fat, healthy looking fish dwelling around the nuclear base were taken as a sign of the absence of pollution, but this interpretation was based on more general assumptions and evaluations about the U.S. Navy environmental behavior and respect for the rules. An expert radioecologist, for example, could easily dismiss these observations of healthy looking fish explaining that it is not a sufficient index of uncontaminated waters.²⁰⁷

All these hypotheses and explanations are based on observations of events interpreted according to some experiences of the surrounding environment, assumptions about the intentions of other groups, and notions of what could constitute a potential source of radiocontamination. Environmental signs could be taken as signs and interpreted according to individual observations and assumptions in a physical and socio-political environment in which the meanings of the U.S. presence were not univocally interpreted. The contradictions emerging from similar observations point to the fact that non-expert residents of La Maddalena lacked a common code, a shared set of assumptions through which they could interpret environmental signs. In some sense, they lacked a shared semiotic ideology of radiological risk.

To analyze how non-experts observe unusual or unexpected phenomena, such as changes in the environment and health effects, and generate hypotheses about their causes, I draw on Charles Peirce’s *theory of abduction*.

Peircean semiotic theory considers natural signs, such as meteorological and environmental changes, and historical events, whether or not provoked intentionally by a human subject, capable of carrying meanings insofar as the signs in question have the potential to be taken as signs in the first place. This presupposes the existence of some shared cultural codes that allow different groups in a community to interpret signs in certain ways, and not in others. One of the classic examples given by Peirce is that of the inferential process through which a

²⁰⁷ In their work, Kate Brown and Joseph Masco for example observe that around Chernobyl and Los Alamos the vegetation is thriving. They use these examples to underline the tricky appearance of life in contaminated areas and the destabilizing effects that radiation introduces in the relations that inhabitants of those zones have establish with the surrounding environment. Kate Brown, *Plutopia*; Joseph Masco, *The Nuclear Borderlands*.

random rural dweller interprets the presence of smoke as a sign that a fire must be going on in the nearby area. This interpretation is possible because the association of smoke and fire—two distinct events—is conventionally established by logic inference based on experience. It is the indexical quality of the smoke that suggests that there is a fire, even if we do not see the flames.

Abduction refers to inferential mechanism used by people (scientists and non-experts alike) to develop causal explanations about unexpected and surprising events for which an established explanation is lacking. It also describes the process of hypothesis selection among other possible, equally plausible ones. The reason why one hypothesis is considered more plausible than others corresponds to a set of assumptions according to which if a certain scenario A were true, the causal link that we hypothesize must also be true. Peirce was, in part, interested in understanding how scientific hypotheses are generated. To accomplish this, he adopted a tripartite classification of inferences. In addition to reviewing classic forms of deduction and induction, he affirmed that another form of inferential process was responsible for the formulation of most hypotheses. He called this process *abduction*.

The process of abduction is similar to an inductive process because it is based on observations to arrive at general statements, but it diverges from induction because in the latter we generalize (or draw conclusions) from a number of similar cases in which we observe that something is true for all of them and, therefore, we infer that the common element must be true for a whole class. Induction, thus, can be described as the inference from a sample to a whole.²⁰⁸ “In abduction instead we pass from the observation of certain facts to the supposition of a general principle to account for those facts.”²⁰⁹

In Peirce’s words, abduction “supposes something of a different kind from what we have directly observed, and frequently something which it would be impossible for us to observe directly.”²¹⁰ In sum, abduction is a form of inference based on some sort of supposition about the existence of a general principle that makes a particular hypothesis about the causes of a new phenomenon plausible. Peirce understood abduction to be a selective process. Only one hypothesis is selected among a set of plausible ones and this is done on the basis of some preliminary explanation, a general law according to which the causal link that we establish makes sense. This implies the existence of a specific ontological order in the head of the one who

²⁰⁸ K. T. Fann, *Peirce’s Theory of Abduction*, cit. p. 10.

²⁰⁹ C.S. Peirce, *Collected Papers*, Vol. 5, p. 198, cited in K. T. Fann, *Peirce’s Theory of Abduction*, cit. p. 8.

²¹⁰ C.S. Peirce, *Collected Papers*, Vol. 2, p. 640, cited in K. T. Fann, p. 9.

abduces for which a certain explanation is more plausible than competing ones. Note that the suppositions that guide us towards the choice of the most plausible explanatory hypothesis can be of different kinds: they can be based on common or shared cultural assumptions, previous experiences, beliefs, or purely invented theories or laws.²¹¹ Peirce was clear about the fact that abduction was the first step through which hypotheses are generated for further tests. In some sense the hypotheses generated through abduction provide preliminary/provisory explanations in the absence of better alternatives.

Peirce's theory of abduction is a useful tool for analyzing how non-experts generated hypotheses about the presence or absence of radiocontamination in La Maddalena not on the basis of fears, or just ideological preconceptions, or assumed forms of local knowledge based on cultural identity. They made inferences exactly like scientists do, but with different material at their disposal. This material was represented by past images, repeated experiences, and new events that allowed them to objectify risk.

For example, in 1976, when three babies in La Maddalena were born with cranioschisis (lack of craniums) within six months, people advanced the hypothesis that there was a causal relationship between the presence of the U.S. nuclear submarines and the episodes of birth defects. Due to the proximity of the nuclear submarines to the urban center of La Maddalena, the parents of the children born with fatal defects thought that radioactive contamination could be the cause of the malformations. Italian experts pushed back against this hypothesis, pointing to scientific explanations that excluded the possibility of the manifestation of genetic effects after only three years since the appearance of the submarines in the archipelago. But since no other conclusive causal explanations were offered, people continued to link the presence of the U.S. submarines to the birth defects. This pushed the local communist party and local anti-base intellectuals to refrain from using the episodes of cranioschisis as an argument against the presence of the base. This calculation about the plausibility of the malformation argument operated as a form of social control, delimiting, *de facto*, possibilities for interpreting the birth defects. Stated otherwise, the meanings of the birth defects were semiotically regimented for political reasons. For example, the causal link established between the group of birth defects—an unprecedented event in the archipelago—and the potential source of radioactive contamination

²¹¹ For a clear discussion of examples of different forms of abduction see Umberto Eco, "Guessing from Aristotle to Sherlock Holmes," *Versus* 30, May-August 1981: 3-19.

tied to the submarines was a hypothesis based on the physical and temporal proximity of the two events: the base was near the urban center of La Maddalena and, prior to the arrival of the U.S. base, there were no such birth defects. But in order for the submarines to assume this indexical value, a series of assumptions had to be in place, such as the notions that scientists and military authorities were not transparent with the public, or were incompetent, or that the available scientific knowledge could not explain the facts. It is worth underlining, however, that the episodes of cranioschisis became a possible material instantiation of radiation effects through which local residents were able to objectify the risk of contamination.²¹²

My second argument about these hypotheses is historical. The representational economy of risk in La Maddalena changed over time as new signs became available for interpretations. To restate the main point, I argue that, in order to be objectified, radiological risk needs to be made visible through material signs. In a place where the presence of radioactive contamination has never been assessed and expert communication was largely deficient, unusual events could provide new signs available for interpretation. But new events did not automatically become signs of risk. Without a general interpretation (a scientific explanation, for example), of a surprising event, the event itself remains an isolated occurrence that cannot be taken as an instance of some regularity—that is subjected to, and therefore explainable by a physical law. Events must be assigned some indexical value that establishes a nexus between the manifestation of a phenomenon and its causes. Their meanings, that is, must be stabilized and socially regimented to make signs interpretable on the basis of shared (agreed upon and divulged)

²¹² In *Material Politics*, geographer Andrew Barry uses Peirce's theory of abduction to demonstrate how Greenpeace transformed a single event—the decommissioning of the Royal Dutch/Shell Oil platform Brent Spar in 1995—into a symbol of the environmentally disruptive practices of oil corporations. In my opinion, though, Barry's use of abduction is quite confusing. It focuses only on the inferential logic that allows environmentalist groups to attribute larger ethical implications to a specific case, and to deploy its constructed significance in future controversies with corporations and European governments. Detached from Peirce's broader semiotic theory, abduction loses its analytical effectiveness. In particular, it is difficult to understand abductive logic without considering the criteria through which signs, according to Peirce, acquire meaning: resemblance of particular embodied qualities (qualisigns), indexes of causal relationship through proximity (sinsigns), and arbitrary-conventional rules through which an instance of a category of objects, signs, and events is established as a symbol (legisign). What Barry fails to demonstrate is that the Brent Spar case could be mobilized politically because Greenpeace used successfully the material signs of decay of the platform as indexes of the environmental disruption of sea dumping practices. Interpreted as signs of pollution, "the presence of toxic sludge and oil, its location in the North Sea, its rust and decay, and the heroism of the Greenpeace activists who has scaled and occupied [the oil platform]" worked to effectively represent the Brent Spar as a toxic object. Subsequently Greenpeace was able to construct a coherent narrative through which those signs of pollution could be interpreted more generally as symbolic of corporations' practices, assuming that their intentions were not to preserve the environment but to maximize economic gains. Andrew Barry, *Material Politics: Disputes along the Pipeline* (Wiley Blackwell, 2013), cit. p. 84.

explanations. As Gramsci argued, the stabilization of ideologies requires organizational work, communicative strategies, and political mobilization. In order to become coherent “upper conceptions of life” (like philosophical systems, scientific explanations, and so forth) ideas need to be transformed into mobilizing material forces that shape the ways in which individuals make assumptions about the world.²¹³

In my analysis two factors account for the ways in which the representational economy of risk changed over time and semiotic ideologies of risk were stabilized in La Maddalena. Unusual events (like unprecedented episodes of malformation) provided new signs that could be interpreted as material instantiations of the presence of radiocontamination. But in the absence of coherent and definitive explanations the observations upon which potential signs of risk emerged remained isolated facts without general meaning. In order to assemble credible arguments against the presence of the U.S. base, local anti-base activists policed and prevented the use of the cranioschisis episodes as examples of radiation effects and instead incorporated scientific explanations of radioecology and radioprotection provided by allied experts.

Below, I will show how objectifications of risk worked among different groups: U.S. Navy servicemen, experts, local administrators, and long-term residents of La Maddalena. First, I will describe how established radioprotection and risk control practices shaped understandings of radiological risk among U.S. Navy personnel. In the second part of the chapter I show how expert communication about risk generated misunderstandings and frustration among the local administrators, who were expecting conclusive answers about the presence or absence of radiocontamination in the archipelago. Finally, I turn into the analysis of my historical argument about the interpretations of new signs of risk, based on unprecedented events, and their stabilization over time.

5.2. Command, Training, and Work Routines: the Culture of Risk Control in the U.S. Navy

Like many other U.S. sailors, Santiago decided to join the Navy because he needed the money to pay for his education.²¹⁴ His mother also supported his decision to join the military, but

²¹³ See Antonio Gramsci, *Selections from the Prison Notebooks*, edited and translated by Quintin Hoare and Geoffrey Nowell Smith, (International Publishers, 1971), especially “Common sense and good sense,” pp. 326-330.

²¹⁴ Santiago is a pseudonym. I use pseudonyms throughout this section to protect the identity of informants. As a non-U.S. citizen doing research on confidential or classified matters regarding U.S. nuclear technology, I could not

he did not want to enroll in the Army, and the Air Force at that time did not often let non-US citizens enroll. Santiago was only eight years old when he left the Philippines to relocate in the Los Angeles area with his family. At the time of his enrollment in the Navy, he was still a Philippino citizen, but was admitted into the forces as part a quota that the U.S. Navy set every year. Thanks to a diplomatic agreement signed on March 14, 1947 between the Philippines and the U.S. government, the Navy was allowed to keep military bases in the Philippines, in exchange for admitting a quota of voluntarily enlisted Philippino citizens every year.²¹⁵

Santiago arrived in La Maddalena on April 1974, his first assignment out of boot camp. He flew from San Diego to Norfolk, Virginia, for a two-week fire fighting training program, before continuing on to Rome and then La Maddalena. “I remember a military bus was waiting for us. The airport was literally in the middle of grass fields. The road from Olbia to Palau was curvy and desolated, almost no constructions in the middle. When I arrived here I thought that my first duty was tough.”²¹⁶ La Maddalena was considered an “isolated duty,” a fair representation of the conditions faced by U.S. sailors in the archipelago in the mid-1970s. The *Fulton*, the Navy tender moored in the bay of Santo Stefano, was the only place where sailors could purchase American products, cigarettes, some alcohol, and other comfort goods.²¹⁷

As Santiago recounted: “La Maddalena was also difficult because of the nuclear stuff. There was a lot of politics around it and sometimes we could feel the tensions. But after all, the economic benefits outweighed the local fears.”²¹⁸ Americans consumed cases of beers, compared to Italian sailors, spending money in bars and discos on the weekend. The Navy tried to minimize conflicts with the locals. The shore patrol policed the streets every night and was known to readily repress any improper behavior of sailors. Under the aegis of the “Intercultural Relations Program” (ICR), the Naval Support Facility hosted a series of events to build bridges

directly access certain places and protected information. My analysis, thus, relies on the generous collaboration of former U.S. Navy personnel stationed in La Maddalena, access to documentation that the local administration made available for my research, and secondary literature. By combining these sources, I could better understand how concealment of classified information and communication strategies deployed by the U.S. Navy in La Maddalena contributed to shape apprehension and representations of risk at the local level.

²¹⁵ *Agreement between the Republic of the Philippines and the United States of America concerning military bases (with annexes and exchanges of notes)*. Manila, 14 March 1947.

²¹⁶ Personal interview with author, November 2012.

²¹⁷ Due to the difficult conditions of their duty, the Navy conceded several incentives to the personnel stationed in La Maddalena. They could extend their assignment, for example, which allowed them to have an extra month license every year (for a total of two) and round trips paid for to every destination. All the sailors in La Madd enjoyed 96 hours of liberty every month, so they could leave the installation on Friday and go back to service the following Thursday.

²¹⁸ Personal interview with author, November 2012.

between its personnel and the Maddalenini. In Santiago's recollection: "We shared holidays, like the Fourth of July, and organized the 'Festa dell'Amicizia' (Friendship Party) every year, consuming tons of beer, hamburgers, and all kind of food with the rest of the population."

Santiago's first journey to "La Madd"—the shorthand used by fellow sailors for the submarine base in La Maddalena—was brief. By September 1974, Santiago was back in San Diego where he attended a trade school to become a machinist. Upon his return to active duty, he stayed in La Madd only one year before moving to Holy Loch, Scotland, where in 1961 the U.S. Navy installed a strategic base for Fleet Ballistic Missiles (FBM) submarines, much bigger, heavier, and slower than the fast attack submarines stationed in Sardinia.²¹⁹ There he worked as a steam generator repair specialist on board of submarines, but the job involved travelling a lot without knowing his destinations: "I had my toolbox and they took me whenever a submarine needed a repair guy on board. So, planes and helicopters took me to subs on patrol. I stayed on board until the problem was fixed, sometimes even two weeks, then they would reemerge and leave me wherever they could." Sometimes Santiago was lucky enough to be landed on a U.S. base from where he could be sent back to Scotland by airplane. Other times, returns were more complicated. Because he was still a Philippino citizen, in Holy Loch he needed a top-secret clearance to go on board FBM subs. After his return to La Maddalena, a year later, Santiago's status was downgraded to confidential: "You know, in La Madd I was mostly working on the tender. I could still go on board if I needed to do a repair when the submarines were anchored next to the ship."

Submarines are highly compartmentalized environments, in which only a commanding knowledge of signs allows the personnel to map out the intricate ensemble of machines, buttons, tubes, and sophisticated instruments. But Santiago accessed them only to do his job: "I was going to the compartment where they needed me. Of course I could see everything, the tubes, the magenta color which signals that you are in the proximity of the nuclear reactor..." Santiago wore a dosimeter aboard the submarine to measure his radiation exposure. Upon disembarking, he would deliver the dosimeter to medical personnel, but never inquired into or was informed of

²¹⁹ They needed space for the vertical tubes nesting missiles with warheads to launch nuclear attacks undetected. While fast attack nuclear subs--also called hunter killers--were small and fast enough to chase other subs in reconnaissance missions, FBM subs were much bigger and used mostly as a mobile, invisible, and undetectable platforms for launching missiles armed with nuclear warheads on Soviet targets. See Graham Spinardi, *From Polaris to Trident: The Development of US Fleet Ballistic Missile Technology*, (Cambridge University Press, 1994).

his doses: “They would not tell you. Sometimes I wondered but never reached the point when they had to put me on a break. You understood that you got enough [radiation] when they moved you to another job for a while so that you do not reach your limit.”

Habituation to nuclear risk was central to Santiago’s accounts of his quotidian engagements with submarine repair on board Navy tenders. “You get used to it [risk], it is part of your work. If you don’t have trust you get phobias. This is how I feel about it. After all, they send you to school and give you all you need.” I objected that I would want to know my level of exposure and that I felt it would be my right to know, but he reassured me that the Navy had qualified personnel—called the R5 division—who monitored radiation exposures. R5 is the acronym for “Reparation Five,” the Navy division also known as “RADCON,” which stands for Radiological Control. Back in La Maddalena, until 1983, Santiago worked in the R2 department (Repair Two, which is the machine shop) on board the Navy tender *Orion*: “Sometimes we wore protective gears and gloves because the parts from the submarines that we repaired could be contaminated. R5 people were making sure that we strictly followed the safety rules. Sometimes they built tents inside the shop so that the area where we were working was closed off. They gave us all the necessary equipment. When you wear all that stuff you feel uneasy because you have to work and operate your machines with it.” All the measures that R5 personnel implemented on submarines and on the tenders followed precise safety protocols, including also the storage of contaminated material from the submarines. Santiago remembers that when he repaired sensitive parts, he was observed by R5 personnel and, after the work was completed, they collected discarded material and protective gear, depositing them inside secured containers for provisory storage to be shipped to the United States for definitive disposal.

Santiago’s story is certainly unique. His initial entry into the Navy first as a Philippino citizen tells us a lot about the nature of U.S. imperial assimilation through its global military outreach. Moreover, the process of amalgamation that Santiago experienced inside the military organization reveals more generally how work routines, safety protocols, and socio-technical hierarchies structured U.S. sailors’ practices and understandings of nuclear risk. More specifically I wanted to gain insights into the relationship between experiences and understandings of radiological work performed by U.S. Navy personnel in relation to how other groups (experts, politicians, and local residents in general) in La Maddalena lived the problem of radiocontamination risks in the archipelago. Even if local residents could not directly witness

operations on the base, they formed their opinions based on observations of the movement of, and their interactions with, U.S. personnel. On the other hand, U.S. sailors, with insider understandings of their work, often generated stylized explanations that were, in part, the outcome of organizational enforcement of rules and technical training. When the safety of the Navy operations was questioned by local anti-base movements or through rumors, Santiago and his colleagues often dismissed local concerns as a factor of ignorance about nuclear technology.

When repairs on radio-contaminated parts could not be performed on submarines the material was sealed into containers, called “drums,” and moved directly onboard the Navy tenders. According to the U.S. Navy *Report of the Decommissioning of the Santo Stefano Site*, issued in January 2008, “All nuclear powered vessels were moored directly to the tenders in lieu of the pier. This allowed sealed radioactive material to be moved directly from the submarines to the tender (both of which are classified as sovereign U.S. property) without being transported across Italian land.”²²⁰ Thus, the U.S. Navy could claim that “no radiological work was performed on Italian land areas ashore,” preventing anti-base movements to scrutinize these operations with more conventional legal and health based frames.²²¹ The U.S. Navy in La Maddalena selectively chose not to mention that, in addition to serving as radiological work platforms, submarine tenders were also used to receive “low-level radioactive material associated with maintenance on naval nuclear-powered plants from tended units.”²²² The encoded vocabulary that U.S. Navy personnel used for describing hazardous procedures (like radiological work performed on the Navy tender) was impossible to decipher for the local population. To avoid the proliferation of ‘unreasonable fears’ about the fact that radioactive stuff was being repaired a few hundred yards from the urban center of La Maddalena, the U.S. command systematically elided “radioactivity” and “nuclear” from official explanations of its activities on the base.

During our conversation, Santiago repeated narratives and arguments I heard from several of his colleagues in other interviews. “The problem with the nuclear stuff is that when people hear the word they start worrying. So, especially here sometimes we heard people saying

²²⁰ Department of the Navy, U.S. Naval Support Facilities of La Maddalena, *Santo Stefano North Atlantic Treaty Organization (NATO) Site - Report on Radiological Conditions on Decommissioning*, Ser. N00A/1093, January 8, 2008. *ENCLOSURE I: Naval Nuclear Propulsion Program - Confirmatory Survey Report in Support of the Decommissioning of U.S. Naval Facilities at the Santo Stefano North Atlantic Treaty Organization (NATO) Site*, p. 6.

²²¹ *Ibidem*, p. 5.

²²² *Ibidem*, p. 5.

that we were the cause of illness or cancer, and so forth. It is not true. Rather, it is well known that these islands are full of granite rocks that are radioactive.”²²³ Anyone who has lived in La Maddalena and Palau for several years has heard contrasting narratives about the risks of radiological exposure. They became tropes that random interlocutors still pick up in informal conversations at the bar, in the central square, or on Facebook about “the time when the Americans were here.” The nostalgics of the U.S. Navy base elide the problem of radioactive contamination, and often accuse activists of creating alarms and mobilizing public fears to kick the Americans out of the archipelago. Further, the U.S. Navy sailors I interviewed believe that radioactivity in La Maddalena was not a real problem. When I asked them what they made of local rumors about radioactivity, I was given explanations similar to that of Jack:

Sometimes you hear stories about nuclear subs leaving a fluorescent wave behind them at their passage or stories about contaminated fish or seaweeds changing color because of radiation, but of course these are all fantasies that people generate because they do not know what they are talking about or have wrong information. The granite rocks here are the only radioactive stuff.²²⁴

I interviewed Jack in Palau, where he lives with his wife and their two kids. Jack retired from the U.S. Navy a few years before the closure of the base and decided to stay in the archipelago to raise his family. He was young when he enrolled in the Navy in the mid-1980s. As Jack recalls, “I lived in a suburb northeast of Philadelphia and was still a high school student. At the time I also worked in a mall near home where a recruiter from the Navy was coming pretty often. I guess he has just been persistent enough to convince me.” After attending the regular boot camp, he was sent to a technical school for training as a “torpedo man.” His job was maintaining weapons, including nuclear ones, repairing missile tubes onboard submarines, and supplying submarines with weapons stored on tender boats. At the end of his course at the “SUBROCK” (Submarine Rocket) missile school he, and the four other torpedo men, were assigned their first duties. Jack, like other former and retired U.S Navy personnel I interviewed, often described his job with formulas such as, “the world knows” or “it is public knowledge that,” in order to emphasize that they are not revealing confidential or classified information.²²⁵

²²³ Personal interview with the author, La Maddalena, November 2012.

²²⁴ Personal interview with Jack and Laura, La Maddalena, October 2012.

²²⁵ The Navy is obviously very concerned about the kind of information that former personnel could share with the public. Breaching the barrier of confidential and classified issues may have severe repercussions even on retired sailors (from losing their pensions and benefits to conviction).

“My Job [loading weapons on board of submarines],” Jack specified, “was performed in the open, so people knew what I was doing.” But, in this case, “people” is limited to U.S. Navy personnel. During the days in which Jack provisioned submarines with missiles, even U.S. personnel were prohibited from entering the dock area and sometimes the entire base was off limits for non-U.S. employees. On those days, Italian civilian employees on the base understood that something was going on that they could not witness for reasons related to safety and security. These exclusionary practices triggered rumors about nuclear weapons being stored in reinforced concrete bunkers niched through the thick granite of the island of Santo Stefano. “Yes, people here thought that we were loading nuclear weapons all of the time, but mostly we were just using ‘trainers,’ you know, those fake missiles that we employ for training. So, most of the time they were not real and not nuclear, which I can neither confirm nor deny that we had there.”

His wife Laura, a native of Palau, was not particularly upset when talking about the risks Jack run on the job: “I did not even know what he was doing until many years after we married. He was not telling me anything about his service and frankly I did not ask. The only time I felt insecure and scared was during the first Gulf War, when Jack came home with a gun that he kept secured in our home.” Indeed, it was during international crises that the familiar presence of the base for nuclear submarines was transformed into a strategic space, demarcated from the routine of the tranquil archipelago. Those moments transformed husbands and dads into sailors worried for the safety of their family.

Like Santiago, Jack confirmed that when working on subs and maintaining weapons he was required to wear dosimeters that medical personnel checked each month to assess his level of exposure. Medical examinations were thorough, he explained: “I have never reached my limit, but if one does he is not allowed to be on the program any longer.” Jack was confident when he recited formulas memorized during his training in the Navy: “Time, distance, and shielding: these are the main factors that determine your exposure. Radioactivity on board ships is not a hazard in normal conditions. Of course, there would be a problem if subs were dumping nuclear waste at sea, but this is never the case.”

Over the course of six years of service, Jack closely observed the procedures and the safety checks followed by each member of the U.S. personnel. In Jack’s accounts, procedures were rigidly scheduled, monitored by supervisors, and practiced repeatedly during training

exercises: “When we load weapons on board subs we do it in teams, usually composed by 4 or 5 members. Two people work [i.e. perform the loading operation], one reads the steps, another one supervises the operations.” At each step the reader announces out loud what has to be done next, one of the two working members acknowledges the step and proceeds to perform it with his colleague, while the supervisor compares the performance with the protocol. “This is what we call ‘reader working routine,’ which assures that everybody is on the same page and knows exactly what each member of the team has to do and what the others are doing and are expected to do at any moment.” After the conclusion of loading operations, the entire team met around the table to discuss the report compiled by the supervisor. Rules are important to the oral histories of sailors who worked on nuclear submarines based in La Maddalena. Like other “total institutions,” the Navy shapes the conduct of individuals in ways that affect also their relations with the external world.²²⁶ The Navy becomes a way of life that extends into the private sphere and family networks of personnel. While checks, supervision, hierarchies, and surveillance on the job minimize the risks connected to individual initiatives or deviance, the Navy also emphasizes personal responsibility, which necessarily includes the private conduct of its personnel. According to Jack, this ethic enforces individual compliance with safety protocols and allows sailors to focus on their work without the interference of personal problems.

We had PRP, personal reliability program, which assured that all of us were personally and financially stable all the time. For example, if the commanding officer received notes or reports that somebody working in the nuclear program had problems at home, with the family, or was not paying the bills, or had addiction problems that could only potentially put safety at risk, he was immediately put out, at least until a committee in charge of re-evaluating the case concluded that the problem was solved.²²⁷

The Navy’s emphasis on rules, routines, evaluation mechanisms, and personal responsibility intensifies during submarine missions, as described by Greg, a former U.S. Navy submariner based in La Maddalena in the 1980s. “When you are underwater, you literally depend on each other. Mistakes are not allowed because details make a huge difference. So, you trust

²²⁶ Erving Goffman, *Asylums: Essays on the Sociological Situation of Mental Patients and Other Inmates*, (Doubleday, 1961). See also Hugh Gusterson, *Nuclear Rites: A Weapons Laboratory at the End of the Cold War*, (University of California Press, 1996), especially Chapter 4 “Secrecy,” and, more specifically on the U.S. Navy, Louis A. Zurcher Jr., “The Naval Recruit Training Center: A Study of Role Assimilation in a Total Institution,” *Sociological Inquiry* 37 (1): 85–98, January 1967.

²²⁷ *Ibidem*.

each member of your crew unquestionably, especially the ‘nukes.’”²²⁸ Greg was a radioman inside fleet ballistic missile (FBM) submarines. He now lives in Palau with his Italian wife, Angela, a former employee on the U.S. base. Greg came to La Maddalena in 1983 towards the end of his career, when he was not working on board submarines anymore: “The alternative I was given was Diego Garcia, can you imagine living there?” Until 1986, when he retired from the Navy, he worked on board the tender stationed in St. Stefano as Assistant Communication Officer. Greg became a radioman back in the 1960s: “At that time there were only two ways for a radioman to avoid Vietnam: going to Canada or volunteering on nuclear subs. The Navy needed us especially on those places. In Vietnam, radiomen were the favorite target of the enemy, so I thought I’d rather go underwater.”²²⁹

Each nuclear submarine, especially FBM ones, spent the entire year underwater, except when they needed reparations and refueling on dry docks back in the U.S. Each submarine had two crews alternating on board every three months. When the other crew was at sea, Greg and his fellow submariners were constantly training. Greg did not attend a formal nuclear training program, but serving on nuclear subs familiarized him with basic knowledge of how a reactor works and what to do in case of an accident. As explained by Greg, life underwater is physically and mentally exhausting: three months without sunlight, no alcohol, and little privacy as even beds are shared between sailors who rotate on and off watch. Psychological and physical examinations are severe for “dolphins,” the colloquial name for Navy submariners. On board rituals are equally important, which distract from the gravity of a steel hull full of people and nukes racing along the ocean floor, sometimes chasing and being chased by other submarines. As Greg recalls: “When we were half way through our patrols, usually there was a ‘party’ during which we transgressed a little bit. We wore strange clothes and wigs, and were allowed ...shhhh!... only one can of beer, which officially should not have been on board.”

Greg discussed a number of risks encountered on the job, but radioactivity was only mentioned when I solicited it in my questions. He told me that the nuclear program in the Navy was a very serious stuff, that Rickover interviewed personally each “nuke” serving on his subs, and that he trusted them completely because of their expertise: “I mean, they go to school much longer than the normal Navy guys like me, right? They know what they are doing, oh yes.” It is

²²⁸ Nuke is a colloquial Navy term used to refer to personnel who attended the nuclear school.

²²⁹ Personal interview with the author, La Maddalena, October 2012.

for this reason that when he heard anti-base activists in La Maddalena denouncing the risks of contamination, he preferred to not even engage with them: “It is not even worth discussing. There’s just so much ignorance and so many misconceptions that it is practically impossible to make certain people reason around these things. Silence is a better strategy.”²³⁰

Greg and Angela, like Jack and Laura, did not think of radiocontamination as a real threat connected to the U.S. Navy presence in the archipelago. In La Maddalena Greg had a delicate role as communication officer and every two months he drove to Olbia to receive top secret orders in sealed envelopes delivered from headquarters in Naples: “You know, in the middle of the 1980s there was still some terrorism going on here in Italy. I had to get into my car, with no gun, because we were not allowed to carry guns on Italian territory. And I remember being so scared that something might happen all the time.” I asked Greg if he thought this atmosphere of secrecy might have been also at the origin of popular misunderstandings and misconceptions about the base that he discussed earlier. Angela was faster to respond than Greg:

This idea that everything was secret in La Maddalena is so unrealistic. I worked on the base and with my colleagues we knew everything that was going on. People talk at the bar, rumors spread. Do you think we did not know all these things? We knew exactly when the tender was leaving Santo Stefano, or when they were training. We understood by just looking at certain movements, or hearing people talking about leaving the next day. It is that simple.²³¹

For Italian employees on the U.S. base, Angela’s argument makes sense. After all, with several exceptions due to security checks and inaccessible areas, they worked in close contact with the U.S. Navy personnel and, after some years, they understood many of the operations on Santo Stefano even if they were not explicitly informed.

5.3. Risk of Misunderstandings

On February 24, 1975 a conference on “pollution” (the adjective “nuclear” was omitted) took place in La Maddalena. It was the best-attended meeting on the problem of the U.S. Navy presence and its ecological impacts since the installation of the submarine base. The Region of Sardinia organized the event and invited all the relevant actors involved in the radiosurveillance program: political authorities and public institutions, like the Province of Sassari, the mayors and municipal representatives of the towns of northern Sardinia, and, most importantly, some key

²³⁰ Ibidem.

²³¹ Ibidem.

experts from CNEN and ISS working on the radioecological survey and on the elaboration of the emergency plan.

The transcripts of the conference yield rich insights into the divergent understandings of risk explored in this chapter. In particular, I examine how experts from scientific agencies, and local political representatives discussed the problem of risk around the U.S. Navy base.²³² Because it was organized by public authorities and was held in the city hall of La Maddalena, the conference required that scientists and local politicians prepare their contributions in advance. Crucially, both CNEN and ISS experts came to La Maddalena after a long media campaign focused on the lack of transparency and credibility of their institutions.²³³ The public knew that the obstructionist position of Italian government and the U.S. and Italian military authorities precluded the access of nuclear experts to technical information necessary to their studies. Further, in 1972, the president of CNEN, Dr. Ignazio Clementel, attempted to assuage the public with a document that denied the presence of health concerns pertaining to the U.S. base. Several CNEN laboratory technicians openly opposed this document.²³⁴ This and similar episodes of internal conflict damaged the reputation of the agency and strengthened suspicions that public authorities, including expert institutions, downplayed the risks of contamination and accidents due to political pressures.

The ISS and CNEN experts who presented at the 1975 conference had specific goals. The first one was pedagogical. They started with a series of interventions illustrating their work, explaining the rationale of radioecological surveys, the meaning of the available data, and the future steps required to develop an emergency plan. The second objective was to demonstrate their scientific integrity, despite the difficulties of working on a nuclear installation in which military secrecy and lack of clear legislative regulations aggravated the already complicated

²³² See, for example, Olga Kuchinskaya, *The Politics of Invisibility*. In her analysis of public knowledge formation about radiation health effects in Belarus' post-Chernobyl contaminated areas, Kuchinskaya develops the concept of "articulation" to describe moments of interactions when experts and non-experts co-shape "definitions of hazards" and the explication of "the work that has to be done to mitigate it along with the conditions and resources available for this work" (9). She argues that: "the theoretical significance of the dialogical approach is precisely in this acknowledgment of the co-shaping of different perspectives, as well as the situated and embodied character of interpretations" (8).

²³³ See Chapter 2.

²³⁴ For example, in 1972 then Director of CNEN, Ignazio Clementel, signed a document, which went public, in which he excluded any sanitary concerns for the residents of the archipelago. A few days later the CGIL Casaccia (the leftist union organization of CNEN technicians working at the laboratory for continental radioactivity) attacked Clementel's declaration by denying that any analysis on samples from La Maddalena had yet been performed. See Chapter 1.

procedures of the Italian bureaucracy. On the other hand, the political authorities who organized the event, primarily the Sardinian assessor for public health and the environment, Ghinami of the Social Democratic Party (PSDI), approached the conference as an occasion to show that the region took responsibility for the safety of the Maddalenini and to restore public trust in democratic institutions. In his opening remarks, Ghinami condemned the “absence of the state” and called the conference “an act of democracy”—a moment of truth in which the experts were invited to speak openly about the results and the future measures to be taken in La Maddalena.²³⁵ But Ghinami’s political strategy, and the openness of the nuclear scientists, did not have the effects they desired. When trying to illustrate their science to a worried and interested audience (mostly composed by local political representatives), experts introduced many technical details that confused the public. In addition, by displaying the shortcomings of the radioecological study, experts created the conditions for more questioning from the audience, with the paradoxical result that as they tried to further clarify technical matters, more alarm and reciprocal misunderstandings emerged.

In La Maddalena, local politicians expected to hear clear results about the existence or non-existence of nuclear risk. In his short welcome speech, mayor Deligia voiced the anxiety of the local administrators and their need for reassurance. They wanted scientific certainties that could justify political action: “It is important that I say that we expect a clear and unequivocal answer, because if there were doubts or indecisions, our position could change... [...] After all, the source of potential pollution is a boat, so if we get rid of it, we will solve the problem.”²³⁶ It was such strong expectations of coherence and unity that made scientists’ answers frustrating and at times incomprehensible to local politicians. On the one hand, local administrators and citizens were uncomfortable with the fact that science could not provide a clear solution. On the other hand, the local Christian Democrat majority, who accepted the presence of the U.S. Navy and supported it as a possible source of economic revenue, bore the moral weight of a decision that could have massive health consequences for the archipelago. In sum, they wanted science to relieve them from this weight by transforming a political decision into a technical one. They hoped that the objectivity of science would lead toward one possible solution, with no alternative avenues left open for debate.

²³⁵ *Atti del Convegno sull’Inquinamento. La Maddalena 24.2.75*, cit. p. 23. Gian Carlo Tusceri, *Personal Archive*.

²³⁶ *Ibidem*, cit. p. 2.

The first part of the conference consisted of long presentations of the ongoing actions of CNEN, ISS, and Sardinian experts and the rationale guiding the radioecological study they had begun to put into place. A common thread emerges in the opening statements, as reported in the transcripts. While reassuring the audience that the data collected until then did not indicate any worrisome anomalies, the panel also underlined the limits of the radioecological program and introduced unfamiliar concepts that generated reciprocal misunderstandings. For example, Arrigo Cigna (CNEN) explained that in the past two years his laboratory had found traces of radionuclides deriving from the activation products of the submarine reactors, but that their concentration in mollusks and aquatic plants were irrelevant to human health.²³⁷ In the following intervention, Professor Campos Venuti of ISS exposed the uncertainties that Italian nuclear experts had to face in La Maddalena. Given that Italy lacked regulations concerning the circulation and approach of nuclear ships to national ports, she explained, Italian nuclear agencies adopted protocols in analogy with those established for civilian nuclear power plants. According to the ISS Radiation Laboratory director, the situation in La Maddalena was problematic due to this lack of clarity and because “the radioecological survey that we are doing now should have been done earlier [before the arrival of the U.S. Navy], although it is never too late to move in the right direction.”²³⁸ Osvaldo Ilari (CNEN) probably talked for half an hour (his intervention is 10 pages long) introducing general radioecological principles before focusing on the specific challenges of monitoring La Maddalena. Italian nuclear agencies, he explained, did not know the characteristics of the submarine reactors and their discharge formula for routine operations. For this reason, they had to adopt a wider spectrum analysis that could compensate for the lack of baseline data.

Most of the questions from the audience focused on the uncertainties suggested by experts when discussing the problematic aspects of their study. In the words of Communist Party secretary and Sardinian deputy Mario Birardi: “If this radioecological study presents such shortcomings how can it generate reliable data about the ecological situation around the U.S. Base?” Franca Careddu, also a PCI Sardinian deputy, added: “If the current data show that the levels of radioactivity are too low to be a menace for the local community now, could you exclude that the accumulation of low quantities over time will not cause health effects in the

²³⁷ Ibidem, cit. p. 3.

²³⁸ Ibidem, cit. p. 6.

future? And if not, when could the safety threshold be reached?”²³⁹ Local doctors echoed similar concerns. Doctor Bentivenga, the health officer of the nearby town of Palau, underlined: “In thirty years we will probably be able to assess whether these low levels of radioactivity are dangerous or not. We will see the possible effects not on ourselves, but on our children. I have to say that I am not convinced by this kind of radioecological study. They are useful but cannot answer these questions.”²⁴⁰ Questions multiplied and became increasingly alarmist, and less technical, as the frustration of local representatives mounted. Francesco Bardanzellu, a city counselor of MSI (Movimento Sociale Italiano—a neo fascist party), was quite direct:

[...] This committee ... has been put together to provide predictions about this constant peril or for studying the effects of radioactivity coming from the ship [the U.S. Navy tender]? I ask because it looks like here we are becoming a center for the study of radioactivity, that is, we are playing the role of the guinea pigs for your experiments. There are still too many questions, among which the biggest is... that they [the experts] cannot give us any certainty because they do not know the characteristics of the reactors. Earlier, Ghinami told us that this information has been requested of the ministry of foreign relations. I am wondering when it will be delivered.²⁴¹

Ghinami continuously reminded the local administrators in the audience that the conference was supposed to focus on technical rather than political matters, as if the two spheres could be neatly separated and discussed independently from each other: “We invited the experts here to illustrate with clarity and transparency their work because we do not want people to think that we are trying to hide something. Politicians cannot answer technical questions. For those we have the experts, who are keeping the situation under control. If one day they tell us that the data are worrisome, we will take the necessary measures.”

But when the experts spoke about technical matters, the political weight of the U.S. Navy presence in La Maddalena became unbearably evident, at least for local politicians. Professor Maiani, an ISS consultant on reactor safety posed this contradiction with alacrity:

Earlier somebody asked if we know the characteristics of the reactors. The answer is that we do not know anything about them. And this is a different situation from the one in which we usually operate in civilian nuclear plants. [...] That information would be very useful because it would allow us to calculate the hypothetical consequences of an accident and predispose a proper emergency plan. [...] The other question that I wanted to answer concerns the risks connected to low dose exposures. Currently, scientists are

²³⁹ Ibidem, cit. p. 19.

²⁴⁰ Ibidem, cit. p. 21.

²⁴¹ Ibidem, cit. p. 21.

oriented towards the idea that a safety threshold below which humans are safely exposed to radiation does not exist. That is, there is a certain probability of damage at each level. In this case [La Maddalena], this is very small, but it exists, like for any nuclear plant, and more generally, I would say, for any industrial activity. For this reason we talk about risks and benefits for the local communities living around industrial installations. In general, for civilian nuclear plants we are able to calculate the risks in a very reliable way, exactly because we know the characteristics of the plant. We can tell you what our opinion is, but honestly we cannot give you the reassurance that you are looking for.²⁴²

It was more challenging for the experts gathered in La Maddalena to explain to politicians that risk was not a stable state, but a probabilistic function: the product of the chance that any given type of accident occurs, multiplied by the detrimental consequences of that accident. While mayor Deligia and his colleagues expected the experts to say a final word about whether the risk of nuclear contamination existed or not, Campos Venuti, Ilari, Maiani, and their fellow scientists, responded that they could not exclude the possibility of an accident or of increasing radioactive discharges in the future. This is why there was an absolute need for the radiosurveillance system to constantly monitor the situation. Toward the end of the conference an upset mayor Deligia complained that:

The experts from the Region, CNEN, and ISS expressed very personal opinions; It is my idea instead that we should invite them to express a collegial assessment, that is [the expert committee should give us] a coordinated answer, because today, it is my impression that Professor Ladu gives us one set of results, but that Professor Cigna presents very different ones.²⁴³ They [the experts] have gone through a list of technical details: risk, danger, potential risk, data showing a slight increase of radioactivity, numbers, as Professor Ladu calls them. On the other hand, Professor Cigna says that there is an increase and then a decrease [of radioactivity]. I'll tell you what, gentlemen: you have to gather together, as experts of CNEN, ISS, and the region; take a look at the numbers written in your charts, decide whether there is a tendency in radioactivity increase or decrease, or if, even at a very slow pace, we are going to reach the safety threshold in, say, one hundred years. I ask the president [Ghinami] that the committee [of experts appointed to study the case of La Maddalena] collegially evaluates the numbers and gives us an answer that leaves no doubts!²⁴⁴

Physicist Mario Ladu intervened to delineate the “different roles of experts and politicians [...] We are speaking two different languages, but now we are asked precise questions that we probably cannot answer satisfactorily. When you ask ‘is there risk or not?’ ... Well this

²⁴² Ibidem, cit. pp. 24-27.

²⁴³ Ibidem, cit. p. 41.

²⁴⁴ Ibidem, cit. p. 41.

question posed in those terms cannot be accepted.²⁴⁵ [...] [You ask] ‘should we agree on having these submarines here?’ The answer is a political one. We, as experts, can only provide data and numbers and monitor the levels of radioactivity. The answer to your question is political in nature and you will have to discuss the solution.’²⁴⁶

Both Ghinami and experts like Mario Ladu made efforts to delineate the boundaries between technical and political responsibilities, but for opposite purposes. Local administrators and politicians like Ghinami (who could not or did not want to oppose the U.S. Navy base) were interested in transforming a political decision into a technical matter. They were looking toward science as an authoritative source of knowledge that would allow them to justify their support for the U.S. Navy base. Therefore, their model could not tolerate too much complexity. Even less could they accept such an overt display of scientific uncertainty, which would ultimately place political responsibility on their shoulders. Scientists, on the other hand, would not take responsibility for the political implications of their results and were clear about the limits of their knowledge. Given the level of uncertainty characterizing the radioecological plan for La Maddalena, scientists argued, politicians should decide whether or not they wanted to assume the responsibility of accepting the presence of nuclear submarines in the archipelago.

The “democratic experiment” orchestrated by Ghinami ended with local representatives, like mayor Deligia, asking nuclear scientists to retreat, do their job in isolation, and to communicate their results only after they had reached an internal consensus. The paradox here is that after three years of requests for more transparent communication, local representatives blamed the experts for being too open.

Calculating risk involves thinking about what has not happened yet. When risk is codified and explained by experts as a calculable hypothetical event that may happen in the immaterial, undetermined future, it is removed from common experience, until something happens. Thinking about risk also means bringing the future into the present. Adams, Murphy, and Clarke define this process of anticipation in terms of “abduction.” In their conceptual exploration of “anticipatory regimes,” the authors posit that anticipation is a defining characteristic of our present scientific epistemology, oriented towards speculative forecasts. Anticipatory practices proliferate as new techno-scientific possibilities and questions (from climate change to strategies

²⁴⁵ Ibidem, cit. p. 32.

²⁴⁶ Ibidem, cit. p. 43.

of cancer prevention based on genetic probability assessments) preview world scenarios in which economies of fear and hope shape individual experiences of time, affect, and knowledge. This creates a reconfiguration of ethical, affective, and epistemological conditions in the present: a constant look into the future that, of course, also transforms present experiences and makes us act and feel as if the effects of future events were already here. From an ethical point of view anticipatory regimes create an “injunction [...] to pay attention to the evidence that risk is real” and to act in preparation for an event that may or may not occur.²⁴⁷

In La Maddalena, concrete instantiations of risk were offered by unprecedented events, which could be interpreted as signs of nuclear contamination. In the final section I present my historical argument about how new signs of risk became available for interpretation and how they changed the representational economy of risk in the archipelago. I argue that new signs did not acquire political leverage, however, because anti-base leaders and expert-activists regimented their meanings to assemble credible technopolitical arguments.

5.4. Events, Rumors, and Cross-boundary Alliances: Safe Uses of Risk

On May 28, 1976 the Sardinian newspaper *L'Unione Sarda* published the first of a series of articles focused on the anomalous deaths of three babies from La Maddalena.²⁴⁸ The babies, all born between August 1975 and March 1976, lacked a portion of their craniums (cranioschisis). According to Sardinian journalist Giacomo Mameli, similar cases may have happened before but were more scattered across time and some of them were revealed to be due to other causes. Mameli wrote that his report was “a response to many anonymous requests coming from La Maddalena,” where rumors of the possible nuclear origins of cranioschisis spread quickly in corner grocery stores, bars, and in the church courtyard. “People, especially women, are scared,” admitted Rosanna Abati, director of the municipal register since 1970: “In five years of work in this office, I had never seen something like this. These things leave us with many doubts.”²⁴⁹

When the journalist Mameli interviewed the doctors at the local civilian hospital, they commented that cranioschisis was extremely infrequent, although statistical records were not

²⁴⁷ Adams, Vincanne, Michelle Murphy, and Adele E. Clarke, “Anticipation: Technoscience, life, temporality,” *Subjectivity* 28: 246-265, 2009.

²⁴⁸ “Nascite anormali a La Maddalena,” *L'Unione Sarda*, May 28, 1976, page 3.

²⁴⁹ *Ibidem*.

accurate because, in the past, families tended to keep such dramatic events private. Also, before the construction of the hospital in 1970, many women from La Maddalena and the surrounding towns of northern Sardinia gave birth in the city of Sassari. For this reason, previous episodes, if they occurred, had probably been recorded there. Dr. Milani, the director of La Maddalena's hospital, and his colleagues did not advance hypotheses about the causes of the malformations. According to them, these episodes, although infrequent, were not unprecedented. All of them concurred that what happened should not alarm the community, even if, they admitted, "the problem has been dramatized because of the presence of the U.S. nuclear submarines."²⁵⁰ In sum, local doctors interpreted the episodes as "natural events."

The parents of the babies agreed to speak publicly about their misfortunes. When interviewed by Mameli, two of the three mothers said that their pregnancies went well, while only the third had experienced a near miscarriage during the fourth month. All three women had previously given birth to healthy babies and, in their families, like those of their husbands, there was no record of malformations or diseases that pointed to an obvious genetic origin of the infant deaths. According to the doctors in La Maddalena, the painful experiences of the three families were random tricks of nature that did not constitute a scientific problem, but mothers and fathers argued otherwise and sought scientific explanations for their losses, which even doctors working in the larger hospital of Sassari could not provide. In the words of one father: "We are scared, we think many things, maybe the nuclear submarines have something to do with what happened, but what can we know about it? The scientists should tell."²⁵¹

Two days after the first article was published, the same journalist of *L'Unione Sarda* reported on the opinions of four scientists from the University of Cagliari, two geneticists and two pediatric neurologists.²⁵² They agreed that the episodes of cranioschisis should not be dismissed as simply random cases; rather, they called for careful investigation. Citing the uncertain etiologies reported in the existing scientific literature, the specialists advanced prudent hypotheses correlating cranioschisis with poor socio-economic and sanitary conditions of the archipelago, in addition to pharmacological and environmental factors. Only one of the four experts said that ionizing radiation could be correlated with episodes of genetic mutation. But

²⁵⁰ Ibidem.

²⁵¹ Ibidem.

²⁵² "Occorre un'indagine seria sulle nascite alla Maddalena," *L'Unione Sarda*, May 30, 1976, page 3.

Doctor Pinna, a pediatric neurologist at the University of Cagliari, did point to the higher frequency of malformations in the regions of Hiroshima and Nagasaki after the nuclear bombing.

After surveying the explanations offered by doctors, the attention of Mameli returned to the still open question of radioactive contamination of the archipelago:

The opinion of ... [the four experts]... is that a serious investigation of the causes of the malformations is necessary. But it remains to be established whether the environment of La Maddalena, since the arrival of the U.S. submarines, has really been modified. To better understand this, studies were conducted at the Physics Institute of the University of Cagliari, directed by professor Mario Ladu. Recently, in a letter sent to the Sardinian assessor of health, the expert announced that the results of the radioecological exams conducted on samples from La Maddalena excluded the presence of higher levels of radio-contamination in the environment and that the traces found were so low that they are practically insignificant for the public health.²⁵³

Notwithstanding the reassuring statements of experts like Ladu, doubts about the reliability of research conducted in La Maddalena continued to circulate. The Sardinian journalist returned to the conference on “nuclear pollution” held in La Maddalena in February 1975 (discussed above), on which occasion, Ladu asserted that current scientific knowledge could not rule out the possibility that low radiation exposure over an extended period of time could cause genetic effects in future generations. After inserting this uncertainty into his analysis, Mameli added political flare to the story by citing a polemic flier posted by the communist and socialist parties of La Maddalena dated March 1975: “The idea that, if they want real responses to their questions, the people of La Maddalena have to be transformed into guinea pigs sadly emerges as an objective reality, even if nobody will ever admit it publicly.”

More interesting than the hypotheses over causality, the cases of cranioschisis reveals the ways in which unusual and disquieting events constituted the material basis upon which local and national media, political parties, and experts constructed and circulated their conflicting arguments about the lack of radiosurveillance systems in the archipelago. While the scientific debates about their causes faded after a few weeks, the cases of cranioschisis reignited political debate about the U.S. Navy base and the apparent lack of public safety measures in La Maddalena, which the national newspapers emphasized with titles, such as, “Babies born deformed in La Maddalena. Is radioactivity the cause?”²⁵⁴

²⁵³ Ibidem.

²⁵⁴ *Il Messaggero*, May 31, 1976.

At times, there was clear political intent behind journalistic hyperbole, but at the origins of such imprecisions was the reticence of expert institutions. In the week following Mameli's controversial article in *L'Unione Sarda*, for example, various local and national newspapers reported that CNEN and ISS were scheduling a radioecological campaign in La Maddalena to respond to public concerns about the "strange deaths." They portrayed the imminent arrival of a boat-laboratory with CNEN radioecologists as the solution to the mystery.²⁵⁵ In reality the *Odalisca*, a fishing boat that the CNEN Laboratory on Marine Contamination rented for its oceanographic campaigns, was supposed to arrive in La Maddalena a few days earlier for a series of sampling procedures scheduled months before.²⁵⁶

The announcement of the arrival of *Odalisca* was the perfect marriage between leaks of information from within expert institutions and journalistic ambitions to report what was happening behind the scenes of powerful state agencies. Often the interventions of CNEN and ISS experts in public debates became necessary to counter or to explain with more precision data, events, and information leaks reported by newspapers. On June 1st Dr. Osvaldo Ilari, head of the Environmental Radioactivity Division of CNEN, sent an official note to the national press, in which he clarified that the expedition of the *Odalisca* in La Maddalena had nothing to do with the deaths of the three babies and that cranioschisis could not be caused by radioactive contamination.²⁵⁷ Of the same tenor was the interview that professor Carlo Polvani, head of the Radioprotection Division of CNEN, gave *La Stampa* on June 2, 1976: "Even if there are traces of radiocontaminants, and this is yet to be demonstrated, they are so small that they could not cause any genetic effect on individuals in such a short time span."²⁵⁸

Lack of univocal communication, both from expert agencies and local institutions, encouraged the proliferation of rumors. The national press reported extensively about the "strange cases of La Maddalena" to illustrate, sometimes with dramatic emphasis, the lack of a serious program of radioprotection around the base, and to comment on the difficult conditions under which nuclear experts had to work. For example, on June 1st, the Communist Party's newspaper *L'Unità* quoted Eugenio Tabet from ISS and Osvaldo Ilari, who painstakingly denied

²⁵⁵ *Il Messaggero*, cit.

²⁵⁶ The second radioecological campaign planned by CNEN and ISS was supposed to start in early May, but for bureaucratic reasons and organizational problems Carlo Papucci and his colleagues could leave their laboratory until July (See Chapter 4).

²⁵⁷ "Una smentita che non smentisce," *L'Avanti*, June 2, 1976; "La Maddalena: smentite le morti da radioattività," *Corriere della Sera*, June 2, 1976; "Si studierà la radio-attività a La Maddalena," *Il Giorno*, June 4, 1976.

²⁵⁸ "I tre bimbi anormali: analizzate alghe, mitili della base Maddalena," *La Stampa*, June 3, 1976.

any causal link between radioactive contamination and the cases of cranioschisis, while at the same time confirming that the radioprotection program in La Maddalena was not yet complete and that data remained partial.²⁵⁹

At the local level, political leaders like vice major Franco Tamponi, a longtime member of the PSI, seemed to have clear ideas about how to solve the problems of public safety, but their requests continued to be frustrated by “inexplicably slow” bureaucratic processes and the logic of secrecy surrounding the U.S. military installation. During an interview, published on June 10 in the socialist newspaper *L'Avanti*, Tamponi expressed the position of his party within the new administration of La Maddalena, guided by a coalition of DC and PSI: “We want all the necessary safety measures around this base. The installation of a laboratory that analyzes samples every once in while is not enough. We need to know immediately if there is an increase in the levels of radioactivity in case of an accident and to develop an adequate emergency plan.”²⁶⁰ The deaths of the three babies became new material for anti-base contingents:

There are no elements to establish a direct causal relation between our dead kids and the presence of the U.S. base - added Tamponi - but this event cannot do anything else but increase our doubts. Honestly we cannot stop thinking about it because our community does not have memory of cases like these. [...] Also, I received confirmation from one of the obstetricians here that in the last years there have been suspect miscarriages.²⁶¹

Unofficial reports and rumors also fed hypotheses about the possible health effects of the nuclear submarines stationed in the Santo Stefano bay. But political leaders knew that unofficial sources of popular anxiety and risk perception were unlikely to travel far beyond the limits of the archipelago. In order to acquire credibility, the opponents to the U.S. Navy needed the robust structure of coherent propositions sustained by historical evidence and scientific facts.

Thus, after voicing the concerns of his fellow Maddalenini, the PSI member illustrated his political position by listing elements that rendered the current state of radiosurveillance in La Maddalena unacceptable. Tamponi borrowed both legal and scientific arguments from nuclear experts and educated activists. First, he referred to judge Amendola's famous article denouncing the 1974 request from the Japanese government for the U.S. Navy to stop the visits of nuclear fleets. According to Japanese sources, some of the radioecological data of the National Agency

²⁵⁹ “Allarme alla Maddalena dopo la morte di tre bimbi,” *L'Unità*, June 1, 1976.

²⁶⁰ “Il ministro della Sanità rischia l'incriminazione,” *L'Avanti*. June 10, 1976.

²⁶¹ *Ibidem*.

on Science and Technology had been manipulated and, for this reason, the U.S. Navy was asked to leave Japanese ports until the reliability of the radiometric measures was re-established.²⁶² Second, Tamponi once again denounced the regime of secrecy surrounding the operation of the nuclear submarines and the technical characteristics of the reactors. His plea for more transparent practices echoed the lamentations of CNEN and ISS experts, who, since the conference of Gruppo Ambiente (Amendola's environmentalist organization) on September 1975, had reproached the lack of collaboration of the U.S. Navy and the subservient position of the Italian government. The vice mayor referred to other events to make his argument stronger: "The lack of a credible emergency plan is almost criminal because an unforeseen problem is always possible, like the accidental dropping of an H-bomb by the U.S. Air Force in Palomares demonstrated."²⁶³ The author of the article, journalist Giorgio Giannelli, a socialist intellectual formed during the anti-fascist resistance, completed Tamponi's argument with some legal considerations that ISS health physicist Eugenio Tabet had already illustrated during his presentation at the 1975 conference of Gruppo Ambiente.²⁶⁴

The polemic around the risks connected to the operations of the U.S. submarines repeatedly took shape through the assemblage of heterogeneous sources, clusters of borrowed technical and political arguments, historical precedents, and questions about the official explanations of national expert and central political authorities. Tamponi's interview is just one instance of how local politicians and journalists aggregated sources to forward interpretations and hypotheses about the causal relationships of nuclear exposure and local health anomalies.

I see Tamponi's discursive elaboration as a creative synthesis of "common sense" and "philosophy." By these two concepts Gramsci intended to distinguish "the diffuse, un-coordinated, features of a generic form of thought common to a particular historical period and a particular popular environment," from a more coherent and scientific elaboration of "upper

²⁶² See Chapter 2.

²⁶³ Here Tamponi referred to the 1966 accident that involved a U.S. Air Force B-52 carrying hydrogen bombs. The B-52 collided with another U.S. airplane during refueling operations causing their crash and the accidental dropping of the H-Bombs near the small fishing community of Palomares, in the region of Almeria, in southern Spain. The detonation of the non-nuclear material at the moment of the accidental dropping caused plutonium contamination over a vast area. The recovery of the bombs and the clean up took several years, involving various military and international research agencies, including Italian ones. The accident had public resonance through the media. A report issued by the U.S. Department of Defense is available at the following link:

http://www.dod.gov/pubs/foi/International_security_affairs/spain/844.pdf

²⁶⁴ See Chapter 2.

conceptions of life.”²⁶⁵ According to Gramsci, the role of organic intellectuals is eminently creative and organizational. Through their political activity, they produce a relationship between “upper level philosophy” and common sense that promotes an alternative worldview to that of elites, which can also travel among lower strata of the population. Achieving this goal, however, is not simply a matter of circulating new ideas: “It is a question, in other words, of fixing the limits of freedom of discussion and propaganda... in the sense of a self-limitation which the leaders impose on their own activity, or, more strictly, in the sense of fixing the direction of cultural policy.”²⁶⁶ In La Maddalena, I argue, the processes of discursive elaboration, of which Tamponi’s is just one example, did not occur spontaneously, but corresponded to precise strategies deployed by local political elites to construct their arguments and to win the consensus of public opinion, especially at higher levels of technopolitical debate.

The spread and incorporation of scientific arguments and expert opinions within the common understanding of citizens was an objective of both pro and anti-base parties in La Maddalena. But anti-base activists saw the proliferation of uncontrolled and unfiltered rumors as detrimental to their cause. Hyperbolic statements or exaggerated/distorted versions of facts and episodes were double-edged swords. Sometimes they could be used to fruitfully provoke public debate and shake the stagnant and quiet atmosphere of a militarized community like La Maddalena. At other times, rumors and debates could generate distrust and be easily dismissed as unreliable by the opposing party and scientific authorities. For this reason, leftist political leaders, in particular, attempted to police rumors surrounding episodes like the cranioschisis ones and filter sensationalistic reports in general.²⁶⁷ Local elites used three strategies to shape the debate on the risks of radio-contamination: (1) They exploited the political valence of events and episodes that could re-launch the debate over the fallacies of the radioprotection system; (2) They policed the use of rumors and unofficial sources in order to avoid the easy rapprochement of official authorities and the consequent loss of credibility that would have followed; and (3) They relied on expert and insider sources connected to their political channels in order to verify

²⁶⁵ Antonio Gramsci, *Selections from the Prison Notebooks*, edited and translated by Quintin Hoare and Geoffrey Nowell Smith, (International Publishers, 1971), cit. p. 328-330.

²⁶⁶ *Ibidem*, cit. p. 341.

²⁶⁷ I say especially leftist political leaders because they were a minority in La Maddalena and generally excluded from the resources that the local dominant elites monopolized thanks to their affiliation with the central government, the local church, and the Italian Navy. Therefore, the anti-base front had to elaborate an oppositional strategy to penetrate the strata of reticence, and the official narratives and propaganda about the economic benefits of the U.S. Navy ‘innocuous’ presence.

the technical accuracy of their interpretations and, moreover, to enroll opinions that national, local, and military authorities could not easily dismiss. These strategies are evidenced in both the arguments and omissions of newspaper articles and editorials of the 1970s. For example, it is striking that *La Nuova Sardegna* (the second Sardinian newspaper), while usually critical of the U.S. Navy operations in La Maddalena, did not publish an article on cranioschisis. Interviews with Gian Carlo Tusceri, a poet, writer, and historian from La Maddalena, make up for this silence.

Tusceri was the local correspondent for *La Nuova Sardegna* from the early 1970s to 1991. Despite his close intellectual dialogue with the powerful Monsignor Capula (also known as “the governor” of La Maddalena) at a young age, Tusceri was a sympathizer of the Communist Party and his critical position toward the U.S. submarines installation was well known. However, due to his professional and intellectual activity, he had preserved an independent position on the political situation created by the arrival of the U.S. Navy, to the point that he established a friendship with Commodore Burkhalter, commander of the 22nd U.S. Navy submarine squadron.²⁶⁸ This liminal position, carved between two opposing ideological stands, allowed him to ponder the pros and cons of competing arguments, but his choice for coherence and thorough documentation did not attract the sympathies of those polarized on each side of the dispute.²⁶⁹ Consider the following excerpt from our interview:

Orsini: Why didn't you write anything about the babies born with cranioschisis?

Tusceri: Look, I have been among the strongest opponents of the U.S. Navy in La Maddalena, and I paid the consequences for it. My boat was mysteriously sunk and my car exploded in front of my house. Nobody could find the authors of those intimidations. But I refused to fall into the trap of the malformations. Everybody was using the story for political reasons. Many colleagues of mine wrote about the malformations because that was ‘the news’ of the moment! It was making it into the first pages of local and national newspapers, which sold more copies. But I knew that emphasizing those stories was scientifically incorrect and consequently detrimental to the anti-base political strategy.

Orsini: But couldn't you try to explain and contextualize better those episodes?

²⁶⁸ The base in La Maddalena was the station of the squadron.

²⁶⁹ During informal conversations, former U.S. Navy servicemen mentioned the name of Gian Carlo Tusceri as the clearest example of the anti-base positions in La Maddalena. A retired U.S. Navy officer who asked to remain anonymous told me: “That shit that G.C.T. [this is how Gian Carlo Tusceri was signing his articles] on *La Nuova* was just political propaganda.” Personal conversation with the author.

Tusceri: In that situation it was impossible to get into the debate and present more accurate accounts. I decided to not participate in what I thought was a weak political move and a conformist attitude of many colleagues. The argument that the radioactivity supposedly released by the submarines could cause the malformations, in general, was exposed to easy counterarguments and was ultimately indemonstrable. It was the wrong way to conduct the right political battle against the permanence of the U.S. Navy.²⁷⁰

Tusceri was not alone in resisting the temptation to use the drama of the cranioschisis events as a political argument. Gianfranco Dedóla, a former member of the Communist Party and a worker at the Italian military arsenal, remembers that inside the party there was reluctance to use sensationalistic stories for political propaganda. This was also the case for the cranioschisis episodes. In June 1976, when Italians voted in general elections, Giovanni Berlinguer, brother of the famous Sardinian PCI secretary Enrico, held a political speech in La Maddalena. Dedóla recounts the day in detail.

We were in front of the city hall. The square was full of people waiting for Berlinguer's speech. A few minutes before the start, Berlinguer asked me personally if there were particular themes that the comrades in La Maddalena considered important to address. He asked if he should mention the story of the babies and I immediately said no! He agreed with me that that wasn't the right thing to do.²⁷¹

Dedóla and Tusceri's explanations provide very clear examples of how local anti-base intellectuals attempted to suppress the interpretation of the cranioschisis episodes as signs of nuclear contamination. By policing the spread and the interpretations of the episodes of cranioschisis—and by suppressing their political mobilization for the anti-base cause—they regimented the meaning of the health episodes and severed their indexical value in connection to nuclear contamination. They also accomplished this with the help of allied experts from CNEN.

Within the Communist Party, both at the local and regional levels, great care was employed in constructing reliable and sound arguments that could stand against the propaganda of the Christian Democrats and the attempts by national authorities and the U.S. Navy to minimize the fallacies of the radiosurveillance system. Salvatore Sanna, speaker of the communist group in the city council, was one of the most prominent political figures on the archipelago. For decades he had been on the frontline against the U.S. Navy installation and his efforts to document the environmental impact of military activities eventually made him an

²⁷⁰ Personal interview with the author. La Maddalena, April 2012.

²⁷¹ Personal interview with the author. La Maddalena, October 2012.

expert on the matter. During the 1980s, in fact, the Region of Sardinia appointed him as a member of the “Committee on Military Easements,” an organism composed by military and civilian representatives that examines the legal, economic, and environmental aspects of the presence of Italian and NATO military training camps, garrisons, and other strategic assets on Sardinian territory.²⁷²

During the 1970s Sanna kept an active correspondence with Carlo Papucci, the radioecologist from the CNEN Laboratory of Marine Contamination. Papucci’s leadership inside the CGIL-Ricerca facilitated their exchange since the beginnings of the public debate around the U.S. Navy installation in La Maddalena.²⁷³ Sanna relied on Papucci’s expertise and position inside CNEN for the availability of technical information about the radiosurveillance plan. They had met on several occasions during several of Papucci’s visits to La Maddalena, both for the CNEN radioecological campaigns and for conferences.

Private correspondence between the two reveals that Sanna was sending Papucci his speeches and official notes to make sure that the technical details supported his political arguments.²⁷⁴ As argued in Chapter 3, Papucci demonstrated a deep personal investment in La Maddalena, from both a scientific and a political point of view. Indeed, for Papucci, these two dimensions appeared inextricably linked. La Maddalena was, at the time, a crucial technopolitical node. Papucci was not only providing Sanna with insider technical information.

Sanna sent letters to the CNEN director, to the president of the Province of Sassari, and to the Italian Navy asking them, in his quality of municipal councilor in La Maddalena, official data and explanations for the long delays of the public safety organization.²⁷⁵ Papucci gave Sanna his opinion as an insider of CNEN and commented on the credibility of the official answers received by the communist representative. Papucci’s expert voice was authoritative, and sometimes Sanna

²⁷² “Comitato misto paritetico per le servitù militari della Regione Sardegna.”

²⁷³ The CGIL (Italian General Confederation of Labor) is still the largest leftist union of the country. Until the existence of the Italian Communist Party, CGIL was considered the closest Union to the Communist Party, and other parties of the socialist constellation. The CGIL-Ricerca was the branch of the union representing the sector of public employees inside national research institutions like CNEN and ISS.

²⁷⁴ I had access to the correspondence thanks to the collaboration of Carlo Papucci, who made his private archive available for my research.

²⁷⁵ A typed letter that Sanna sent to Papucci on May 5, 1977 shows the constant flow of communication between the two: “Dear Carlo, I am attaching a copy of the most recent articles, including the one that you requested with particular interest during our last phone conversation. I also send you a copy of my note to the mayor [of La Maddalena]. . . . and a copy of the letter that I sent to CNEN, hoping that it will reach Albonetti [Achille Albonetti, then president of CNEN] who signed the response to my previous letter and that I also include here together with the other documents. Warm wishes, Salvatore.” Carlo Papucci, *Private Archive*.

asked him to use his affiliation with the CGIL-Ricerca and his expertise to support the communicative strategy of the communist group. For example in a letter dated March 11, 1977 Sanna illustrated the “points of attack” to the problematic implementation of the radiosurveillance plan, asking Papucci to support his intervention: “If these points are exact in their formulation, it would be necessary that the *tecnici* [experts] confirm them when (if we will be successful) the Ministry of Health and the other Authorities involved will say that everything is under control and that [the radiosurveillance plan] is in an advanced state of implementation.”²⁷⁶ In sum, Papucci not only provided technical mentorship, but he also actively contributed to shaping the public debate about the U.S. Navy installation.²⁷⁷

In June 19, 1976, a few weeks after the episodes of cranioschisis broke into national reporting and debates, an official note from CGIL Ricerca (inspired by Carlo Papucci) reframed and reordered the sequence of events, clarifying (as previously done by CNEN personnel) that the sensationalistic approach of the newspapers and the polemic around the causal relationship between the death of the three babies and the supposed nuclear contamination of the archipelago was shifting public attention away from the real problem: the preparation of an emergency plan.²⁷⁸ “The mission of the *Odalisca*”—said the official communication—“has not yet started because of bureaucratic delays due to the complex decisional mechanisms inside the agency [CNEN]... Thus the campaign programmed for the past spring could not be done, which means that the entire radioecological survey will be delayed for one year...”²⁷⁹ The CGIL-Ricerca, explained the article, stigmatized the fact that the supposed arrival of the *Odalisca* was used [during the elections] to assuage the anxieties of the public. The note pointed out that the activity of CNEN was part of a larger radioecological campaign with the objective of generating basic knowledge of the environmental characteristics of the archipelago for a more complex evaluation of the risks connected with the U.S. Navy presence: “Without this preliminary survey and with

²⁷⁶ Salvatore Sanna to Carlo Papucci, private correspondence March 11, 1977. Italic added by the author. Source: Carlo Papucci, private archive.

²⁷⁷ He was responsible for the energy policies sector inside CGIL-Ricerca. He often made direct interventions on national newspapers to advocate for the continuation of the radioecological campaigns in La Maddalena or to point out critical limits of the research and the responsibilities of the government for the lack of assistance in the implementation of safety measures, like emergency plans: “Urgente un piano di emergenza a La Maddalena,” *Paese Sera*, August 5, 1976, signed Carlo Papucci, Energy Committee CGIL-Ricerca.

²⁷⁸ “Facile ottimismo di stampa e TV sui rischi nucleari alla Maddalena,” *L’Unità*, June 19, 1976.

²⁷⁹ *Ibidem*.

only partial data, experts cannot do their job to evaluate scientifically the dangerousness of radioactivity.”²⁸⁰

When I asked Carlo how he could manage to be inside CNEN and, at the same time, organize a sort of internal opposition through CGIL-Ricerca, he answered that he did not have political weight inside the agency: “I was the low man on the totem pole, I could not decide anything really. But I could express my opinion, and the unions were pretty active inside the agency.”²⁸¹

Sanna and other communist party members were competing with already powerful structures and with a diffuse sense of identification with the military at the local level, sustained by the economic structure of the place. The cultural and the economic leverage of agencies like the Italian Navy and the church were formidable tools of social control. In order to challenge this particular power structure, Sanna and others had to rely on the careful and accurate construction of technopolitical arguments that could not be dismissed as simply prejudiced ideological positions against the U.S. Navy. That is why the scientific-technical components of the disputes around the deficiencies of the radiosurveillance system in La Maddalena were so crucial from the beginning. In this context, the political organization of the party, its use of coherent scientific explanations, and its control over the diffusion of popular arguments based on rumors and anecdotal evidence, were key weapons in a battle between unequal adversaries.

5.5. Conclusion

In La Maddalena, radioecologists and health physicists, U.S. Navy personnel, policy-makers, and long-term residents engaged in public debates about the environmental consequences and the possible health effects of the presence of the U.S. base.

U.S. Navy personnel doing radiological work relied on direct experiences of radioprotection where personal badges, gloves, protective clothes, written instructions, and training programs made risk visible. During disputes over the meanings of nuclear contamination associated with the presence of the submarines, experts’ discourses focused on the technical and decontextualized characteristics of risk (the probability that an accident would occur multiplied by the calculable harm of that event). Abstract expert definitions and lack of previous direct

²⁸⁰ Ibidem.

²⁸¹ In Chapter two I explained Papucci’s involvement as an active expert in the debate over the implementation of the radiosurveillance program of La Maddalena.

experience with radiation and its effects left local residents without a clear idea of what radiocontamination could look like. They adopted other strategies to objectify risk. Through the lens of historical ethnography, this chapter examined how these different groups of actors constructed meanings of nuclear risk. I argued that for radiological risk to become visible material signs must be available for interpretation. But material signs, such as radiometric results, measuring instruments, environmental changes, and unusual events cannot be interpreted without what Webb Keane calls semiotic ideologies—some shared codes or assumptions about the ontological order of the world, moral values, agency, intentionality, and political orientations that regiment their meanings.

I explored the following questions: How do exchange and circulation of technical information between experts and non-experts work? And how do more fluid and porous interactions between experts and non-experts impact activist arguments vis-à-vis official narratives of expert and public authorities? The archival and ethnographic material discussed here reveals that, when analyzing the formation of meanings of risk, scholars need to consider how communication actually moves, and is policed, between experts and non-experts engaged in technopolitical controversies. In the case of La Maddalena in the 1970s, political party organizations, labor unions, and the Church were loci of pedagogy, cultural elaboration, and exchange between different levels and forms of knowledge production. More importantly, the case discussed above shows that experts and non-experts are not necessarily opposed and homogeneous social entities, but that internal differentiations emerge when we take a closer look at the epistemological conflicts, information control, and political processes that enable both groups to reduce complexity and present stylized arguments in socio-technical controversies. In terms of method, this involves understanding how experts and non-experts form meanings of risk in interaction with one another, rather than assuming that incompatible socio-cultural identities or cognitive dichotomies are at the core of their epistemic conflicts. I did not assume that people of La Maddalena knew the effects of radiological risk better than scientists or that they could deploy alternative forms of knowledge about it based on their close daily interactions with the local environment or—even more vaguely—because of their cultural identity. My goal was to show how non-experts deal with invisible risks and how they formulate hypotheses about phenomena about which they lack direct experience and knowledge.

In a place such as La Maddalena, in which only radioecology experts and U.S. Navy personnel trained in radioprotection had acquired common understandings of radiological risk, local residents made sense of risk in an uneven representational economy shaped by what Ulrich Beck calls “relations of definitions.” This unbalance did not prevent local residents from formulating hypotheses about the presence or absence of radiocontamination on the basis of observations of the environment, others’ behavior, and unprecedented disquieting events. I demonstrated that these observations were often contradictory and could not be immediately taken as signs of radiological risks (that is, as effects of radiocontamination) because they could not be explained coherently and could not be interpreted as recurring manifestations of some physical regularity.

In the last part of the chapter I discussed some examples of how understandings of risk can change over time, even when the representational economy of risk is dominated by expert discourses and semiotic ideologies. New facts, such as the episodes of cranioschisis, became potential signs of risk that could be politically mobilized, especially in the absence of conclusive scientific explanations but the unstable (because not demonstrated) causal nexuses between the malformations and the presence of the U.S. nuclear submarines made local anti-base elites abstain from using them in their technopolitical arguments. The organizational efforts of local anti-base political elites to present sound arguments against the presence of the U.S. Navy involved policing rumors about the cranioschisis episodes in order to exclude unscientific evidence that expert and central political authorities could easily dismiss. Drawing on Gramsci’s theory of ideology, I have argued that local anti-base elites regimented the meanings of risk by assimilating scientific discourses into their representational strategies. They did so with the help of allied experts, who shared a democratic view of nuclear technology and communication with the public.

Chapter 6

Scientific Controversies and Political Mobilization after the Hartford Accident

On October 25, 2003 the nuclear submarine USS Hartford hit a rock near the U.S. Navy base of the Archipelago of La Maddalena. U.S. military authorities reported the accident a full 18 days after the event. Harsh reactions from the Italian government and Italian representatives followed, criticizing the lack of transparency in the U.S. Navy conduct. The U.S. Navy report excluded any damage to the reactor and, when interviewed to comment on the accident, the Italian minister for the environment reassured the public: “It was a serious accident, but first reports did not mention environmental problems.”²⁸²

One month after the accident, Sardinian health authorities and the local laboratory managing the radiosurveillance system in the Archipelago reported that no increase of radioactivity levels was detected following the submarine’s grounding. In that interval of time, CRIIRAD, an independent French research institute, and Dr. Fabrizio Aumento, a retired Italian marine geologist, had already begun to collect and analyze samples of sea-water, rocks, and algae, with the financial and logistical support of local environmentalist groups. Instead of assuaging the anxieties of the local residents, their interventions raised further questions about the possible consequences of the accident. CRIIRAD analyses revealed exceptionally high concentrations of Thorium 234 (Th234) in samples of *Jania Rubens*, a red algae present in various marine environments of the Mediterranean Sea. Thorium 234 is a natural radioactive element and also a decay product of Uranium 238 (U238). A hypothesis that a connection between the presence of such radioactive elements in the red algae and the Hartford accident became the object of an intense public debate, leading to unprecedented public scrutiny of the radiosurveillance system in place around the U.S. Navy installation since the late 1970s.

This chapter offers a historical analysis of the accident of October 2003 and of the scientific and political debates that unfolded in its aftermath. A historical analysis of the

²⁸² *La Repubblica*, November 13, 2003.

reactions to the Harford accident reveal how state sponsored agencies, and, later, independent experts, activists, and local residents constructed and challenged techno-scientific practices and narratives of safety and failure of the radiosurveillance system. The radiosurveillance system in La Maddalena was not only the response to a technical problem; it was the result of expert radioecological protocols, practical adaptations to environmental challenges, and organizational and bureaucratic instantiations of regulatory regimes. As detailed in earlier chapters, the assemblage of these components stabilized the radiosurveillance system as a sociotechnical system that held together as long as the power relations that configured it remained fundamentally unquestioned.

This chapter details why national experts faced a crisis of public credibility, and how the intervention of independent experts and local activists reshaped debates about the risks of the U.S. nuclear base in La Maddalena. I argue that the heterogeneous assemblage constituting La Maddalena's radiosurveillance system—including laboratory protocols, instruments, sampling procedures, data interpretations, divergent epistemic cultures and the legal and political frameworks they relied upon—shaped collective assessments of risk by making only select elements of nuclear risk and exposure visible to the local population. My analysis moves beyond deterministic and all encompassing explanations of public opposition to particular technologies and industrial activities as reactions to accidental “events.” Rather, I show that to understand expert and public reactions to risks in the aftermath of accidents, we need to analyze the historical formation of scientific epistemic approaches to risk as well as the socio-cultural conditions in which public interpretations of accidental events are forged and politically mobilized. Through the analysis of official reports, internal correspondence, archival material, and oral interviews, I show that the epistemic premises of expert controversies after the accident derived from partially divergent scientific protocols and agendas shaped in the context of the Cold War and in the aftermath of the Chernobyl disaster. Italian radioecologists, most of who worked for the state, formed their expertise during the Cold War, and adopted established methods of analysis that led them to interpret the presence of radionuclides in the archipelago as long-term consequences of atmospheric fallout from previous nuclear experiments. In sum, they argued that the radioactivity in La Maddalena had nothing to do with the presence of the U.S. submarines. But CRIIRAD, an independent laboratory founded by French activists in the 1980s in response to Chernobyl, adopted a different method that revealed phenomena of isotopes’

bioaccumulation unnoticed until then (previously undocumented). Finally, independent marine geologist Fabrizio Aumento introduced a fast alpha-particle tracing technique that evidenced of the presence of plutonium in the archipelago.

I argue that the mismanagement of the aftermath of the accident by public authorities, more than the accidental event per se, provoked a crisis of credibility of the institutions in charge of monitoring environmental radioactivity in the archipelago. Controversies among experts, and the uncertainty that they produced, had obvious reverberations on public debates, but they were not the only factors. The mismanagement of the Hartford accident by local and national authorities, including Italian and U.S. Navy, unfolded in a moment of renewed political mobilization in the archipelago. For example, in early 2002 a small group of citizens had already formed to oppose a U.S. Navy project for the expansion of the submarine base. For local activists, the accident was an ideal occasion to mobilize sectors of their community traditionally unwilling to confront the military institutions. Composed of schoolteachers, public employees, students, merchants, and craftsmen, the Spontaneous Committee of Citizens (Co.Ci.S), was not simply the product of a contingent political battle. Among its members was a new generation of Maddalenini who grew up during the 1990s, when the Italian Navy was gradually decommissioning from La Maddalena. They had political experiences outside of the archipelago, but maintained strong ties with their community of origin. The establishment of the National Marine Park in 1996 provided an alternative to the military-industrial economy. While they went largely unfulfilled, hopes for a local economic conversion legitimized the aspirations of a new generation of Maddalenini who imagined an economic future for the archipelago free from the military presence.

6.1. Silent Service, Silent Accidents

On October 25, 2003 the nuclear submarine USS Hartford hit a rock near the U.S. Navy base of La Maddalena. U.S. military authorities did not report the accident until November 10, when the spokeswoman of the Six Fleet headquarters in Naples announced that the commander of the 22nd Squadron and the captain of the submarine had been removed from duty. The Hartford remained in La Maddalena for assistance and left the base a few weeks later, when it could safely cross the Atlantic, headed to Norfolk, Virginia, for major repairs. The Italian press agency ANSA picked up the news from *The Day* of New London, a small town near Groton,

Connecticut, the Hartford's home base.²⁸³ Italian authorities were caught by surprise when national newspapers reported on the accident, relying on details provided by *The Day*.²⁸⁴ Indeed, it is striking that a local newspaper based in New London, Connecticut, was able to report on the accident on October 28, only three days after the event, while Italian authorities did not access this information until three weeks later, and only through an official press release of the U.S. Navy. In his first article on the event, Gianluca Di Feo, a journalist for *Corriere della Sera*, speculated that “the first indiscretions about the accident appeared on *The Day* [...] probably because the families of the Hartford crew informed local reporters of the unexpected return.”²⁸⁵



Figure 6.1. The damage to the USS Hartford after the accident²⁸⁶

In La Maddalena the secrecy surrounding the accident undermined the credibility of military and civilian authorities. The mismanagement of communication after the accident had disruptive effects within a community that had proudly formed its identity along two centuries of

²⁸³ *The Day* of New London, CT, gave the news of the grounding only three days after the accident, on October 28th. In the following weeks a series of new articles added more details about the circumstances and the consequences of the accident. The initial news of the Hartford grounding in La Maddalena can be found here: <http://www.theday.com/article/20031028/DAYARC/310289954/0/Search>

²⁸⁴ “‘Cover-Up’ Fury After US Nuclear Sub Is Grounded,” *The Independent*, November 13, 2003. The *New York Times* published the news on November 19, 2003: “Nuclear Sub Heads Home After Accident.” Accessed on January 30th 2015: <http://www.nytimes.com/2003/11/19/world/nuclear-sub-heads-home-after-accident.html>

²⁸⁵ “Incidente a Caprera per il sottomarino nucleare USA più potente,” *Corriere della Sera*, November 12, 2003.

²⁸⁶ Source: Gian Carlo Fastame, personal archive, May 2012, La Maddalena. The picture, downloaded from the web, was taken by U.S. Navy divers of the USS Howard Gilmore, the tender ship that assisted the Harford after the accident, during their damage assessment and the first underwater repair in La Maddalena.

cohabitation with the Italian Navy and where the U.S. Navy was largely perceived as a reliable institution. The reaction of Rosanna Giudice, the first woman to be elected mayor of La Maddalena, exemplifies how the accident catalyzed tensions between military and civilian authorities in the archipelago. On November 14, 2003, Giudice organized a press conference explaining that both U.S. and the Italian Navy acted irresponsibly by keeping the Hartford's accident confidential. The mayor's attempt to dissociate herself from the behavior of the military authorities was not successful. Both political opposition and important voices within her party accused her of being an incompetent or, worse, directly involved in the cover-up.

Giudice made clear that the regime of secrecy and the paternalistic tutelage of the Italian Navy could not be tolerated further, especially when episodes like the Hartford's accident put the safety of the local population at risk. During the press conference she denounced her vulnerability as a woman responsible for a community traditionally dependent on male dominated military institutions. She interpreted the attempt to cover-up the accident by the Italian Navy not only as an act of disrespect toward the civilian authorities administering the archipelago, but also as a sexist maneuver "that excluded a woman from the manly business of military command."²⁸⁷

Rosanna Giudice was an easy target for the complaints of the Maddalenini. The anxiety of the local community had ramped up during the three weeks preceding the news of the submarine grounding. La Maddalena's administration was on the defensive trying to respond to rumors and polemics about an unexplainable "earthquake" perceived along the northeastern coast of Sardinia. As reported by local newspapers, on the night of October 20 "a boom followed by a tremor woke up half of the residents of La Maddalena who run down the streets in panic."²⁸⁸ The following day, hypotheses, conjectures, and contradictory explanations followed. Mayor Giudice and the prefect of Sassari announced that the "bang" was provoked by a military jet breaking the wall of sound during a training operation, but a few days later they reversed their explanation: the tremor was provoked by an earthquake detected near the northern coast of Sardinia.²⁸⁹ The biggest fear of the Maddalenini was that something had happened on the U.S. base. The local radio received numerous calls of alarmed citizens asking if, in the event of an

²⁸⁷ Rosanna Giudice, press conference, November 14th, 2003 (Municipal Archive, La Maddalena).

²⁸⁸ "Giallo sul boato notturno alla Maddalena. Versione ufficiale: il bang di un aereo militare" *La Nuova Sardegna*, October 22, 2003; "Misteriosa esplosione nella notte di Lunedì," *L'Unione Sarda*, October 22, 2003.

²⁸⁹ "Un terremoto ha scosso la Maddalena," *La Nuova Sardegna*, 25, 2003; "Troppe versioni sullo scoppio. È necessario fare chiarezza," *La Nuova Sardegna*, November 26, 2003.

accident, the local administration had an emergency plan.²⁹⁰ Rumors spread that an accident on the U.S. base was the source of the bang. Citing anonymous sources (but most likely an Italian employee on the U.S. base), municipal councilor Stefano Filigheddu, who was opposed to Giudice's administration, "revealed" that on the night of October 20 "an air compressor exploded inside one of the caves of Santo Stefano, where the U.S. Navy stores weapons and other hazardous materials."²⁹¹ U.S. and Italian Navy officers denied Filigheddu's claim, which was never verified.

After reading the news of the Hartford accident on November 12, some Maddalenini interpreted the unexplained "earthquake" as a consequence of a submarine accident.²⁹² So strong and generalized was the suspicion that the archipelago had lived under a regime of lies and deception that many associated the two episodes (the accident of October 25 and the earthquake-bang-explosion of October 20) as part of the same event. Years later, during my fieldwork interviews, some Maddalenini still referred to the earthquake-bang-explosion as a probable consequence of the Hartford accident. If the cover-up of the Hartford accident confirmed local distrust of the state and Italian public institutions in general, it also provoked something new. When the dynamic of the submarine crash started to emerge through the details provided by subsequent reports and newspapers, it appeared clearer and clearer that it was due to a series of "banal individual mistakes." Even experienced U.S. Navy sailors who served in La Maddalena reacted with astonishment: "I can't imagine what happened—it's an easy channel," declared a Navy veteran to *The Day*.²⁹³ Other veterans, interviewed years later, gave me similar opinions:

That was such a strange accident. I have gone through that channel many times. That point of the archipelago is tricky if you do not steer at the right time. Obviously something went wrong in the communication. Even if the instruments fail, trained submariners should do it by just reading the charts. The fact that the captain was immediately removed from duty and other six members of the crew have been punished tells you that whatever they have done was considered a serious mistake.²⁹⁴

²⁹⁰ "E dalle radio va in onda la rabbia dei maddalenini," *La Nuova Sardegna*, October 24, 2003.

²⁹¹ "Un diessino rivela: 'C'è stata un'esplosione a Santo Stefano'," *La Nuova Sardegna*, October 23, 2003.

²⁹² "Sommersibile nucleare su una secca. Licenziati commodoro e comandante," *La Nuova Sardegna*, November 12, 2003.

²⁹³ "USS Hartford Gets New Skipper After Grounding," *The Day*, November 15, 2003.

²⁹⁴ Personal interview with the author. The author of the comment wants to remain anonymous.

The U.S. Navy released a detailed account of the accident months later. A summary of the report was published *The Day*, on June 27, 2004: "Report Details How USS Hartford Failed To Steer Clear Of Danger." Also, a first hand account of the accident appeared in a book published in 2010 by a former U.S. Navy sailor on duty on the Hartford. See Christopher Brownfield, *My Nuclear Family: A Coming-of-Age in America's Twenty-first Century Military*, Alfred A. Knopf, New York, 2010. Especially Chapter 3 "Damn the Torpedoes!!!," Pp. 37-49.

The accident contributed to eroding the image that many Maddalenini held of the U.S. Navy as a reliable, efficient, and technologically advanced organization. In a place where almost everybody has a boat and is, on average, a skilled sailor, people responded acrimoniously to the grounding of a submarine in a charted shallow point of the archipelago. “Who could be so stupid to crash over a bunch of rocks that are signaled on every map? If this is the level of their personnel in charge of nuclear submarines, we cannot really feel safe!”²⁹⁵

6.2. Rewind: Political Mobilization before the Accident

The mismanagement of the aftermath of the Hartford accident by local and national authorities, including Italian Navy and U.S. Navy, also unfolded in a moment of renewed political mobilization in the archipelago. In early 2002 a small group of citizens had already formed to oppose a U.S. Navy project for the expansion of the submarine base.

Rumors about the “doubling of the base”—plans for expansion—became a major concern of the local administration beginning in 2002. News was not official, but Italian employees on the U.S. base and the personnel of the local administration directly involved in the appraisal of the project leaked bits and pieces of information during conversations with friends and families. The U.S. Navy project became an official topic for local political debate in November 2002, when regional papers reported indiscretions about a possible massive relocation of U.S. Navy troops to La Maddalena, which would be used as a strategic outpost for launching attacks in the imminent war against Iraq.²⁹⁶ The increasing percentage of unemployed Maddalenini, who were hoping for a job with the “Americans,” reacted positively to news of the expansion. But many others, including the local administration, had reservations: “Was La Maddalena going to be transformed into a giant military base with thousands of Americans?”

²⁹⁵ This is how Antonello Tovo, and other Maddalenini I interviewed in 2012, described the atmosphere of those days in the Archipelago.

²⁹⁶ For example the local correspondent of the regional newspaper *L'Unione Sarda*, reported the alarming words of Giulio Giudice, a provincial councilor and a member of Berlusconi's party, Forza Italia. Giudice affirmed that the Americans had already asked the municipal administration of La Maddalena the documents for the acquisition of the former Italian Navy arsenal and other properties. Mentioning that “rumors inside the city hall” made clear that this was a concrete possibility, he claimed the recent change of political regime in Turkey and the imminent attack on Iraq pushed the Bush administration to consider a massive relocation of U.S. naval contingents to La Maddalena. *L'Unione Sarda*, November 12, 2002, page 29.

Rosanna Giudice had recently won the elections with the support of a center-right coalition. The U.S. Navy project caught the newly elected mayor by surprise and provoked her immediate reaction. After all, it was not unusual for the local administration to receive notice of ongoing or already stipulated agreements between the U.S. Navy and Italian Ministry of Defense only after the fact. In a letter sent to the minister of defense dated November 20, 2002, mayor Giudice solicited an official response in relation to the alleged imminent relocation of the U.S. naval forces from Turkey to La Maddalena.²⁹⁷ The minister denied that such a plan had ever been submitted and that in any case such a dramatic change was practically impossible.²⁹⁸

Despite the reassurance of the minister, the project for a sizable expansion of the U.S. base continued to be discussed among experts and delegates of national and local institutions in the Regional Mixed Committee for Military Easements (CO.MI.PA) of Sardinia.²⁹⁹ The U.S. Navy and the Italian military authorities promoted the plan as a restoration of infrastructures dating to the 1970s with prefabricated materials, now in need of major renovations to match new safety standards. But representatives of the Sardinian Region and the technical personnel of La Maddalena's administration interpreted the project differently. During a heated meeting of the CO.MI.PA in July 2003, the technical personnel voted against the approval of the project asserting that it had not been previously submitted to the attention of the competent civilian authorities and that it implied a substantial modification of the status quo: an expansion of constructed volumes almost three times bigger than the current installation.³⁰⁰ The process for the approval of the project continued despite the opposition of local and regional authorities and, following an established praxis of disregard for formal procedures, the Italian military commands "convinced" the minister of the environment to put his stamp on the construction of the new structures.

When the controversy over the doubling of the submarine base erupted into public debate, a small group of activists convinced that La Maddalena's future resided in the liberation of the archipelago from the military economy created an informal network of citizens opposed to

²⁹⁷ Telegram sent from Comune di La Maddalena to the Minister of Defense, honorable Martino, November 20, 2002. *Source*: Municipal Archives of La Maddalena, Document Prot. n. 14594, December 2, 2002.

²⁹⁸ Response of the Minister of Defense to the Mayor of La Maddalena, November 29, 2002. *Ibidem*.

²⁹⁹ Comitato Misto Paritetico sulle Servitù Militari della Regione Sardegna (CO.MI.PA) - Verbale della riunione del Comitato Misto Paritetico per le servitù militari in Sardegna tenutasi alla Maddalena il giorno 08 Luglio 2003 (Convocazione di Maridipart La Spezia con MSG N. 28973/INFR del 13 Giugno 2003). Transcripts of official meeting: July 3, 2003. *Source*: Municipal Archives of La Maddalena.

³⁰⁰ *Ibidem*.

the U.S. Navy project. I met former members of the Spontaneous Committee of Citizens (Co.Ci.S) in 2012 during a dinner organized by one of the group's leaders, Antonello Tovo. As one member recalled during our conversation:

We did not want to become a colony of the United States! Can you imagine La Maddalena, with a local population of 10,000, being invaded by 5/6,000 U.S. military personnel? What about our freedom to circulate in the archipelago and our life-style, our traditional activities? If we accepted the logic of total dependence from the U.S. base we better said goodbye to the tourists. We did not want to radically change our identity. That's why we started to organize.

The formation of Co.Ci.S made evident that the doubling of the U.S. Navy base was a matter of public concern, not only a problem discussed within restricted circles of military and environmental authorities. Most importantly it represented a significant departure from traditionally elite-driven efforts of local mobilization, described in the previous chapters, and transformed the political scenario of the archipelago. Co.Ci.S members (initially six) were schoolteachers, public employees, students, merchants, and craftsmen. Their political agenda was not inspired by any particular national movement outside of La Maddalena and had the only goal, at least initially, of opposing the expansion of the U.S. base. During the weekly meetings “usually hosted inside the workshop owned by one member,” they gathered information, audited former local administrators, constructed their strategies, possible alliances, and shared many frustrations about the traditional apathy of their community. They also had to solve internal conflicts concerning the best course of action to be undertaken. Co.Ci.S was a “group of concerned citizens” united around a common objective, but individual members had different political views and motivations. Antonello Tovo, for example, recalls that he joined because he “had always been an anti-imperialist.”³⁰¹ He knew about Co.Ci.S while still in Pisa, Tuscany, where he got a B.A. in history with a thesis on the U.S. Navy base of La Maddalena:

For me joining this group was a way to reintegrate myself upon my return. It was also an opportunity to give back to my community. With my knowledge of the history of the U.S. Navy presence I was able to contextualize and analyze the political and diplomatic dimensions of the problem. I gained respect and credibility inside the group. Or at least, I saw that during my interventions people listened. I was excited about the fact that finally, after so many years a group of people from La Maddalena, not from outside, took the lead of the protest.

³⁰¹ Interview with the author. La Maddalena, November 2012.

When he was just a boy, at the end of the 1980s, Antonello witnessed local teenagers confronting groups of young pacifists and anarchists who came to La Maddalena from all over Italy to protest against the U.S. Navy. Like anti-nuclear movements in the 1970s they “invaded” the archipelago because it was a symbol, a sort of reusable space to stage epic battles against the state, imperialism, war, and nuclear power: “Our community usually has not responded well to this kind of exogenous protests. Actually there was a general rejection of the disorders and the tensions they provoked. This is why Co.Ci.S strategically changed the local dynamics. We were not punk anarchists from, say, Milan. In our group there were “respectable” members of the community, so to speak.”

Among them were other young activists who formed their political experiences far from La Maddalena. Marco, for example, was an employee of the local administration. Four years earlier he graduated with a degree in economics at the University of Florence (1996) with an honors thesis on the economic and environmental perspectives of the newly established Marine Park in the archipelago.³⁰² Like others of his generation, he hoped for a drastic break from the traditional dependence of La Maddalena on the military economy. During his years in Florence, he kept in touch with other students and coauthored short satirical cartoons and pamphlets about the “noxious presence” of the U.S. Navy base. One of these short self-produced publications in the mid-1990s (mostly circulated among friends and in bars of the Archipelago) was titled *Torta Gialla* (Yellow Cake), an explicit reference to the U.S. nuclear submarines and the risks deriving from their presence (Image 6.2.). *Torta Gialla* emulated similar initiatives that local political activists organized during the 1970s, the most famous of which was *Il Cobalto è Blu* (The Cobalt is Bleu), a mimeographed satirical journal produced by the Federazione dei Giovani Socialisti di Sassari (the Italian Social Party (PSI) Youth Movement).³⁰³

³⁰² Marco Leoni, *L'ARCIPELAGO DI LA MADDALENA: NUOVE PROSPETTIVE IN RELAZIONE ALLA REALIZZAZIONE DEL PARCO NATURALE*, University of Florence, B.A. Thesis, Academic Year 1997/98.

³⁰³ Marco Leoni provided copies of the pamphlets. I thank him for sharing his personal archive with me.

TORTA GIALLA

La rivista per non prendere uno scoglio

FOSFORESCENZE

Questo esempio di giornalismo neorealista nasce alle ore 00.00 o' cioè del 1° Aprile 1997 d.c. per mano di un'accozzaglia di pendolari da forza. Per comunicare con voi abbiamo accuratamente evitato di rileggere gli articoli, autoimponendoci tre regole: la prima: non la ricordiamo; la seconda: 45 secondi a cartella; la terza: inebriarsi con ogni sorta di stupefacenti. Ma questo documento non è l'espressione del pensiero di vecchi avvinazzati, bensì quello di giovani avvinazzati. Se pensate che la nostra goliardia superi le vostre cognizioni intellettuali sull'argomento, sappiate che la prima fase di preparazione dei combustibili a uranio ci (e vi) regala l'URANATO AMMONICO (la torta gialla). Per gli amici U308. Non potevamo quindi evitarci questa estenuante maratona pseudoinformativa soprattutto dopo che, circondati da future colate di cemento, prospettive di caporalato militare, offerte di organi è arrivato il contingente che ha fatto traboccare il vaso. La torta di cui vi parliamo non è di quelle da decorare con le candeline, anche perché, una volta spenta la luce, brilla benissimo da sola. Desiderando quindi festeggiare con altre leccornie i nostri compleanni vi auguriamo di gustare ogni singola fetta e guarnirla a piacere.

IL MADDALENINO C'E'!



E S'INSINUA COME UN CANCRO NELLA CULTURA MILITARE NORDAMERICANA

IDEE PER SALVARE UN'ISOLA

E' doveroso far iniziare questo breve contributo con un ringraziamento ai redattori di questa testata per averci invitato ad intervenire su uno dei problemi di La Maddalena: i problemi di Maddalena. Essendo noi stessi i redattori, non facciamo che stringerci la mano e offrire un giro di birra a testa. Uno dei problemi di Maddalena è: l'inadeguatezza della rete viaria, specialmente nel periodo estivo e in particolare d'inverno. Che fare? Si

potrebbe, come con rara efficacia è stato suggerito, impedire l'accesso alle macchine dei non residenti (milanesi, torinesi, romani, americani, etc.); oppure far sì che i servizi pubblici di trasporto siano realmente servizi. Certo, se le circa 700 autovetture targate AFI non fossero sull'isola il problema sarebbe parzialmente risolto, ma questo è un altro problema... Un altro problema di Maddalena è: l'inquinamento dell'acqua, dell'aria, della terra e del fuoco. Di nuovo, che fare? Sarebbe opportuno impedire il transito di petroliere nelle Bocche; sarebbe inoltre

segue a pag. 5



Figure 6.2. Cover page of the first issue of *Torta Gialla*

Torta Gialla issued sarcastic recriminations against state and military institutions that, according to the editors, de facto ruled over the subservient local community, silenced and controlled through the distribution of a few jobs and some economic benefits. The effects of secrecy and radioactivity, symbols of the American military power, were made visible through cartoons, poems, and rhymes, as if their representations on paper could make them real and force the local residents to sharpen their senses. The risk of radioactive contamination, for example, was contextualized through the use of local tropes, such as the passivity of the local residents, and transformed into active political claims about the negative effects of the U.S. Navy presence. Similar to a cancer, the Americans subtly invaded the body of the local community, who lost its

sense of identity, spoke a hybrid idiom (local dialect mixed with English), and overlooked its health and environmental problems.

The initiative of the young students editing *Torta Gialla* was a symptom of the more profound socio-economic transformations that were taking place in the archipelago during the 1990s. With the gradual but inexorable retreat of the Italian Navy (now the arsenal counted fewer than two hundred workers) the local administration was facing for the first time the perspective of mass unemployment and a crisis of identity. In 1992 Pasqualino Serra, a dissident Christian Democrat historically critical of the U.S. Navy base, was elected mayor of La Maddalena.³⁰⁴ Among his political plans was the demilitarization of the local economy and the transition towards a more tourist-oriented future. For this reason, his administration worked restlessly to promoting La Maddalena's candidacy for the institution of a national Marine Park, which was formally established in the mid-1990s.³⁰⁵

I thought that this wonderful archipelago could be preserved and promoted as a national reserve that could attract tourists and make possible the conversion of the local economy, especially in a moment of crisis due to the progressive disengagement of the Italian Navy. Second, I thought that the establishment of the park would make the presence of nuclear submarines incompatible and would push the Italian government to rethink its agreements with the U.S.³⁰⁶

For Serra this was not enough. To convince his community that it was time to turn page, the mayor commissioned a study of the economic benefits of the U.S. Navy presence, including

³⁰⁴ Serra's was and still is one of the most respected families in the Archipelago. His grandfather, a descendant of the Corsican shepherds who inhabited La Maddalena before the arrival of the Piedmontese army in 1767, bought the island of Santo Stefano at the beginning of the 20th century and transformed it into his entrepreneurial dream. In a few years, an islet of granitic rocks separated by three hundred yards of seawater from the major island of La Maddalena, became an industrial site of granite extraction surrounded by beautiful vineyards, audaciously transplanted from the interior of Sardinia. When the Italian Navy in the 1960s expropriated a portion of Santo Stefano to build a naval pier and a system of protected caves carved into the granite, Serra protested and refused any emolument offered as a pay back. When I interviewed Pasqualino Serra in the summer of 2009 (he died a few months later in 2010) he explained that when the U.S. Navy installed its base, right on the expropriated portion of Santo Stefano, his opposition to the military rule over the archipelago grew even stronger. Coming from a family of successful entrepreneurs, whose business grew independently of the military economy in the archipelago, Serra had always seen the presence of the Italian and the U.S. Navy as an oppressive condition that excluded other possibilities of local economic development. When he became mayor in 1992 he did not oppose openly the U.S. Navy: "In fact since they came here I had the most cordial relationships with them. Some of them, like Commodore Burkhalter, became personal friends for life. My opinion about their presence was not dictated by any negative preconception. Rather I was opposed to the logic of the Italian state and our military institutions who wanted to impose their rule over this silent community."

³⁰⁵ The institution of the National Marine Park was formally introduced through the presidential decree of May 17, 1996 and previously anticipated by the general law on national parks (Legge n.10 del 4 Gennaio 1994).

³⁰⁶ Personal interview with the author. La Maddalena, July 2009.

indirect revenues, taxes, and the influxes on the local commerce.³⁰⁷ The document, more than 100 pages dense with statistics, charts, and lab-style explanatory narratives, made evident that the U.S. Navy did not bring major economic advantages to La Maddalena. Instead, it represented a cost for the local community. Serra was ambitious. He wanted to change the mentality of an entire community by dismantling with scientific evidence deep-seated narratives about the innate military vocation of the archipelago. His project did not succeed immediately but insinuated some doubts, and opened the possibility of economic alternatives.

This socio-economic and political background nurtured the aspirations of Marco and his friends. To understand the reactions triggered by the submarine accident in 2003 we need to keep in mind that at the local level a reserve of political capital was ready to be activated. The accident amplified already existing concerns among the local community. More importantly, it materialized, all the conjectures, reassurances, and complicated technical terms that the Maddalenini had previously heard of through opposite factions in the city council. Fears became palpable and justified.

6.3. Unexpected Evidence and the Challenge of Independent Experts after the Accident

The post-Hartford crisis in La Maddalena challenged, in unprecedented ways, the rationale of radioecological surveillance policies established by Italian experts after the installation of the U.S. base in the mid-1970s. The modalities of intervention and communication adopted by official expert institutions failed to respond to the expectations of local residents in two ways. First, experts did not provide any evidence of the radioecological situation until one month after the accident, which opened a space for the interventions of independent experts, who challenged established methods of risk assessment and management. Second, experts tried to reassure the public about the reliability of the radiometric system by dismissing the preoccupations of the local inhabitants and attributing them to their lack of scientific knowledge. Even worse, some Sardinian scientists interpreted local citizens' efforts to open a public debate

³⁰⁷ *Venticinque anni di presenza della base Americana nell'arcipelago della Maddalena: una valutazione economica dell'impatto*, (IZI S.p.A, Roma, 1996). Salvatore Sanna, *Personal Archive*.

with the help of independent experts as attempts to use bad science to question the legitimacy of the U.S. Navy presence in the Archipelago.³⁰⁸

When the Hartford accident was officially reported, the personnel of the local radio-surveillance laboratory of La Maddalena conducted a supplementary radioecological survey. In a laconic report dated November 22, 2003 the directors of the laboratory, Dr. Floriana Manca and Dr. Giuseppe De Luca, wrote:

[...] Our personnel conducted gamma spectrometry analyses on biological samples collected in the area where the accident allegedly occurred. The results are negative. Therefore we can conclude that the accident did not provoke any radioactive contamination of the environment.³⁰⁹

In their report, Manca and De Luca describe collecting routine samples, as they had done for twenty years, based on a radiosurveillance protocol from the late 1970s. As we saw in Chapter 3, this protocol followed guidelines established by the National Committee on Nuclear Energy (CNEN) and the National Health Institute (ISS) on the basis of their environmental studies in the area and their hypotheses about the characteristics of the U.S. Navy submarines. Given the regime of secrecy surrounding the technical details of the U.S. naval reactors and the discharge formula associated with their operations (that is, the types of radio-contaminants dispersed into the environment as a consequence of their routine operations), Italian national expert institutions suggested a radiosurveillance protocol similar to those followed around inland civilian nuclear plants. In the specific case of La Maddalena they hypothesized that U.S. Navy submarines were propelled by Pressurized Water Reactors (PWR) of 70 to 80 Mw of power and that the radioactive elements most likely dispersed into the environment (especially in case of accident) would be fission products like Iodine 131 (¹³¹I) and Cesium 137 (¹³⁷Cs), and activation products such as Manganese 54 (⁵⁴Mn) and Cobalt 60 (⁶⁰Co).³¹⁰

³⁰⁸ The personnel of the local laboratory of radioecological surveillance in La Maddalena emitted its first official report on the levels of radioactivity only on November 30th, 2003—after a full month of rumors, speculations, and insufficient explanations provided by the mayor of La Maddalena.

³⁰⁹ *Report: Extraordinary Radio-ecological Campaign – November 2003*, Presidio Multizonale di Prevenzione di Sassari, Laboratorio Analisi di Mongiardino.

³¹⁰ CNEN experts identified and included these radio-contaminants in analogy with radio-ecological campaigns conducted around the nuclear plant of Trino Vercellese, in Piedmont. There in 1964 a Pressurized Water nuclear Reactor was activated. Given the lack of crucial information about the discharge formula of U.S. reactors, Italian experts worked assuming that the pressurized water reactors propelling the U.S. submarines had the similar characteristics to Trino Vercellese's reactor.

Since the late 1970s, the guidelines illustrated above, combined with sampling procedures, instrumentations, and expert knowledge transmission, produced what Michelle Murphy has aptly phrased a “regime of perceptibility” that structured the way in which the radiosurveillance system operated and the kinds of evidence it produced. As Murphy argues, different measurement devices and epistemic approaches can render visible, or perceptible, widely different risk factors in a given environment.³¹¹ The radiosurveillance protocols established in La Maddalena shaped the way in which radioactivity and nuclear risk were made visible. In sum, Italian nuclear experts’ epistemic paradigms generated interpretations of data that removed any causal link between the presence of radioactivity in La Maddalena and the U.S. Navy nuclear submarines.

Before the Sardinian radioecology experts published their first report, in November 22, the World Wildlife Foundation (W.W.F.) section of northern Sardinia and the Corsican environmentalist group “ABCDE” joined forces to collect samples of seawater and algae in the areas where the accident supposedly took place.³¹² They sent these samples to the French agency *Commission de Recherche et d’Informations Independenantes sur la Radioactivit * (CRIIRAD), an independent laboratory founded after the Chernobyl accident in response to the ambiguous conduct of the French government in assessing the risks of radioactive fallout.³¹³ On January 15, 2004, the director of CRIIRAD, the engineer Bruno Chareyron, communicated the results of the

³¹¹ Michelle Murphy, *Sick Building Syndrome*.

³¹² As the precise location of the submarine’s impact was not released to the public, activists relied on semi-official communications provided by authorities as a proxy.

³¹³ CRIIRAD is an NGO founded in 1986 in response to widespread preoccupations outside the scientific community for the effects of the radioactive fallout after the Chernobyl accident. While the French government continued to minimize the consequences of the disaster for the population, various scientists, like the nuclear physicist Robert Bernaud, received numerous requests by citizens to analyze samples of grass, milk, and other products. In one of such occasions, Bernaud agreed to help a biology teacher and an airline pilot to analyze their samples in Bernaud’s laboratory in Lyon. The teacher and the pilot, Michel Rivasi and Francois Mosnier, were among the future founders of CRIIRAD. Sezin Top u argues that “since the Chernobyl ‘scandal,’ the rise of mistrust in the authorities as well as the social awareness on official ‘secrecy’ provoked a radical shift in the manner of framing criticism of nuclear energy and risks.” In this context the CRIIRAD adopted a whistle-blower strategy, relying on concrete experts’ methodologies to demonstrate fissures in the system used by French official authorities to assess nuclear risks. Because of their independent position, made possible also through the funding of a technologically advanced radiometric laboratory, CRIIRAD established their authority as “counter-experts.” This strategy allowed CRIIRAD to break the boundaries of nuclear expertise in France, by deploying qualified expertise, introducing new kind of facts, introducing new policy-making logics, and criticizing upfront the bureaucratic rules of French national nuclear agencies and the regime of nuclear secrecy. For further discussion, see Sezin Top u, “Confronting Nuclear Risk: Counter-Expertise as Politics Within the French Nuclear Energy Debate,” *Nature and Culture*, 3(2), 2008: 225-245.

gamma spectrometry performed on the samples.³¹⁴ While the analyses revealed that no radioactive elements usually associated with reactors' activities were present, anomalous concentrations of Thorium 234 were discovered in the algae from La Maddalena.³¹⁵

The findings of CRIIRAD posed a problem that was not contemplated in the radio-surveillance programs of the National Agency for Environmental Protection (APAT), the Regional Agency of Environmental Protection of Sardinia (ARPAS), and consequently by the local laboratory of La Maddalena. As Dr. Floriana Manca explained during an interview released twenty days after the first CRIIRAD report (February 6, 2004):

Our lab is perfectly equipped to detect Thorium in the environment but in the past we never did it because Thorium is a natural radioactive element that has nothing to do with the operations of nuclear reactors, therefore it is not included in the list of radiocontaminants that we look for around nuclear installations.³¹⁶

While the personnel of the local lab addressed why they were not looking for Thorium, the puzzle of its high concentrations in the red algae remained unresolved: "We will make a comparison with other sites with the help of other research centers to understand what is going on with Thorium, to make sure that sea weeds are not experiencing the same phenomenon and that it is not affecting the food chain."³¹⁷ In La Maddalena Dr. Manca's words sounded less than reassuring.

The new evidence provided by CRIIRAD introduced uncertainty and disquiet among local residents, who were already alarmed by the silence of civilian and military authorities about the Hartford accident. Importantly, CRIIRAD was not the only independent institution to intervene after the accident. At the beginning of 2004, Dr. Fabrizio Aumento, a retired marine geologist, sponsored by the Italian environmentalist NGO Legambiente and the Association of Italian Scientists Against the War, started to collect samples of rocks, sediments, and algae from

³¹⁴ CRIIRAD sells its services to a vast array of clients, including individual citizens, activist groups, and other NGOs. The modality with which Sardinian and Corsican environmentalist groups asked CRIIRAD's for its services corresponds to a consolidated practice in line with CRIIRAD's post-Chernobyl legacy. In the case of La Maddalena, WWF Gallura and ABCDE could afford to pay only for gamma radio-spectrometry analyses on a few samples collected by their activists (2,000 Euros). More complex analyses with sophisticated methods of chemical separation and material preparation would have involved much longer times and considerable expenses. CRIIRAD eventually took the initiative to ask a Belgian laboratory to perform more sophisticated analyses, whose results were publicly announced only in June 2004.

³¹⁵ *Analyses d'eau de mer and algues marines dans les bouches de Bonifacio (Corse du Sud) et le secteur de La Maddalena suite a' l'incident de navigation du sous-marin USS Hartford*, CRIIRAD, June 15, 2004, Note 04/01.

³¹⁶ The interview appeared in the Sardinian newspaper *La Nuova Sardegna*, February 6th, 2004.

³¹⁷ *Ibidem*.

the Archipelago and from various other Mediterranean locations (reaching more than 160 samples). Dissatisfied with the results published by CRIIRAD and with the first report by Sardinian experts, he adopted a comparative approach to discern whether the radioactivity in the samples collected in La Maddalena came from the abundance of granite rocks or was introduced by anthropogenic sources. As Dr. Aumento recounts:

I wanted to increase the number of samples and to include material coming from different places in order to make a more reliable comparison between the concentrations of radioactive elements present in La Maddalena and elsewhere. This allowed me to distinguish the natural radioactivity emitted from the granite rocks of La Maddalena from the anthropogenic radioactive elements. I am a marine geologist and my approach is quite different from that of a classic nuclear expert. Only many high quality samples can give you reliable results. This is why I was not happy with the first assessments made by the CRIIRAD and the other Italian research centers.³¹⁸

Aumento's preliminary results were even more worrisome than the ones announced by CRIIRAD a few months earlier.³¹⁹ Based on wide-spectrum autoradiography techniques, Aumento's measurements revealed the presence of alpha emitting particles, which he took as evidence of possible plutonium contamination.³²⁰ These findings renewed the alarm among local residents and pushed the Minister of the Environment to ask the National Agency for Environmental Protection (APAT) to conduct an extraordinary radio-ecological survey in La Maddalena with two main goals: verifying and explaining the high levels of Thorium 234 in the

³¹⁸ Fabrizio Aumento, personal interview with the author, Montefiascone, January 2012.

³¹⁹ Aumento formally presented his research in La Maddalena in November 2004, but before then, *Legambiente* informally divulged some of the preliminary results.

³²⁰ Alpha autoradiographs are indeed the simplest way to individuate the emission of alpha particles even at very low intensities in a large variety of samples, which require much less expensive and time consuming preparation. In cases when the number of samples to be compared is in the order of hundreds, this large spectrum analysis allows a quick preliminary assessment of the presence of alpha emitting particles, but requires further examinations in order to assess whether the particles are belonging to natural elements or anthropogenic radionuclides. The technique consists of simply exposing readily available films sensitive only to alpha rays of a particular energy to the treated sample so that the emission of alpha particles from the material examined leaves traces concentrated in portions of the film that are vertically bombarded (hot spots). The density of the tracks impressed on the film by the emission of the alpha particles gives a visible measure of the intensity of radioactivity present in the sample. Given that various natural and artificial radionuclides are alpha emitting elements, the second step is identifying the exact elements that produced the tracks on the film. Aumento found traces compatible with artificial transuranium nuclides such as plutonium (Pu) and americium (Am), but in order to test his hypothesis his team proceeded to the analysis of the hot spots through radiochemical/alpha ray spectrometry, which confirmed only the presence of Uranium (while Americium had concentrations below the detectable limits) (87). What captured Aumento's attention was the fact that the supposed traces of plutonium were detectable only in the samples coming from around the U.S. Navy base. Thus, he advanced the thesis that the source of alpha emitting particle must have been local, that is related to the activity of the US Navy base of La Maddalena.

algal samples analyzed by CRIIRAD and assessing if plutonium was present in the Archipelago.³²¹

APAT published its results in June 2004.³²² In the same month, CRIIRAD delivered its third and final report, which substantially agreed with APAT's conclusions: 1) the high concentration of Thorium in the algae was due to a process of natural bioaccumulation not related to anthropogenic emissions; 2) the traces of plutonium present in some of the samples were not alarming because they were probably the result of nuclear test fallouts from the 1950s and 1960s.³²³ CRIIRAD added that the hypothesis of radioactive discharges in La Maddalena could be excluded once and for all only by comparing current data with the levels of radioactivity before the arrival of the U.S. Navy. CRIIRAD thus invited both U.S. and Italian military authorities to break the regime of secrecy surrounding the base's activities.

6.4. Who is an Expert? The Politics of Expertise and 'Regimes of Perceptibility'

Fabrizio Aumento's intervention introduced new evidence and scientific methods to radioecology in La Maddalena. Nuclear expert communities, especially Italian radioprotectionists and radioecologists who had worked in La Maddalena for more than two decades, resisted them. At the local level, even the WWF activists who promoted the CRIIRAD's study publicly contested Aumento's thesis that the plutonium in some of his samples derived from the U.S. submarine base.³²⁴ In La Maddalena retired radiochemist Giancarlo Fastame dismissed Aumento's results as methodologically flawed.³²⁵

Aumento's thesis did not get much public attention outside of La Maddalena until 2005, when the well-reputed *Journal of Environmental Radioactivity* published his study, provoking negative replies from American and Italian radioecology experts.³²⁶ Introducing the series of

³²¹ It is important to underline that the initiative of the Minister of the Environment started only after an official request from the mayor of La Maddalena. On February 2nd, 2004 the City Council of La Maddalena gathered in an extraordinary session to discuss the alarming data published by CRIIRAD. *City Council of La Maddalena, Report of Deliberations*, February 2nd, 2004 – Archives of the City Council of La Maddalena.

³²² AA.VV. *Indagini Straordinarie di Monitoraggio della radioattività ambientale nell'Arcipelago della Maddalena*, APAT-ICRAM, June 2004.

³²³ *Base Militaire de San Stefano*, Communiqué de Presse, CRIIRAD, June 24, 2004.

³²⁴ I learned this during a personal interview with Dr. Vincenzo Migaleddu, a radiologist, member of WWF Gallura and one of the promoters of the CRIIRAD intervention in La Maddalena. (Sassari, November 2012).

³²⁵ Fastame's comments on Aumento's study were published in *Il Vento*, n. 110, October 1, 2004: 8 and n. 126, June 4, 2005. 9. Fastame also explained his position during a personal interview (La Maddalena, June 2012).

³²⁶ F. Aumento, K. Le Donne, and K. Eroe, "Transuranium radionuclide pollution in the waters of the La Maddalena National Marine Park," *Journal of Environmental Radioactivity*, n. 82 (2005): 81-93.

comments sent in response to Aumento's article, the editor of the journal, S.C. Sheppard, openly acknowledged the controversial nature of Aumento's results. All letters to the editor complained that an article "with such problematic methodological flaws and unsupported conclusions could even be published in a highly respected scientific journal."³²⁷ Carlo Papucci and Roberta Delfanti, respectively a retired researcher and the current director of the Center for the Study of Marine Environment of ENEA (formerly CNEN – National Committee on Nuclear Energy) in Italy, argued that the autoradiography methods used by Aumento's team did not reliably measure plutonium concentrations. In particular, they argued that the "conversion factor" used to calculate concentration levels on the basis of the evidence provided by the "hot spots" in the radiography films was arbitrary, in that it did not account for the possible contribution of natural alpha emitters to the data set. Therefore, they insisted, Aumento's conclusions were to be taken as "wishful thinking" and "personal opinions," that did not constitute rigorous scientific evidence of plutonium contamination.³²⁸ Dr. Arrigo Cigna, a renowned, retired Italian radioprotectionist and former director of the Continental Radioactivity Laboratory of ENEA in Rome (a colleague and friend of Delfanti and Papucci) generated similar critiques. Even if traces of plutonium could be revealed through radiography, Cigna argued, "hot particles were distributed throughout the world from the radioactive fallout [of nuclear atmospheric tests] and may still be available in the environment since the radioactive decay is not affected by weathering, as the authors [Aumento et al.] must know."³²⁹

Aumento's reply to Papucci, Delfanti, and Cigna reveals the substance of the controversy and helps explain why his approach and that of Italian radioecology experts diverged so significantly and led to different data interpretations. First, Aumento and his co-authors justified the adoption of radiography not for its indisputable reliability or for the sake of methodological innovation, but rather as a necessary response to an emergency:

An accident, that was kept secret by the military authorities, [...] could have provoked a nuclear disaster in La Maddalena National Marine Park. A couple of laboratories initiated investigations on possible nuclear contamination of the area: inexperienced local citizens collected a handful of algal samples selected at random from the vast area in question, and sent them to these laboratories for gamma ray spectrometry analyses. The analyses of several key radioisotopes were omitted. The gamma ray spectra did not reveal any

³²⁷ Harsh comments were sent to the editor by P. Kershaw, Roberta Delfanti and Carlo Papucci, and Arrigo Cigna: "Letters to the editor," *Journal of Env. Rad.*, n. 87 (2006): 130-133

³²⁸ *Ibidem*, cit. 131.

³²⁹ *Ibidem*, cit. 132.

particular anomalies, except for the Thorium 234 excesses in two samples. As marine geoscientists we could not accept the validity of the data of this line of approach.³³⁰

Indeed, Aumento and his colleagues worried that the granitic composition of the archipelago, notoriously associated with higher levels of background radioactivity, could lead to biased results. For this reason they adopted a comparative approach involving the selection of larger samples from equally granitic environments that did not present any local direct source of anthropogenic radioactivity (such as nuclear plants or industrial activities). This broader ecological design, according to them, was key for discerning the real status of La Maddalena's environment. According to this logic, the fact that higher concentrations of supposedly transuranic elements appeared in the samples coming from near the U.S. Navy base in La Maddalena was a clear indication of their strong correlation with the submarines' activity.

The comparative model was also justified on the grounds that the geographic discrimination across possible sources of radioactivity was crucial in absence of more precise and time-consuming radiochemical procedures:

Our multi-disciplinary approach, based on expert field-work performed by the very same analysts (both on land and at sea) who subsequently performed the lab work on the extensive sampling repeated over time, combined by rapid laboratory analyses, were and are the only ways to proceed in the event of a possible nuclear catastrophe!³³¹

Aumento's article clearly contested the scientific canon of Italian radioecologists and expanded the debate by shifting the focus from the concentration of Thorium 234 in the red algae (first discovered by the French CRIIRAD) to a broader discussion about the evidence of nuclear pollution provoked by the activities of the U.S. Navy in the area.

Italian nuclear experts instead countered Aumento's arguments by relying upon established epistemic models developed in years of radioecological campaigns in the area and during their disciplinary training. A holistic approach, such as the comparative ecological model based on large spectrum radiography (as the one adopted by Aumento), appeared inappropriate to scientists who formed their expertise on highly specific research designs, based on a deep knowledge of the dispersion of radiocontaminants into given eco-systems. According to the latter, broader ecological comparisons alone could not discriminate among natural and artificial

³³⁰ Ibidem, cit. 133.

³³¹ Ibidem, cit. 133.

sources of radioactivity: only specific and time-consuming radio-chemical analyses designed to detect radioactive traces associated with the activities of nuclear reactors could give reliable results. Equally important, they interpreted the possible presence of radioactive elements (Plutonium and Cesium) in the waters of La Maddalena as evidence of the long-term effects of atmospheric explosions (in the 1950s and 1960s) and of the Chernobyl disaster. This interpretation was not contingent on the case of La Maddalena, but was a well established paradigm of Italian radioecology expertise since the 1950s, when (as we saw in Chapter 3) the National Agency for Nuclear Energy (CNEN/ENEA) organized a national network of radiometric stations specifically designed for measuring the levels of environmental radioactivity determined by the fallout of nuclear tests. Arrigo Cigna, one of the experts who contested Aumento's findings, was a pioneer of these studies and brought his expertise within the radioprotection laboratories of CNEN and ENEA, of whom he became director in the early 1970s (see Chapter 3).

In 1984, the team of ENEA experts (former CNEN) who conducted ten years of radioecological campaigns in La Maddalena had published a final report providing a comprehensive synopsis of their results. They wrote that since 1972 the radiometric exams in La Maddalena had never evidenced health-relevant accumulations of radionuclides that could be linked to the operations of the U.S. submarines.³³² According to the authors, including Dr. Cigna, comparative analyses of samples coming from La Maddalena demonstrated that the concentration of fission products in the archipelago's environment were similar to those coming from other sites. Therefore, they concluded that: "the generalized presence of artificial radionuclides must be caused by an ubiquitous phenomenon such as the deposition of radioactive fallout from experimental atmospheric explosions."³³³ This interpretation of the data, I argue, must be understood as the outcome of deep-seated protocols in radioecological research during the Cold War, as it was primarily focused on the environmental dispersion of radionuclides coming from atmospheric explosions.

Aumento's intervention, even if problematic in many respects, contributed new elements for public discussion. His approach was justified on the grounds that the U.S. submarine accident generated questions to which Italian public institutions were not able to respond, both politically

³³² A. Bruschi, A. Cigna, P. Maffei, A. Zattera, and G. Zurlini (Eds.), *Indagine radioecologica nell'arcipelago della Maddalena: Rapporto conclusivo delle campagne effettuate*, ENEA RT/PAS/84/9, May 1984.

³³³ *Ibidem*, cit. p. 52.

and scientifically. He deemed the consolidated models of Italian nuclear experts “outdated and corresponding to old conceptions of radioecological monitoring, especially in cases of dramatic events such as an accident.”³³⁴

While Aumento’s article, published in a well-reputed international scientific journal in English, intensified the controversial debate within specialists’ circles, it did not acquire the same relevance as CRIIRAD’s findings in La Maddalena. Scientists more traditionally identified as nuclear experts—namely nuclear physicists, radio-protectionists, and nuclear engineers—rejected Aumento’s approach because it was not in line with the disciplinary standards at the basis of their epistemic culture.³³⁵

6.5. Local Political Mobilization and the Quest for Democracy

From January to June 2004, uncertainty over the radioecological analyses conducted by both independent and state-sponsored laboratories undermined the credibility of La Maddalena’s radiosurveillance system. Exposed to alternative approaches and data interpretations from independent experts, local residents started questioning the rationale and the efficacy of the radioecological surveillance policies implemented by Italian experts for over thirty years. Editorials and investigative reports in local and national newspapers began to inquire into how the radiometric monitoring system actually functioned. Was it reliable? Who were the experts in charge of it? What was the safety protocol if accidents occurred? Was there an emergency plan? Were any cases of cancer in the archipelago connected to the presence of the submarines? Were epidemiological studies conducted to rule out this possibility? As questions multiplied, so did the number of experts who were involved in the debate.

Giancarlo Fastame, a retired radiochemist from La Maddalena, frequently addressed these issues from the columns of *Il Vento*, a popular local weekly magazine. Having accumulated a long managerial and scientific experience in large petrochemical companies throughout Italy and Europe, Fastame had a reputation as an expert within the local community: “Because of my education and professional experience I certainly have concrete notions about radiation and radioactive contamination. So, what I did after the accident was to get basic information about its dynamic, the U.S. Navy safety procedures, and the radiosurveillance system of La Maddalena,

³³⁴ Personal interview, January 2013.

³³⁵ Karin Knorr-Cetina, *Epistemic Cultures: How the Sciences Make Knowledge*, (Harvard University Press), 1999.

including the reports of the local laboratory and of the national authorities.”³³⁶ Even for somebody like Dr. Fastame, gathering official documentation on the radiosurveillance of the archipelago was not easy. When he asked the local administration for access to the monthly reports of the laboratory directed by Dr. Floriana Manca, the personnel of the city hall refused, insisting that Fastame, a private citizen, could not have any legitimate interest in the data. With the intervention of the municipal ombudsman, a week later, the radiochemist obtained the reports anyway. The data he gathered showed that “the radioactivity was at the natural level, so there was no problem at all. Dr. Manca confirmed this also when we met. She explained to me the situation and the routine radiosurveillance protocol. We are both experts, we use the same language, so we understood each other immediately.”

According to Giancarlo Fastame, the alarm was provoked by the intervention of CRIIRAD, and later by Dr. Aumento, who went to La Maddalena to present their results: “In the city hall, full of people, they said that their analyses showed the presence of radiocontamination. You can imagine the reaction of this community.” It was in response to these alarms that Fastame began his work of divulgation. Local journalists and members of the community started to call him to ask for an expert opinion. The director of the local radio and of *Il Vento* decided to host weekly programs in which Fastame explained basic concepts about radioactivity and nuclear energy and responded to frequent questions about the situation after the accident. “Sometimes I was asked bizarre questions, like if people could eat the fish of the archipelago. Someone told me that he started to buy frozen fish coming from the Atlantic!! Surely that fish was contaminated, unlike the one caught here.”

During our conversation, Dr. Fastame told me that he does not blame his fellow Maddalenini for their “ignorance.” Rather, he laments the fact that the local authorities and the national expert agencies did not have any communication strategy: “If I, a radiochemist, could barely access the data, you can imagine how hard it would be for other people to know what is going on and what to do in case of a real emergency.” For Fastame the crisis of trust and the fears of radiocontamination in the archipelago had two origins. On the one hand military and expert authorities failed to have a transparent relationship with the Maddalenini. On the other hand, this lack of transparency caused uncertainties and doubts, which traditional opponents of the American presence could use to amplify the alarms and create a stronger anti-base front. Like

³³⁶ Personal interview with the author, La Maddalena, May 2012.

other members of the community, involved in the debate since the beginning of the 1970s, Fastame came to know first hand the culture of secrecy that, almost fifteen years after the end of the cold war, still reigned in the little archipelago: “Secrecy is counterproductive. There is no need to keep secrets about the levels of radioactivity around a nuclear installation. Unfortunately, especially in Italy, and in particular within the Navy and among military circles, there is the idea that keeping secrets is the basis of authority.” Fastame recalled that when he worked in France he came in contact with another communicative approach, one that the state forged and organized to make the population part of the national nuclear culture. The French model, according to the radiochemist, should have been taken and directly transplanted in Italy. Instead of protecting the public by keeping it ignorant--Fastame insisted--public authorities should have organized credible emergency plans:

The one that the Prefect of Sassari presented here in late 2004, during a small meeting exclusively reserved to the authorities (I was invited only because of my reputation as a local expert but could not intervene or ask questions) was simply ridiculous. There were very naïve evacuation strategies, unrealistic contamination maps and dispersion models, and poorly organized interventions. For example, according to the plan, a group of firefighters specialized in radiocontamination emergencies should have come from the north of Italy to monitor the levels of radioactivity after a hypothetical accident. Can you imagine that? What could have they done after one or two days? Nothing.

Fastame proposed, almost provocatively, to install a monitor in the public square to screen in real-time the radiometric data collected by the local laboratory. The military and the local administrators never gave an official response to this suggestion. Three elements emerged in Fastame’s analysis of the post-accident reactions: the unpreparedness and disorganization of public safety agencies, the ignorance of the public, and the lack of transparency of military and civilian authorities. He communicated this view in a report that he sent to local, regional, and national authorities, concluding that of all the institutions involved in the mismanagement of the radiosurveillance system the U.S. Navy was the most transparent. In light of the attempt to cover-up the Hartford accident, Fastame’s statement sounds hyperbolic, but it is understandable if interpreted through the lens of an educated Maddalenino who worked in highly regulated industrial environments and with a comparative view of safety regulations. His review of the safety organization in La Maddalena was an explicit critique of Italian bureaucratic mentality and inefficiency, juxtaposed to the efficiency of foreign “nuclear cultures.”

Local activists also desired access to information after the Hartford accident. The Spontaneous Committee of Citizens (Co.Ci.S) was initially formed by six Maddalenini opposed to the expansion of the submarine base proposed by the U.S. Navy. When they learned of the accident, their strategy changed: “They made a huge mistake and we could not do anything else but jump on it. Our choice was not simply strategic. People here were in fear, like I had never seen before. It was real.”³³⁷ Fabio, a former Co.Ci.S member, who later became assessor of public works in the local administration, told me: “We did not even think of using the problem of radioactivity when we started our campaign against the expansion of the U.S. base. But when the accident happened, clearly that became our major topic, together with the emergency plan, the efficiency of the radiosurveillance system, and the epidemiological data.”³³⁸

Their strategy involved promoting a democratic approach to information access, intended as a collective effort to understand what was going on. The public dimension of the problem also needed a stage for a pedagogical representation of a collective drama: a community that had always been surrounded by secrecy and paternalistic calls for obedience finally woke up and decided to stand up for its right to knowledge. Co.Ci.S members did not want to embrace, prejudicially, any particular argument or scientific demonstration. Rather, they wanted to involve the public into a process of engagement with the problem of risk after the accident, but also with the other dimensions of the U.S. Navy presence that had been neglected over time.

While this group of citizens had no radioecological expertise, it mobilized traditionally apathetic sectors of the local community to confront secrecy by opening a balanced public debate on the scientific and safety problems that emerged after the accident. If, during the 1970s and the 1980s mostly exogenous groups went to La Maddalena to openly protest against the U.S. Navy presence, Co.Ci.S changed this pattern. Now the Maddalenini felt confident enough to participate in public. Antonello Tovo, one of group’s leaders recalls this with particular pride:

In the public square we counted more or less 500 persons. I was desperate and started to cry. I thought that it was a complete failure. After all the work we had done, gathering only 500 protesters seemed like a defeat. Then I received a call from Salvatore [Sanna], who, with an excited tone of voice, congratulated me for the formidable result! He told me that getting those people out to openly protest against the mismanagement of the Hartford accident was just unthinkable 10 years earlier.³³⁹

³³⁷ Antonello Tovo, personal interview, La Maddalena, October 2012. Other Co.Ci.S members expressed the same opinion, almost with the exact same words, when I interviewed them individually.

³³⁸ Interview with the author, La Maddalena, April 2012.

³³⁹ *Ibidem*.

Local activists also took the lead by organizing and moderating a series of public events during which experts of different positions discussed the first results of the radioecological surveys performed after the accident. Antonello Tovo, one of the leaders of Co.Ci.S, explains their strategies at the time:

Our attempt to open a public debate on the risks related to the U.S. Navy presence in the archipelago was based on three methodological principles. We had to be credible, transparent, and objective, unlike the mayor, the Italian Navy, and the scientists who came here to tell us that everything was fine and that we did not have to worry.³⁴⁰

Co.Ci.S exploited the window of opportunity offered by the intervention of independent experts to open the black box of the radiosurveillance system put in place by Italian experts and authorities. In so doing, Co.Ci.S members acquired credibility among the local population in a moment of disorientation and lack of trust towards military and civilian institutions.³⁴¹

6.6. Facing the Public: Sardinian Experts and the Production of Ignorance

In February 2004, Co.Ci.S organized two public assemblies in the City Hall. Doctor Vincenzo Migaleddu animated the first event (on February 8th), titled “La Maddalena and nuclear power: a dialogue for more thoughtful policies.” At the time, Dr. Migaleddu was a radiologist in Sassari and active member of WWF Gallura, one of the NGOs that sponsored CRIIRAD’s independent analyses of the Hartford accident. During the second debate held on February 14, Co.Ci.S invited Professors Giorgio Cortellessa and Mario Ladu, retired health physicists with opposite views of the environmental effects of the U.S. Navy base. Cortellessa developed his career as a radioprotectionist mostly inside ISS. In the past he had vocally opposed the U.S. Navy installation, denouncing presumed evidence of radioactive discharges in the archipelago with interviews and op-eds on national and Sardinian newspapers.³⁴² Mario Ladu was a preeminent Sardinian physicist and radioprotectionist involved since the 1970s in La

³⁴⁰ Antonello Tovo, personal interview, La Maddalena, October 2012.

³⁴¹ A future version of this chapter will feature extended analysis of the modalities of intervention of independent experts (CRIIRAD and Dr. Fabrizio Aumento in particular) in the local and national debate over the Hartford accident.

³⁴² See for example the article by Paolo Figus in *L’Unione Sarda*, on April 13th, 1990: “La Guerra dei dati,” [Trans. “The war of data”] in which the author interviews the Commander of the US Fleet in the Mediterranean, who for the first time responds directly to Cortellessa and other scientists and activists denouncing the presence of radioactive discharges in La Maddalena.

Maddalena's radiosurveillance program as a consulting expert for the Region of Sardinia (see Chapter 5). His position, like that of most Italian nuclear physicists, was markedly anti-military. But after the Hartford accident, he took a strong position against the alarm created by CRIIRAD's results. According to him, the controversy over radioactive algae was another political tactic of anti-base activists to kick the U.S. Navy out of the Archipelago. As he stated in a newspaper interview during the controversy:

I have monitored the levels of radioactivity in La Maddalena repeatedly for the last twenty-five years and the only radioactivity I found there is due to the abundance of granite, as various researchers had already noticed since the 1930s. [...] They [Politicians] have brought up the problem of radioactivity instrumentally, invoking scientific arguments for mere political purposes. This is not honest.³⁴³

Mario Ladu voiced the frustration of many of his Sardinian colleagues, who felt that their use of "scientific evidence" made them suspect: instead of feeling reassured, the local population accused them of reticence about the real risks of contamination, and even in collusion with the U.S. Navy and Italian military authorities. By contrast, the initiatives of Co.Ci.S crystallized efforts of the more active sectors of the local community to cope with the uncertainty and lack of information about the way in which scientists assessed the risk of contamination around the U.S. base.³⁴⁴ I will briefly analyze local experts and activists' contrasting points of view about nuclear risk after the Hartford accident through passages of a private written correspondence between a member of Co.Ci.S and a Sardinian nuclear physicist.

A few days before the second public assembly in La Maddalena, Professor Ladu announced that he could not participate in the event. Co.Ci.S invited another nuclear physicist and radioprotectionist (a friend of Ladu) from the National Nuclear Physics Institute of Cagliari in Sardinia, Dr. Paolo Randaccio. According to the local newspapers, on the evening of February 14, the large room where the city council usually assembled was so full of people that hundreds

³⁴³ Interview by the journalist Lucio Salis, "La base non è a rischio radioattività," *L'Unione Sarda*, January 28, 2004.

³⁴⁴ One of the paradoxes posed for La Maddalena, and likely other communities living around nuclear submarine installations, was the invisibility of the system of radiosurveillance that supposedly monitored their safety. At first glance, this apparent paradox could be interpreted as a self-defense mechanism: removing the object of risk from daily life by simply ignoring it. However, this explanation does not take into account concrete historical processes that have made nuclear risk disappear from the map of visible threats (see, for example, Gabrielle Hecht, *Being Nuclear*). At the level of general public opinion, but more dangerously among political elites, the phasing out of nuclear plants after the Chernobyl accident in Italy has made nuclear risk disappear as if problems like plants' decommissioning, spent fuel disposal and reprocessing, and transportation of highly radioactive material are outdated concerns.

of citizens had to wait outside of the City Hall.³⁴⁵ For the first time, local scientists who managed the radiosurveillance system had to face a very large number of anxious and suspicious local residents, who interrogated, interrupted, accused, and even booed whomever tried to dismiss their preoccupations as obstructionism. As Dr. Manca recalls:

With that atmosphere it was impossible to make people understand that from a scientific viewpoint their anxieties were unjustified because there was no evidence whatsoever of any sort of contamination after the accident. But they preferred to support, yes support, like soccer fans, those who were creating alarm!³⁴⁶

A few days after the event, Dr. Randaccio started a correspondence with professor Giovanna Sotgiu, a member of Co.Ci.S, French teacher at the local high school, and also a highly active public intellectual. In his letter Randaccio addressed his disappointment and preoccupation for the atmosphere he breathed during the assembly:

[...] The people approved *en masse* all the interventions that emphasized the risks of nuclear contamination [...] while they disapproved and put under accusation all those interventions that tried to prove that there is no risk [...] What struck me even more is the fact that nobody seemed to know that in La Maddalena there is an efficient and well equipped laboratory of radiosurveillance. I do not know whether your request of further analyses to the French lab is due to simple lack of information or distrust in the local institutions. Distrust toward the laboratory directed by Dr. Manca has been expressed several times, with requests for new measurements, new methodologies, different instruments, without actually saying a word about the reasons why [the personnel of the local lab] should modify the way in which they perform their analyses. Dr. Manca has explained very clearly that her lab has never looked for Thorium because it would be like trying to detect the presence of salt in the [sea] water: we know that Thorium exists and does not provoke any harm, therefore we need to look at the real polluting factors. The cause of the higher or lower concentrations of Thorium is only a collateral scientific problem. I am more and more convinced that the people are simply afraid of nuclear things and ionizing radiation because they do not know anything about them. Trying to make them reason in a meeting like the one we attended on 02/16/2004 is simply impossible.³⁴⁷

Randaccio not only repeated the mantra of local Sardinian experts since their first radiometric report in November 2003; in trying to prove the good faith and competence of the

³⁴⁵ Cite newspapers here.

³⁴⁶ Dr. Floriana Manca, who was invited to intervene during the second public assembly organized by Co.Ci.S. described the atmosphere of that night in the City Hall (Personal Interview, Sassari, May 2012).

³⁴⁷ Private e-mail correspondence (February 17th, 2004). I would like to thank both Professor Randaccio and Professor Sotgiu for allowing me to access their private correspondence about the post-Hartford debate in La Maddalena.

personnel of the local lab in La Maddalena, he also justified overlooking the presence of Thorium by arguing that its natural presence in the environment did not constitute a new phenomenon and was irrelevant for the radiosurveillance system. By comparing Thorium to the presence of salt in seawater, Randaccio represented Thorium as a ubiquitous radioactive component of everyday life, totally extraneous to the exceptionality of anthropogenic radioactive contamination detectable by radiosurveillance systems. In Randaccio's explanation, the mundane presence of Thorium in the environment conveys the idea that non-experts' perception of radioactivity is "partial" and skewed, due to their ignorance, while experts' assessment of risk is comprehensive and driven by their educated understanding of what is nuclear and what is not, and therefore of what is worth seeing and what is not.³⁴⁸

At the end of his letter, Randaccio asked Giovanna Sotgiu to collaborate with an experiment he wanted to conduct in La Maddalena. The initiative consisted in distributing among the student population of La Maddalena dosimeters for detecting the levels of natural radioactivity and a series of lessons about laboratory techniques for understanding their real presence and danger: "The youngest part of the population, more sensitive to scientific problems and less affected by political distortions, shall develop a correct culture of nuclear things and natural radioactivity, so that these themes can be addressed with rationality instead of relying on assumptions of total rejection for technology."

Professor Sotgiu positively reviewed Randaccio's proposal and tried to address some of his critiques by explaining the point of view of the local community. While conceding that some of the extreme positions observed during the public assembly of February 16th derived from ignorance, misunderstandings, and emotional reactions to uncertainty and the mismanagement of the Hartford accident, Sotgiu maintained that:

Knowing the technical aspects [of radio-protection] is important in order to understand rationally what the problems are and how to solve them; but from another point of view I am asking myself why, after phasing out nuclear plants in our country [after the referendum of 1987] we in La Maddalena have to live with a military nuclear installation potentially subjected to incidents, whose consequences are unimaginable.³⁴⁹

³⁴⁸ The distinction between the terms "radioactive" and "nuclear" here is crucial, in the sense that while the first indicates a general status that encompasses both anthropogenic and natural sources of radioactivity, the second directly related the source of radioactivity to nuclear technology, therefore "artificial" sources (both for civilian and military purposes). A future version of this chapter will draw upon and expand on Gabrielle Hecht's (2009, 2012) analysis of shifting techno-political meanings of nuclearity in different geo-political and historical contexts.

³⁴⁹ E-mail message to Paolo Randaccio, February 17th, 2004.

This contradiction posed a problem of credibility for Italian public institutions, which, in the context of the post-Chernobyl de-nuclearization of Italy, had to make the presence of a nuclear military installation in La Maddalena appear safe and thus politically acceptable. “Believe me”—added Sotgiu in her earnest letter to Randaccio—“the behavior of our politicians and the atmosphere of secrecy, partial information, and promised emergency plans that we have never seen, do not help us to approach the correct scientific information that experts like you are trying to divulge.”

Sotgiu’s explanation for why local residents preferred to give credit to alarmist theses rather than accepting the reassuring evidence presented by Randaccio and his colleagues was that: “When facing a presumed increase of the cases of cancer in La Maddalena, the idea that the cause is related to the U.S. Navy presence and that it is possible to eliminate it [by closing the base], makes people more or less consciously espouse this possibility.”

6.7. Conclusion

By contextualizing local perceptions of risk within a political and a cultural point of view, Sotgiu’s reply summarizes several different modes of analysis deployed by Sardinian experts and local inhabitants to make sense of the post-Hartford crisis. While experts like Randaccio tried to reassure the local population by dismissing their fears and critiques of the political and technical mismanagement of the accident, local activists used the intervention of independent experts to place the local system of radiosurveillance under additional scrutiny. When, after the disclosure of the Hartford’s accident, CRIIRAD and Aumento’s analyses produced evidence that the local laboratory of La Maddalena could not readily interpret, the controversies about Thorium accumulation processes, particularly in red algae, and the possible presence of plutonium, created unprecedented alarm among local residents. Historical analysis of the scientific controversies in the aftermath of the accident reveal that understanding the complex mechanisms at play in nuclear risk perceptions demands an analysis of radiosurveillance systems as assemblages of heterogeneous elements: laboratory protocols, instruments, sampling procedures, data interpretations, epistemic cultures, and the legal and political infrastructure. Collectively, these elements regulate and make possible particular regimes of perceptibility about the “nuclearity” of individual samples of entire local ecologies.

In this chapter, I argued that the failure of local radioecologists to produce stalwart responses to the concerns underscored by CRIIRAD and Aumento was not a contingent, technical matter, but the result of a complex socio-technical short circuit. Local scientists defended established practices relying on disciplinary assumptions that excluded, *de facto*, the contribution of nuclear submarines to the archipelago's radiation levels. These approaches identified the source of radioactivity in La Maddalena as tied to environmental factors—such as granite rocks and bioaccumulation process of the algae—and residue from the radioactive fallout of nuclear testing in the 1950s and 1960s and from the Chernobyl accident.

By naturalizing the presence of radioactivity in La Maddalena, Italian expert institutions attempted to remove any causality from the U.S. Navy presence, which, according to professor Sotgiu, many local inhabitants were ready to espouse. This strategy, however, was ineffective. After months of uncertainty and distrust in public and military institutions, the credibility of the system of radio-surveillance could not be effectively restored.

Conclusion

Natural Histories: Unearthing the Military-Industrial Legacy of La Maddalena

On January 25, 2008, five hundred people attended the “disestablishment ceremony” of the U.S. Naval Support Activity base of La Maddalena.³⁵⁰ On the stage assembled in front of the U.S. Navy headquarters, the Italian and the American flags waved beside one another for the last time. U.S. and Italian Navy high officers, along with political and religious authorities, celebrated thirty-five years of American presence in the archipelago. The U.S. Navy departure was the end of an era—of close friendships, work routines, and shared stories. Italian workers on the U.S. base, as many other Maddalenini, were also worried about the economic future of the archipelago.

A few days after the departure of the U.S. Navy, a group of activists of Legambiente—one of the environmentalist movements that opposed the U.S. base since the mid-1980s—traveled to La Maddalena to celebrate the “liberation” of the islands from the nuclear submarines. When they reached the proximity of the harbor of Cala Gavetta on board of their boat, a contingent of upset merchants and former employees on the U.S. base received them: “Go back! You come to celebrate but here there are people without jobs”—they yelled, while launching rotten eggs and tomatoes against the environmentalists.³⁵¹

This epilogue represents the ongoing attempts of the Maddalenini to transform what was once considered the “natural” military vocation of the island—a military-industrial economy—into one oriented toward eco-tourism and the “natural” beauty of this Mediterranean outpost.

³⁵⁰ “L’U.S. Navy è andata via dalla Maddalena,” *La Nuova Sardegna*, January 26, 2008.

³⁵¹ “La Maddalena: pomodori contro Legambiente,” *La Nuova Sardegna*, March 17, 2008.



Figure 7.1. The decommissioning ceremony of the U.S. Navy in La Maddalena³⁵²



Figure 7.2. The departure of the U.S. Navy from La Maddalena³⁵³

³⁵² Courtesy of Andrea Nieddu.

³⁵³ Courtesy of Andrea Nieddu.

For some regional and national politicians, the closure of the nuclear base wedged open new possibilities for the future. Once attractive for its strategic military position—sandwiched between Corsica and Sardinia, with deep coves that could hide Navy ships and submarines—La Maddalena could now attract tourists, rather than soldiers, to the crystalline waters of the archipelago.

As this dissertation has documented, local historical narratives of La Maddalena as a “natural” military outpost are deep-seated and mobilized in times of socio-economic struggle. But despite the concrete economic benefits of the military presence, this representation of La Maddalena has become destabilized in recent years. The closure of the Italian Navy arsenal in 2004, and of the U.S. submarine base in 2008, have brought to the surface old debates and tensions over the military role in the local economy, and unveiled the toxic legacy produced by the archipelago’s military-industrial activities. In 2007, Sardinian health authorities classified La Maddalena as one of the most environmentally exposed former military-industrial sites of the region, due to the quantity of asbestos and other chemicals leached into the sea and soils during the operation of the Italian Navy arsenal. Despite massive investments in transforming the seaboard of the arsenal as a resort area to host the 35th G8 meeting in the summer of 2009 the site was never opened and became an object of legal litigation between local and national authorities over who held financial responsibility for its reconversion. The agency in charge of the environmental restoration never removed the contaminants, and national authorities ultimately sequestered the portion of sea in front of the resort complex—declaring it unfit, until proven otherwise, for public use. During my fieldwork, a conference on the health effects of military industrial activities was held in La Maddalena. Decades after their retirement, former arsenal workers reflected on the hazards they faced on the job and described how safety regulations were often transgressed or overlooked. In the face of a growing number of colleagues dying from mesothelioma, retired workers have reinterpreted the arsenal as a toxic work place. This has further destabilized notions of local identity tied to military culture and its economic benefits. The archipelago’s residents now mobilize politically to challenge the island’s military-industrial history and its long-term impacts on physical health and the local economy.

Local activists who opposed the U.S. Navy presence for decades did not express interest in monitoring the decommissioning process of the U.S. submarine installation, as if, after the departure of the American ships in 2007, the problem of radioactive contamination ceased to be

relevant. Some long-term residents argued that this confirms their suspicion that “the problem of radioactivity was raised only instrumentally, for political reasons.”³⁵⁴ Yet, local administrators and businessmen express ambivalence about the future uses of the site. A local administrator told me: “Officially the site is clean, but how many tourists do you think will want to go there knowing that until five years ago there were nuclear submarines?” Even former employees on the U.S. Navy base recounted that “working on the submarine installation was ok, but fishing around it is not recommended.”³⁵⁵

Two dramatic ironies have emerged from the decommissioning of the archipelago’s military-industrial sites. First, local residents have historically celebrated La Maddalena’s military vocation. In the past, they argued that the “natural preservation” of the archipelago resulted from its centennial military occupation, which impeded the development of other industrial activities that would have degraded its environment on a larger scale. However, the closure of the Italian Navy arsenal first, and later of the U.S. submarine base, has revealed that those areas of the archipelago are potentially toxic and polluted. The second irony is that while, local residents have expressed concerns about the risks of nuclear contamination around the U.S. Navy installation for over thirty years, it is now clear that the mundane operations of the military arsenal was also a major source of environmental pollutants—even perhaps the only source.

In sum, the environmental restoration of the former arsenal and the U.S. Navy base should have brought the military-industrial legacy of the archipelago to an end, but instead it worked to unearth toxic remains and to make visible the damaging health and environmental effects of the military-industrial economy around which the local community constructed its life and its sense of identity for well over a century.

The “natural” history of the archipelago, tied to its strategic role in the Italian and the U.S. military-industrial complex seems finally decoupled for the sake of its (potential) value as a tourist destination, incompatible with the presence of polluting industries. This now visible bifurcation puts the Maddalenini in front of new choices. The costs of the military economy become available for different political interpretations as they emerge through the physical signs of environmental pollution and health effects.

³⁵⁴ “Radioattività, polemiche dopo la chiusura del laboratorio,” *La Nuova Sardegna*, April 27, 2014.

³⁵⁵ Personal interviews with the author, La Maddalena, September 2012.

Even now, years after decommissioning, the legacy of the nuclear base is still haunting the future of the community. Any time national media present stories featuring the storage of hazardous material (from chemical weapons from Syria to nuclear waste coming from former Italian nuclear plants) local residents think that the granite bunkers of Santo Stefano are still there. Once used for the storage of weapons and other hazardous material, they can be reopened as a storage facility, probably for other projects through which the Italian state, once again, will reclaim the possession of the archipelago in the name of its centrality to the future of the nation. Now La Maddalena rejoins Sardinia and its double identity: the island of ancient civilizations, archaeology, nature, and uncontaminated sea, and the very contaminated nature of its colonial relationship with Italy.

This study examines central questions about the nature and the limits of Italy's national sovereignty vis-à-vis the U.S military global outreach during the Cold War. It does so by analyzing how Italian experts, U.S. Navy personnel, local administrators, and citizens addressed the problem of radiological risk around the U.S. submarine base of La Maddalena. This approach aims at overcoming the limits of diplomatic histories of the Cold War and institutional histories of nuclear power in Italy, which tend to privilege top-down views of political power and technological development. The focus on radiological risk allowed me to move across different scales of analysis to keep track of the mutual effects of international and national nuclear regulatory regimes, their practical implementation in particular physical, social, and political contexts, and the contributions that a variety of individual and collective actors made in co-constructing (often conflicting) meanings and representations of nuclear power.

Writing this dissertation pushed me to challenge established analytical categories and binary oppositions often used for understanding historical agency and power relations shaped by the political economy of knowledge production. The first analytical problem that I encountered since the beginning of my research project is the tension between change and continuity. In La Maddalena the arrival of the U.S. Navy did not transform the archipelago into a typical American fleet town. The bicentennial presence of the Italian Navy incorporated the archipelago into the military-industrial projects of the Italian state while forging a widespread sense of local identity around military institutions. The U.S. Navy adapted to this context without altering its fundamental traditions.

The military legacy of the archipelago has become a point of departure to understand on the one hand why the local population did not oppose the American presence, and on the other hand why La Maddalena was chosen for the installation of the U.S. submarine base. The Italian government hoped that the local acquiescence to the military presence would make less problematic the stationing of nuclear submarines just in front of the urban center of La Maddalena. My analysis of local historical production reveals the tensions running through the local community as it rediscovers the meaning of its past while trying to make sense of an uncertain future without military installations. Was the U.S. Navy base a beneficial presence—in continuity with the military legacy of the archipelago—or a risky business not worth to keep?

When important sectors of the Italian scientific community, including expert radioecologists and radioprotectionists working inside regulatory agencies, protested the lack of safety measures around the base, the Italian government responded with arguments that represented nuclear submarines as non-nuclear objects or as completely safe, like inland nuclear plants. The contested nuclear status of the U.S. base, and consequently of the archipelago, revealed the political power of nuclearity—the contested technopolitical category of being nuclear—that Hecht examines in her study of uranium mining in Africa. My analysis shows that the Italian government and the U.S. Navy on one side, and anti-base activists and experts on the other side, adopted different discursive registers of nuclearity, relying on the ambivalent exceptional status of nuclear technology as both safe and risky.

Controversies about the U.S. Navy presence in La Maddalena revolved around technopolitical arguments about radiological risk and public safety: the delays in the implementation of the radiosurveillance system, the availability and interpretation of radioecological data, episodes of birth defects, and accidents.

Combining ethnographic methods with a close reading of previously unexplored archival material, this dissertation analyzes the complementary effects of secrecy and the institutionalization of ignorance on the political economy of knowledge production during the Cold War. Works on agnotology have traditionally focused on strategic acts of knowledge removal, pointing to corporate, state, and military interests in preventing public access to information. More recently, Scott Frickel et al. have proposed to move beyond the analysis of the microphysics of power behind knowledge removal to focus more on the institutional arrangements of research protocols, epistemic traditions, and field practices that create and

reproduce knowledge gaps in regulatory agencies' work. This sociological approach relies on models of distributed agency to trace the multilayered and cumulative effects of epistemological assumptions and bureaucratic inertia that with time stabilize and define objects for research and regulatory paradigms.

I see Frickel's proposal as an institutional variant of Michelle Murphy's "regimes of perceptibility," which openly relies on the analytical tradition of "historical ontology."³⁵⁶ But the leap forward that Frickel advocates for—mostly in reaction to the individualistic paradigm of agnotology—risks to overlook larger political trends that inevitably shape institutional processes and collective trajectories of knowledge (and ignorance) production.

The material I examined in Part II of this dissertation points to the technopolitical compromises between military security and public safety that during the Cold War influenced the concrete implementation of scientific protocols and created the conditions for the development of radioecology—exploiting both the challenges and opportunities of nuclear radiocontamination. By keeping the perspectives of agnotology and of the systemic production of ignorance together this study moves across global and local scales of analysis by following a variety of actors crisscrossing institutional and physical ecologies. This allows me to avoid the overdetermining effects of studies of the Cold War as a homogeneous global phenomenon while underlining the general significance of the Italian case and of La Maddalena. I argue that the radiosurveillance system of La Maddalena embodied and enacted a technopolitical compromise between public safety and military security, which epitomized the limits of Italy's sovereignty in the context of the U.S. Cold War military strategies.

This dissertation also contributes to bring Italy back into a larger discussion of the technopolitical and cultural significance of nuclear power during and after the Cold War. Traditional analyses of the Italian nuclear program have focused almost exclusively on institutional history, discussing the diplomatic and domestic political struggles of national elites over the development of nuclear technology. Looking at radioprotection and radioecological practices in the environment of La Maddalena allowed me to overcome two important limitations of Italian nuclear studies: the almost complete neglect of public engagement and mass political mobilization over the meaning of nuclear power and the treatment of nuclear technology as a black box, a mere political instrument, whose technical characteristics are relegated to the rank

³⁵⁶ See Ian Hacking, *Historical Ontology*, (Harvard University Press, 2004).

of historical curiosity. Thus, it is not surprising that the main historiographical interpretations of the parable of the Italian nuclear program converge towards two explanations. The first looks at it as a political failure caused by the conflicting interests behind Italy's energy production. The second insists on the role of irrational fears that after the Chernobyl accident pushed the majority of Italian citizens to vote for opting out of nuclear energy production. These explanations look alternatively at political strategies among elites and public debates over nuclear technology in isolation, without foregrounding the tensions that—even inside nuclear agencies—existed between technocratic and democratic views of nuclear power.

In this study I look inside nuclear technology—its development, applications, deployment, and disputed claims about its effects on the environment and public health—to explore the scientific, political, and cultural contributions of Italian experts in shaping the meanings of nuclear power within scientific and regulatory institutions and in public debates. Further I examine how communities living around nuclear installations construct meanings of nuclear technology and its related risks.

Science and Technology Studies have successfully overcome the severe limitations of cognitive and psychometric approaches to risk perception in vogue until the end of the 1980s. The concept of “risk perception” is laden with normative definitions and empirical operationalizations of rationality predominant in cognitivist approaches to public reactions to technological risk developed during the 1960s and 1970s. In these studies, “risk perception” was defined in contradistinction to “risk assessment,” where risk perception was the illogical, distorted view of an undefined collective, while risk assessment was the objective practice of scientists.³⁵⁷ Distortions of lay people are usually attributed to their limited understanding of scientific information, due to their cognitive, cultural, and political biases. This analytical frame has been fundamentally maintained and expanded in more recent analyses developed in the 1980s, under the research program of the broadly defined field of “public understanding of

³⁵⁷ Proposers of the “risk perception” paradigm have recently reconsidered the importance and value of socio-cultural variables in public and expert understanding of risk, but their model remains largely unable to address the complex mechanisms of knowledge formation about risk. Moreover, they continue to consider “culture” as an overarching and yet unspecified and decontextualized factor in shaping public understandings of risk. See Roger E. Kasperson, “The Social Amplification of Risk: Progress in Developing and Integrative Framework,” in Krimsky, S., and D. Golding (Eds.), *Social Theories of Risk*, Praeger Publishers, 1992, 153-178. For an exhaustive review of cognitivist approaches and their relative critiques see: Douglas, M., *Risk Acceptability according to the Social Sciences*, Russel Sage Foundation, 1985, especially Chapter 3 “Risk perception;” Krimsky, S., and D. Golding (Eds.), *Social Theories of Risk*, Praeger Publishers, 1992; Lupton, D., *Risk*, Routledge, 2013 (2nd edition), especially Chapter 2 “Theorizing Risk.”

science” (PUS).³⁵⁸ This literature assumes that a lack of scientific knowledge lies at the origin of public deficits in the understanding of science and technology. As a solution, PUS studies propose the expansion and strengthening of efforts by public institutions to enforce broad communication strategies for the education of the masses through the divulgation of scientific information.

This top-down understanding of experts’ role in democratic western societies and of the role of western scientific rationality in other parts of the world has been increasingly criticized for its view of science as an unproblematic form of knowledge and for reproducing hierarchical social models based on the objective epistemic superiority of science.³⁵⁹

Together with cultural explanations of public reception of nuclear technologies, STS scholars and anthropologists have demonstrated that trust, local knowledge, and social identities shape interactions between experts and non-experts in specific contexts. The influence of Ulrich Beck’s theses on “risk society” is hardly disputable. Works on street science, citizen science, and popular epidemiology, to cite similar approaches, share a common assumption: the existence of epistemic divides between experts and non-experts. While a now large number of empirical cases point to this phenomenon as a widespread characteristic of socio-technical controversies across different political and socio-cultural contexts, its initial analytical leverage—I argue—has become an almost teleological frame to study power relations in knowledge production.

In this study I show how expert radioecologists had to adapt their protocols when conducting their campaigns in La Maddalena. I also underlined the limits of epistemic traditions and institutional arrangements of expert agencies during the design, installation, and operations of the radiosurveillance system. At the same time I did not want to assume that non-experts were necessarily able to deploy alternative forms of knowledge, deriving from their close cultural connections with the social and physical environment of the archipelago. Instead, my point of

³⁵⁸ For a review of the conceptual frames and research agendas of “public understanding of science,” see Brian Wynne, “Public Understanding of Science,” in Sheila Jasanoff, Gerald E. Markle, James C. Peterson, and Trevor Pinch (Eds.), *Handbook of Science and Technology Studies*, Sage, 1995, 361-389.

³⁵⁹ See Brian Wynne, *Rationality and Ritual: Participation and Exclusion in Nuclear Decision-making*, Routledge (2nd edition), Routledge, 2010 (2nd edition), and “Misunderstood misunderstandings: social identities and public uptake of science,” *Public Understanding of Science*, n. 1, 1992: 281-304. See also Sheila Jasanoff, *Designs on Nature: Science and Democracy in Europe and the United States*, Princeton University Press, 2005, and her recent discussion “A mirror for science,” *Public Understanding of Science* 23 (1): 21-26. An interesting comparative analysis of how national and global health institutions frame and implement vaccination policies in the UK and West Africa is Melissa Leach and James Fairhead, *Vaccine Anxieties: Global Science, Child Health and Society*, Routledge, 2007.

departure is to understand how non-experts make sense of invisible risks—such as radiocontamination—when they lack previous training and experience of the phenomenon. To a certain extent this problem is pre-epistemological and requires asking some preliminary questions about the strategies that allow non-experts to make invisible risks visible. Based on recent phenomenological approaches to risk perception among nuclear workers and local communities living in radiocontaminated places, I advanced the argument that making sense of radiological risk requires the availability of material signs.

For this reason I propose a semiotic approach to risk to examine how observations of changes and continuities in the local environment, others' behavior, and new events are deployed and become available for interpretation according to semiotic ideologies—a concept that I borrow from anthropologist Webb Keane—that allow the objectification and the representation of radiocontamination effects.

In the context of limited access to information and of the uneven representational economy of risk—shaped by what Beck calls “relations of definition”—non-experts conclusions about the environmental status of the archipelago were often contradictory. Experts relied on general definitions of risk as a calculable product of the harm provoked by an event (accidental or otherwise) and the probability of occurrence of that event. The effort to translate this definition and the relative meaning of risk into the experiential frame of the Maddalenini could not work not because the Maddalenini lacked the same knowledge that scientists had, but because they lacked a material referent upon which that meaning could be built. Concepts like risk remain empty categories until not filled with material signs. This is why changes in the environment, and events like accidents and birth defects enrich the representational economy of risk as they become available to different groups. Their interpretations depend on larger ideological structures (including scientific knowledge) that, for example, shape assumptions about the world, and about the intentions of other actors. But, as Webb Keane argues, we should not take political and semiotic ideologies as totalizing. Ideologies do not overdetermine every single aspect of life and certainly change over time.

Thus, in the last part of the dissertation, I show that if we look at the concrete processes through which experts and non-experts assemble and deploy technopolitical arguments we can see their inner contradictions, strategies, and sometimes their cross-boundary alliances.

Finally this study explores accidents as processes rather than events. The unfolding of public controversies after the Hartford accident in La Maddalena in 2003, allows me to examine the political and epistemological conditions that made public interpretations of the accident and of its potential environmental effects possible in the first place. Instead of looking at the accident as the single event that shaped public perceptions of risk in the archipelago, I reconstruct how local attitudes towards the U.S. Navy presence changed over time, providing anti-base activists with new opportunities to scrutinize the effectiveness of the radiosurveillance system in place since the mid-1970s.

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Private Archives

Senator Mario Birardi
Dr. Arrigo Cigna
Marco Leoni
Carlo Papucci
Salvatore Sanna
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National Newspapers and Magazines

L'Astrolabio
Avanti!
Avvenire
Corriere della Sera
L'Espresso
L'Europeo
Il Giornale d'Italia
Il Mattino
Il Messaggero
Paese Sera
La Repubblica
Il Resto del Carlino
Rinascita
Rivista Italiana di Ecologia
La Stampa
Il Settimanale
Il Tempo
L'Unità

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La Nuova Sardegna
Tutto Quotidiano
L'Unione Sarda
Il Vento

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Mainichi Daily News (Japan)
The New York Times (U.S.A.)
The Stars and Stripes (U.S.A.)
The Day of New London, CT (U.S.A.)
The Independent (U.K.)
KYRN (Corsica)

Conference Transcripts/Proceedings and Scientific Reports

Reviews and Journals

Annali dell'Istituto Superiore di Sanità
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