

Daunting Encounters: La Hague's Infrastructures of Secrecy

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Abstract

The article explores secrecy, more particularly, nuclear secrecy in relation to two nuclear facilities situated at the tip of the Norman peninsula of La Hague, in France. Both sites - the CSM nuclear waste repository and the close-by refueling plant - were developed at the end of the 1960s in connection with France's extensive civil and military nuclear program. While institutional archives and access to the sites remain tedious, the article contends that the nuclear secrecy shielding the facilities can be approached by unpacking the numerous accidents that took place at the site. Silenced and subjected to amnesia, spills and accidents offer an epistemological opportunity to address the political and engineering conditions that led to their happening, the political era that framed them, and subsequently, the ways with which they were normalized and meant to be forgotten. The article advances that the repository facility co-evolved with and co-extends to the waste it received. Thus, by staying with the facility's opacity and façading - its secrecy - one can delineate how secrecy operates and informed the surrounding landscape.

Keywords

CSM (Centre de Stockage de la Manche), French Nuclear, La Hague, nuclear culture, nuclear history, nuclear secrecy, nuclear waste, public health, radiation

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Encountering Agence Nationale pour la Gestion des Déchets Radioactifs' (ANDRA) nuclear waste repository, by the French Western tip of France's Norman coast, highlights conspicuous imbalances in scale, shape, and time. The first encounter with La Hague's Centre de Stockage de la Manche (CSM) is

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always pregnant with uncanny affects, reminiscences, and interrogations.² The vault stands out among the gentle rolling hills of the pastoral landscape. Angular slopes and sharp edges distributing its vast monolithic frame give up its existence. Even if its lawn cover mimics the dominant green tinge of the natural landscape surrounding it, the CSM spectacularly fails to integrate with its environment. Its shape is too disruptive. Its projected timeframe, too unsettling.³ Surrounded by three close-by nuclear installations, the repository is ensconced at the heart of one of Europe's most important nuclear clusters.⁴ Closed in 1994, with the arrival of its last nuclear waste containers, the CSM reverses conventional acceptance of infrastructural techno-scientist modes of operability: its closure kicked off its surveillance phase which is expected to last for thousands of years to come. In contrast with past decades that witnessed waves of enterprises working at the site, the daunting silhouette is imbued with stillness. Several convoluted strands of surveillance and monitoring operate to maintain the stability and equilibrium of a site that needs, on one

2 Two different acronyms designate the near-surface medium to low waste nuclear waste repository situated in La Hague, Normandy. ANDRA (Agence Nationale pour la Gestion des Déchets Radioactifs) was created in 1979 and took over the management of the repository from the previous private company after a succession of accidents. ANDRA was subsequently put in charge of all the repositories in France, as well as developing the research laboratory for the deep geological CIGEO repository currently built in the Meuse region. ANDRA's generic acronym is sometimes used to designate the repository in La Hague. Though the repository's official and original acronym is CSM, standing for Centre de Stockage de la Manche. Interestingly, the acronym points to a storage (stockage) facility and not to a burial site as it turned out to be.

3 The initial official argument that framed the site as a low to medium radioactive waste repository stated that surveillance and monitoring would extend to 300 years.

4 The French Norman nuclear cluster is made of four installations: along CSM repository and ORANO nuclear refueling plant, exist Cherbourg's military nuclear propelled submarine naval base and Flamanville electricity nuclear production plant. Two reactors have been in operation since the 1970s, Flamanville 3 has been under construction since 2007. Developed by EDF (Electricité de France), it belongs to the third-generation pressurized water reactor design (EPR). The reactor's completion has been delayed for years due to safety issues and infrastructural faults. It is expected to start production in 2024.

hand, to be shielded from human trespassing and weapon attacks, and on the other hand, to maintain containment systems preventing waste fuels from spilling into the surrounding environment.

Enforced security measures are also engaged in surveilling contaminated soils and ecosystems, a response to a series of accidents that have taken place through its six decades in operation. The accidents prompted uninterrupted radioactive flows to accrue in the site's vicinity. Incremental failures - technical, scientific, and managerial, but also ethical - frame the repository's initial stages of development, hence during the 1990s, the repository embarked on lengthy and costly remediation work. Many layers of technical adjustments were deployed to improve the weak containment systems initially implemented. Partaking from a multitude of scenarios, and at various speeds and scales, leaks continue to disseminate radio-toxic contaminants into the surrounding ecosystems.⁵ Therefore, architecture, containment, and secrecy weave a continuum eschewing the disputed evidence of radioactive spills and fallout. Picked up by wind or rain, radioactivity is flown towards populated hamlets, where it enters the food chain, and fixes itself in human and non-human bodies. La Hague's radio-toxic history, diverse though repetitive, has been and still is inevitably met by a blunt official and institutional answer: that of suppressing information and normalizing accidents and risks' accountability.

To explore how secrecy pervades not only La Hague's repository but the

5 The principal recipient for liquid contamination is the network of aquifers surrounding the plant and water reservoirs that fluctuate with seasonal rain. One must remember the nuclear refueling plant and its repository were built on a moor landscape, where streams and rivers are numerous.

landscape that frames it, I will primarily probe secrecy from the CSM's monolithic vault whose ominous presence imposes itself on the territory. Studying secrecy in La Hague extends to the way the whole peninsula was developed into a nuclear experimental site from the 1960s on, and as such, transformed into a suppressed internal colonized damaged landscape (Liboiron 2021). The article contends that nuclear secrecy is about more than just the "intentional blocking, compartmentalizing, concealment, control, distorting, hoarding, censoring, and manipulation of information" (Maret 2005, 364). It argues that radioactive spills and secrecy are co-existent in the way in which they shaped the waste repository through iterative technical attempts at curtailing radioactive fuels' spilling into the site's vicinity, whilst simultaneously hiding the very existence of the leaks. Leaving aside the dormant presence of radioactivity lacing the peninsula's wild moors and pastoral land, I use the CSM repository as the main epistemological node from which to think secrecy in relation to the site's military toxic legacy.

My approach expands along two threads. The first consists in methodologically focusing on the repository's material presence as a platform from which to investigate how the techno-industrial installation is embedded in secrecy. Indeed, the infrastructure's physical presence provides a counterpoint to the informational deficits about the toxic spills taking place since the 1970s. The repository's distinctive architecture anchors its presence, a physical manifestation of a relational dynamic between technical solutions implemented at the site and the curtailing of information about radioactive spills. Its

monolithic presence brings into focus a secondary thread focusing on the radiotoxic spills, to show how iterative technical adjustments shaped the infrastructure's secrecy. Progressively swallowing the surrounding landscape around it, the resulting monumental structure has not only been formalized by engineering and technical developments engendered to contain radioactive materials' unruliness, but also by external, social, and historical constraints that stabilized the site into the final infrastructure it currently exposes. Continuous radioactive leakages required maintenance redeployments, which simultaneously helped to censor their existence. Addressing containment system failures to isolate nuclear materials from disseminating into the world, the paper contends that radioactive spills and secrecy are co-produced through engineering inconsistencies, faulty infrastructures, and political invisibilization. La Hague's nuclear infrastructures reveal how nuclear secrecy and architecture are co-constituted and co-evolved through an enmeshed evolution that redeployed the repository's containment systems and curtailed information about leaking toxic waste.

To explore how La Hague's nuclear secrecy operates, the paper progresses in three stages. Firstly, it identifies the CSM repository as a direct endeavor of the French nuclear bomb program during the Cold War. The waste site entails an ambivalence shared by military and secret laboratory sites, where secrecy was essential to military activities. The second section brings into perspective the repository's distinctive containment architecture as an affordance from which to yield forms of knowledge, to show how the two

threads of architectures and leaks are co-produced. The CSM's façading and surveillance deliver contours and materiality that serve as a counterbalance to the inaccessible state archives and monitoring data testifying for past and current radioactive spillages. The tensions that sustain nuclear secrecy regimes underline how material systems' flawed assemblages continuously fail to contain nuclear loads that appear inherently excessive and leaky in space and time. The final section interrogates how disruptive leaks underline the impossible task of shielding, maintaining, and containing both radioactive spills and suppressed events. By exploring the oozing quality of secrecy (Deleuze and Guattari 1984), I conclude by approaching accidents as potential epistemological ruptures that cut through the secrecy systems in place and allow new formations of information and narrative.

An Ambivalent Cold War Lineage

It must be emphasized that secrecy, in La Hague, is a legacy of the Cold War.⁶ Thus, the first part of the paper investigates the lineage between France's military nuclear Cold War and La Hague's geography. Inherent to the Cold War

⁶ An important shift took place in 1986, as information about Chernobyl's fallout unleashed waves of revelations through international media and spread knowledge about the scale of the disaster and the fallout over Europe. France took a distinctive stand, the state and nuclear industry jointly decided to remain silent about the consequences of the passing radioactive cloud above some of its regions. While the controversy progressively died out, authorities were forced to improve their communication procedures as well as upscale and implement new health and security measures. As a result, transparency started to be widely deployed to manage nuclear controversy. Transparency was applied to disrupt the impact of unfolding revelations and to promote new forms of control and censorship. Transparency and accountability, two terms introduced after the catastrophic management of the Chernobyl accident, provided new tools to counterpoise information and its access.

era, nuclear secrecy complicates access to information about past accidents and their current consequences. This is because radioactive fallout scattered around the peninsula provides uninterrupted and forensic flows of data from the leaking waste buried onsite, exceeding efforts of archival containment and military secrecy. While the 1990s marked a turn in the politics of truth, confronted by anti-nuclear activists, media, and local populations, the state was forced to release monitoring data and publicly admit that a series of accidents of various gravity had taken place. Most of the information was provided by ACRO (Association pour le Contrôle de la Radioactivité dans l'Ouest), an independent laboratory which has been monitoring La Hague's nuclear installations since 1986. Discredited at first by the state and nuclear authorities, the independent laboratory has enforced a thorough counternarrative that gained recognition. Led by citizens and scientists, ACRO developed an expertise that forced nuclear authorities to disclose information they held back and to conduct remediation work to prevent further contamination around the sites. Nevertheless, access to information to assess the scale of the radioactive leaks is tempered by amnesia and incomplete knowledge about the real extent of La Hague toxic heritage.

In France, the birth of the nuclear program enforced a symbolic and nationalist investment that went on to epitomize the "radiance of France" (Hecht 2000, 2). Nationalistic by essence, nuclear scientific prowess ensured the country could "regain" a place among the winning nations of WWII (Hecht 2000, 2). Gabrielle Hecht demonstrated the nation's will to develop a specific French

nuclear system, the gas-graphite “filière”⁷ which was eventually abandoned in 1969 after a series of accidents. The collaborative endeavor of EDF⁸ and the CEA⁹ scientists and engineers developed, built, and exported the technology for gas-graphite design reactors.¹⁰ Hecht analyzes how, in France, technology and national discourse merged to produce an imaginary that tangled technological expertise with nationalist propaganda. Hecht’s analysis posits that French nuclear history reflects the way the nuclear industry irrevocably shaped the country’s energy politics and manufactured the general public’s acceptance of nuclear energy. As a nuclear nation-building exercise (Masco 2006, 20), consensus about the hegemony of nuclear science and politics was manufactured and sustained through managing controversies (Topçu 2013).

By interrogating how La Hague’s nuclear secrecy evolved, I identify how amnesia results from the ways in which risks have been normalized (Arnhold

7 Unlike its European nuclear counterpart Britain, whose access to the nuclear bomb technology was facilitated by the United States, the French resumed their nuclear program at the stage it was interrupted by the German invasion. Due to persistent US suspicions against French scientists and the adherence of its lead scientist, Pierre Joliot, to the Communist party, the French atomic program was, in its initial stages, mainly and inherently a French affair (Goldschmidt 1987, 297-320).

8 Created in 1946, EDF (Electricité de France) was nationalized after WWII amidst 1 450 strategic companies. Owned by the state at 99,98%, EDF is currently managing the country’s 56 civil nuclear reactors fleet and has been exporting its technology abroad since the end of the 1960s.

9 Created by De Gaulle in 1945, the CEA (Commissariat à l’Energie Atomique) epitomizes the country’s determination to propel France into becoming a nuclear nation. As nuclear weapons became a dominant feature of the Cold War, France became the 4th country to detonate an atomic bomb.

10 The gas-graphite system was abandoned after a major accident at St Laurent des Eaux’s electricity nuclear plant in October 1969. The gas-graphite reactors correspond to a period when the nation needed plutonium for its military program. Ten reactors went on to be built with one in Spain. The latest, at Vandellòs nuclear plant, was interrupted by an accident that took place in October 1969. Most of the gas-graphite reactors, which were in use until the 1990s are currently undergoing decommissioning work.

2022).¹¹ Thus, French nuclear secrecy pertains to the way consensus and restriction of information shaped the French nuclear imaginary.

The Cold War first and foremost shaped La Hague's peninsula.¹² The era deeply transformed the lonely Norman coastal land that, until the mid-20th century, had been lagging behind the transformative French "Trente Glorieuses" industrial and social modernity. The CSM's creation in 1967 was preceded, a year earlier, by the construction of La Hague's nuclear laboratory piloted by the Commissariat à l'Énergie Atomique (CEA). Created in October 1945, by provisional president Charles de Gaulle, the CEA was entrusted with the development of all aspects of nuclear technology: from uranium prospection, to civil electricity production, nuclear weapons, and radioactive waste repositories. CEA authorities chose the Norman peninsula to develop a back-up plutonium laboratory to the existing Marcoule center that produced military grade plutonium for the French atomic program.¹³ Opened in 1966, the nuclear laboratory refueled spent fuels for De Gaulle's military project of obtaining a French atomic bomb (Henni, 2017, 2022).¹⁴ Run by the CEA, the

11 Few examples of research addressing secrecy studies exist in France, see Zonabend (1989) and Pô (2001). In his literary review on French nuclear secrecy studies entitled "La Question du Secret Nucléaire: Technologie, Secrets d'État et Enjeux Démocratiques," Thomas Fraise (2022, 172-181) underlines the absence of research on the topic. "Nuclear secret" in France is commonly used by authorities to justify restricting access to data and information.

12 On the 26th of December 1954, a governmental meeting laid the bases for pursuing the French atomic program. Among recommendations listed in a notice published by the Comité de la Défense Nationale, dated from the 21st of March 1955, secrecy featured as a requirement for the whole decision process regarding the implementation research and development of nuclear weapons (Mongin 1997, 333).

13 A five-year plan launched in 1952 programmed the French nuclear military project to obtain enough fissile materials for developing a bomb. The plan was the first determining step in using nuclear sciences for military applications. It connects two institutional bodies, that of the CEA and that of the Ministry of Defence (Mongin 1997).

14 The first over ground bomb codenamed "Gerboise Bleue" was detonated on the 13th of February 1960, about five years after the outbreak of the Algerian Revolution (1954– 1962) at

initial military laboratory laid the foundations for what has become a gigantic scientific-industrial series of infrastructures extending across the peninsula's vast plateau.¹⁵ The CSM was initially created to momentarily store waste fuels from the adjacent plutonium laboratory. The two sites sit next to each other, only separated by layers of elaborate security fences. The storage facility was built under the responsibility of the CEA, on a section of 12 hectares of land that belonged to the refueling laboratory and went on to be ceded through a governmental decree signed on the 19th of June 1969. It stated that the site aimed at developing a storage facility for solid and liquid waste (Blanck 2017, 59).¹⁶ The repository and the refueling plant's combined presence within the landscape underlines how their imbricated operations irrefutably connect refueling activities with vast amounts of radioactive waste. Their enmeshed infrastructures return to the military initial orientation of their paralleled developments, and as such to plutonium and fissile materials production. Though officially declared to host nuclear waste from civil electricity production reactors, the CSM outgrew its civil waste destination and hosts waste fuels produced by military Cold War activities.

Reggane, in the Algerian desert, then part of the contested French colonies. A 70 kilotons bomb, *Blue Jerboa* was about four times the strength of Little Boy dropped on Hiroshima. Blue Jerboa was followed by three atmospheric tests and 13 underground nuclear tests at In Ecker, in the Hoggar Mountains of the Algerian Sahara. See Henni (2017, 2022).

15 For France left devastated by the war, the CEA emblematically demonstrated that nuclear physics, which had brought national pride in scientific circles with the 19th-century discoveries of Marie Curie and Henri Becquerel, could become instrumental in rebuilding France's lost geopolitical position. Obtaining atomic technology, writes Hecht (1992,2) "epitomized the link between French radiance and technological prowess."

16 All French nuclear installations bear a number that relates to the chronological order of their creation. La Hague CEA's refueling laboratory is known as UP2 400 (Uranium Plutonium 2; 400 points to the maximum tonnage of spent fuel processed per year), whereas the CSM repository is numbered INB 66 (Installation Nucléaire de Base 66; Blanck 2017, 59).

La Hague's nuclear sites gain additional significance while damage from long exposures to low radioactive levels is established. The consequences of the Cold War on workers and subsequently their families, as well as on landscapes in the vicinity of nuclear secret laboratories and bomb test sites are still debated, while dose reconstruction programs are developed to legally assess responsibility and provide compensation. The Cold War's impacts on humans, non-human life, and natural ecosystems remain one of the most debated epidemiological and scientific issues about nuclear military and civil geographies.¹⁷ Nuclear disasters do not always belong to hyper iconic events such as Chernobyl or Fukushima (to select recent nuclear accidents), or the atomic mushrooms of nuclear propagandist states (O'Brian 2015). La Hague demonstrates that nuclear violence by the nuclear complex "are rendered invisible through overlapping regimes of secrecy, misinformation, and bureaucratic boringness designed to deflect attention" (Hurley 2020, 7).¹⁸ The

17 In 1997, a major controversy took place in La Hague with the release of epidemiological research on the suspected elevated levels of leukemia among children born in the peninsula. Conducted by Jean-François Viel, the published study brought immediate controversy and was contradicted by CSM and refueling plant's authorities. However, the debate forced the government to launch the GRNC (Groupe Radio-Ecologie Nord Cotentin) a group of independent experts who retrospectively evaluated the radioactive doses received by the local population to establish if the excess rate of leukemia (4 instead of 1,4 observed at a national level) could be explained by ionizing effluents fallout, resulting from refueling activities, that went to be released in the atmosphere and along the sea coasts. (Topçu 2013, 250). The GRNC experts group concluded that it was impossible to establish causal links between ionizing activity levels picked up around the sites and the development of cancers (Topçu 2017, 251). At international level, state-sponsored corporations and international monitoring agencies have ensured that damage exerted by long-term exposure to radioactive low doses remains under-research (Hurley 2020, 7).

18 Makhijani (1995, 482) writes that "France's extreme secrecy about its nuclear weapons program is most evident with regards to information regarding health effects. Almost no information is publicly available with which to directly assess health effects. On the other hand, French officials tend to publicly downplay the health hazards of ionizing radiation. This reflects

secrecy I address is informed by the concept of the slow accident, that is, the invisible, slow, and inescapable leaks taking place since the CSM's opening. La Hague's nuclear violence belongs to a long continuum that inescapably leads back to the origin of nuclear sciences, at the precise turn when it was reclaimed by the Manhattan Project for the development of the nuclear bomb.¹⁹ All nuclear violence articulates back to its point of origin. Barbara Rose Johnson (2007, 3) writes that "nuclear war began with the first use of radiogenic materials for military purposes, and the assault on the world's environment and its peoples has continued ever since." Foregrounding her assertion while addressing the French context, I selectively return to the site's first decade, when it received consignments from secret laboratories. In La Hague, the 1970s marked the crucial moment nuclear violence was unleashed in the Norman peninsula.

The insistence with which the state, La Hague plants' authorities, and military-industrial-complex have manufactured secrecy, is motivated by the will to systematically erase the relational dependencies between civil and military

France's sensitivity over its nuclear power industry, which provides about 75 percent of the country's electricity, as well as over its nuclear program. Major inconsistencies are apparent in the reporting of the little data that exists."

¹⁹ Leaving aside estranged past colonial nuclear-damaged geographies, at national level, limited by the absence of vast inhabited pieces of lands, French nuclear secret geography offers an interesting realm of sites scattered around the capital. Several of the city's 19th-century military defense systems and military forts, were used as secret laboratories until the late 1960s. The Fort de Vaujour, as well as the Fort d'Aubervilliers have been decommissioned and cleaned before developing new urban developments. The latest is currently disappearing under the conjoint dynamics of gentrification and Olympic Games urban regeneration. Fort d'Aubervilliers was used to host a laboratory where Irène and Pierre Joliot Curie worked in the 1930s on secret military projects such as bomb detonator systems.

nuclear science.²⁰ Unrestricted data deliberately chooses not to factor in information and events related to the site's early stages of development. Conceived as a low to medium waste repository, La Hague's CSM was expected to host nuclear waste from civil electricity production reactors, nevertheless, it also received vast amounts of waste coming from secret military laboratories. The CEA, which had been breeding in a culture of military secrecy since its creation at the end of WWII, understood that information and data about the military nuclear program needed to be constantly shielded from the general public and more importantly from allies and potential enemies. The culture of secrecy shared by all nuclear nations pertains to how, during the Cold War, radioactivity monitoring became a mode of global surveillance used to spy on other nations across the political divide. If the USSR was the center of attention, France, which had a complex relationship with NATO, was also subjected to scrutiny. Monitoring of radioactive fallout provided ways to identify and locate test bombs' location and time scale. As such, radioactive monitoring reliably ensured that nuclear nations stayed alert to the progress of their respective military engineering efforts, whilst also exacerbating competition about nuclear technology. Picked up by spy planes or meteorology stations, radioactive isotopes provided crucial information about the relevant stage at which a nation's nuclear program stood. Radio-chemical fallout carries sensitive

²⁰ The term was coined by President Eisenhower in 1961 in his final address to the nation.

Several scholars have analyzed the extent to which militarization has, after WWII, through the Cold War period (Beck 2009; Brown 2013; Kuletz 1998; Masco 2021, 2006) ramified deeply into the fabric of global capitalist nations informed by violence (Grove 2019).

information that provides strategic technical data: such as the yield, the type of detonators used, the radioactive charge, and its amplitude.

Following a similar analogous logic, traces of plutonium disseminated around La Hague point ostensibly to the country's military weapon development. Chemical threads provide a wide range of information. Six decades after its construction, La Hague's CSM data provides ways to follow and retrace the political decisions that led to the shift from military activities to commercial-scale reprocessing activity undertaken by public-private partnerships. Meant to salvage remaining fissionable material for future fuel reinstalled in reactors, reprocessing methods produce vast additional amounts of radioactive waste, mostly in the form of liquid effluents.²¹ Unlike the argument promoted by the plant's authorities, who emphasize that refueling equates to recycling spent fuels, the extent of the gigantic production of waste is evidenced by their urgent request to construct extra storage pools for highly radioactive fuels (Topçu 2011, 274).

The whole peninsula, immersed in the accretional rhythm of fifty years of accidental spills, has thus been turned into a natural archive from which to excavate narratives and investigations. Tracing chemical and material threads that are picked up in and around the site, delivers evidential traces leading to

²¹ The most famous refueling plants were Hanford in the U.S., Kyshtym in the former USSR, and Windscale renamed Sellafield in Britain. The first two plants used rivers to dispose of effluents. Britain turned the sea, "into sizable quantities, putting that country at the center of the sea disposal controversy" (Hamblin 2009, 4). In 1966, with the opening of La Hague's refueling plant, France joined the practice; "...[but] until the late 1960s, when France began to operate a coastal reprocessing facility at La Hague, only Britain discharged such effluents directly into the sea in sizable quantities" (Hamblin 2008a, 4). Today, La Hague is one of the last refueling plants to continue with sea disposal for liquid effluents.

the French military program and its subsequent techno-industrial program. Resurfacing at various locations around the moors, pushed upwards by aquifer streams, gushed by rivers, and fixated by sediments, radio-toxic traces constitute evidence that can be retraced back to their source (Schuppli 2020, 56). Hence, they provide the researcher a traceability that directly points toward issues of accountability and responsibility.²² However, establishing clear lines of information remains a delicate operation, as the provenance of certain waste loads is complicated by a lack of traceability. The CSM's early history is still shrouded in inconsistencies, due to feeble and often incomplete information about the waste drums that arrived on-site²³: incomplete information slips, vague notices, and lax technical requirements (Blanck 2008).²⁴ Encased in concrete, waste drums were laid inside soil or concrete trenches and covered with cement or sand. In the absence of precise records, it remains impossible to establish the amounts contained and to precisely understand their decaying processes.

22 Rachel Carson pioneered the use of chemicals to analyze fallout pathways, in order to study the way pollutants disseminate and circulate within ecosystems. In her project *Trace Evidence*, Susan Schuppli focuses on cesium-137 to detect how radioactivity escaped from the Fukushima-Daiichi disaster and journeyed 7,600 kilometers (about 4722.42 mi), for five years, before running aground the coasts of Vancouver Island, in British Columbia, Canada. "Despite its radical and covert nature," writes Schuppli (2020,56), "the unique signature of radioactive isotopes allows its traces to be forensically tracked back to their source, thus reconnecting the evidential links that global systems of circulation have seemingly pulled apart."

23 Military nuclear waste that arrived from Le Bouchet, Fort de Vaujour or Bruyère Le Châtel laboratories directly link with the early stages of the nuclear bomb project (Mongin 1997, 355).

24 The 1970s saw a list of accidents at the site, culminating in 1976 with a massive spill of tritiated water that inundated the St Hélène River (Blanck 2017, 93). The accident created a precedent as contamination spilled outside the site's boundaries and therefore became traceable by independent NGOs surveilling the peninsula. The technical and managerial solutions that were implemented at the site demonstrate what Blanck calls a "technical and institutional DIY approach backed by a lack of defined industrial responsibilities" (Blanck 2017, 92).

At the end of the 1960s, the decision leading to the CSM's creation was hastened by the urgent request to build a storage facility for increasing nuclear waste. As oceans were closing down as possible routes for waste discharge (Hamblin 2008a), French authorities foresaw that the projected 1970s' extensive civil nuclear programs would result in a buildup of vast amounts of waste.²⁵ When it opened in 1969, the CSM was immediately put to use. Waste containers started arriving before the site had been properly developed as a storage facility. At the time, the allotted piece of land provided a temporary space where waste was stored momentarily; meanwhile, technical and managerial solutions were developed. Often, as Sezin Topçu recalls, military waste consignments "coming from different centers, [meant waste containers] arrived in urgency before new regulations were enforced" (Topçu 2013, 175). The temporary solution progressively morphed into a long-lasting storage facility, that in turn, invited more consignments from all over France. Lacking and incomplete, information about the site's first decade entails an uncomfortable set of epistemic unknowns that still await to be fully addressed.

During the 1960s, when La Hague was selected among other potential French regions, engineers and geologists participating in the reconnaissance work failed to conduct preliminary radiological surveys. It means that all radiological analysis and data monitoring produced since 1969 is devoid of

25 Blanck points to an interesting shift: during the 1970s, the civil nuclear industry's culture of expertise was nascent, whereas the military had developed what she calls "management through quality." Therefore, when in 1979, ANDRA took over the site, its board of directors invited a team of army experts to work at the CSM. Military personnel, employed by the CEA, and part of "interarmes" staff were brought in to inject expertise in managing the site (Blanck 2017, 125).

baseline data. In scientific fields, baseline data are produced prior to experiments or the implementation of installations with long-lasting consequences. Thus, figures required to build consistent monitoring data on which to assess radiation fallout's consequences and effects are absent.²⁶ At the time the CSM was created, the distinction between general industrial waste and nuclear waste was non-existent. Waste management procedures were nascent, and regulations were developed iteratively and experimentally. Classificatory systems addressing the type of waste and the required procedures to process it were elementary. During the first decade, upon arriving at the CSM, the consignments were classified and packed following three main technical specifications: the origin of the laboratory, chemical processes involved in the waste production, and importantly, its decaying activity.²⁷ Julie Blanck (2017, 92) insists that La Hague's repository was developed, through test and trial procedures, relying on engineering systems that were constantly challenged by the technicality required by the waste's

26 The first ambitious study about the consequences of nuclear materials on the environment in the Norman peninsula was produced in 1974, five years after canisters and containers started arriving on site. "At the time the CSM was created in 1969, we did not dispose of a state of reference - radiometric analysis. Indeed, when the CEA (first agency to run the site) moved to La Hague in the 1960s, the law at the time did not require a public inquiry, nor a state of reference" (Agence Nationale pour la Gestion des Déchets Radioactifs 2008, 30). 1991 was retained as the date for establishing a state of reference, albeit 22 years after the first load of radioactive canisters had arrived. That year was deliberately chosen as it preceded the infrastructural work on the cover lid built between 1992 and 1997 (Agence Nationale pour la Gestion des Déchets Radioactifs 2008, 30).

27 "Waste containment's characteristics based on the nature and levels of activity of the radioactive waste evolved in conformity with the prescription of the Autorité de Sûreté Nucléaire established on the 21st of September 1979, then revised on the 6th of February 1985, as well as the recommendations enacted in Règles Fondamentales de Sûreté (RFS I.2 et III 2e). Otherwise, the normalization of the diverse types of containment was progressively established throughout the CSM's time of operation." Translation by the author (Agence Nationale pour la Gestion des Déchets Radioactifs 2008, 37).

quantities and diversity. Distinct sets of problems arose when consignments unexpectedly contained liquid effluents. Once onsite, they could not be sent back and had to be dealt with, even though no facilities existed for them.

After the Chernobyl disaster, public requests for information and accountability about past decades' contamination forced stakeholders to publish monitoring data that demonstrated that alpha emitters fuels and long-life waste were buried onsite. It took a parliamentary commission launched in 1996 to publicize some of the most contentious information about the management and lasting consequences of successive accidents.²⁸ In July 1996, the Turpin Commission's dossier went public. It sent a shock wave, as for the first time, it confirmed and documented a series of disputed facts and events that had, until then, circulated amongst anti-nuclear activists who had gained access to documents with the help of whistle-blowers.

In the absence of precise information about the type of fuels and subsequent ionizing activity, information remained sparse, though it included official documents which had not yet been made public. Some of the figures provided had been produced with the help of mathematical modeling systems in order to provide average scenarios for the disseminated leaked fuels. They were obtained from sampling radioactive water sitting at the bottom of the trenches, from water retrieved from the site's reservoirs or pumped from contaminated aquifers underneath the repository. In the absence of

²⁸ The Commission was launched on the 2nd of February 1996 to rule on the repository's impact on the environment and to investigate ANDRA's proposed 300 years surveillance period for the repository. The commission handed in its report on July 16, 1996.

information about the toxic loads buried in the drums, the analysis had to proceed retroactively by speculatively reconstructing the quantity of contamination that had dispersed around the site. The dossier shared some daunting numbers about the activity of plutonium-239 and strontium-90, now part of the site's lasting toxic legacy.²⁹

Until the Turpin dossier's publication, authorities had stated that the CSM would be monitored for 300 years after its closure. The three centuries period was controversially established on the assumption that cesium-137 (the site's most prevalent waste), would have sufficiently decreased to allow the end of close surveillance. In harsh contradiction to the CSM's official timeline, the Turpin dossier pointed to plutonium's alpha emitters activity - a fissile isotope used in nuclear weapons - which achieve their decaying cycle after 240 000 years. Nowadays, no time limit exists for the CSM's end of surveillance and monitoring; leaving open the uncertainty about the unknown quantities of contaminating waste that sit there.

Scientific, political, and epistemological mishandling characterizing the site's first decade leads us to interrogate the motivations for developing an

²⁹ The Turpin dossier forced the stakeholder to disclose previously unmentioned amounts of alpha emitters' waste. From the end of the 1990s, ANDRA's annual reports always include figures relating to the amount of waste and its activity: "most important contributions to the alpha inventory at their admission consists of plutonium-239 (around 220 TBq) and plutonium-238 (around 90 TBq) with americium-241 that represent nearly 40 TBq. For the inventory of beta gamma itself, the most important contributions come from cobalt-60 (around 15 000 TBq) plutonium-241 (10 600 TBq), cesium-137 (around 11 000 TBq), and nickel-63 (more than 5 000 TBq)" Agence Nationale pour la Gestion des Déchets Radioactifs (2008, 52). Such a move towards transparency does however strategically leave aside information about alpha emitters' materials that went on to disseminate for decades around the nuclear premises. Acknowledging previously censored information brought the authorities to tactically renew their tactics to prevent further disclosure of additional data.

important waste repository on La Hague's marshlands plateau. Distinct from a foreclosed physical and hermetic sarcophagus for toxic contents, "a simple container" (Deleuze and Guattari 1987, 287); La Hague's terrain, architecture, and toxicity grew out of the gradual accretion of relations between radioactive particles, liquids, water, procedures, processes, technologies, terrains, and political decisions.

Amnesia and unaccountability are concomitantly manufactured as a means to circumvent the uncertainty of assessing leakages' continuous damages to aquifers and rivers. As Jessica Hurley (2020, 205) explains, "[i]nfrastructures are relational, entangling us with the world and with the other beings who share it." Thus, the impossible task of containing the spills and of accurately monitoring the isotope dispersions taking place since the 1970s, folded itself in secrecy. Contamination, which has deeply transformed the peninsula and its foreseen future, is complicated by the secrecy regimes that distribute knowledge about past and present accidents in uneven and selective ways.

The disquieting deep-time resonance of the site's toxic activity recalls the violent legacy of living with toxicity. It connects La Hague with other known sites of disaster, such as Hanford or Mayak. It establishes the traumatic reckoning of accepting that humans, non-human lives, and ecosystems are bound with radioactivity. As Beck (1992) emblematically declared,

dangerous, hostile substances lie concealed behind the harmless façades. Everything must be viewed with a double gaze, and can only be correctly understood and judged through this doubling. The world of the visible must be investigated, relativized, and evaluated with respect to a second reality, only existent in thought and yet concealed in the world. (Beck 1992, 72)

The “second reality” Beck points to, shifting and transient, is manifested in the highly visible tumulus of the waste disposal facility.

Staying with Secrecy

The second part of this paper now addresses the two threads of architecture and leaks, to show how secrecy congealed into the actual near-surface waste tumulus architecture, shaped by decades of technical maintenance decisions, leaks’ remediation, and attempts at invisibility. The radioactive waste monolith somehow fixed itself into a state of opacity and obfuscation. That said, the attempts at invisibilization are undermined by the slow violence of radioactive dissemination (Nixon 2011). Spillages that entered rivers and water tables overflowed efforts at technical containment and overrode security surveillance. As such, by overturning secrecy’s dichotomy of revelation and obfuscation, at Birchall’s (2011; 2014) invitation, I delineate La Hague’s secrecy contours by focusing on infrastructures, façades, and security systems. All three affordances fold back to the military and Cold War origin of La Hague’s repository.

The silencing of information from the CSM’s sixty-year history is epitomized by the defensive architectural infrastructure that secures the tumulus-shaped pile of waste drums. Continuous dynamics of revelations and concealments kept linking La Hague’s toponym with media revelations. However, releases of information about past accidents failed to enforce or bring

accountability. Slow violence (Nixon 2011) perpetuated by the leakages is constantly eschewed and censored, through processes of invisibilization (Beck 2009; Masco 2021), imperceptibility (Murphy 2006) and secrecy (Brown 2013; Wellerstein 2021).³⁰ Hence, assessing the way slow violence is perpetuated in time and space prompts us to return to the ways in which secrecy is shaped, produced, and sustained in order to ensure lasting profitable industrial refueling commercial activities. More importantly, it underplays the failures to securely contain radioactive fuels.

Leaving aside any simple binary relation between secrecy and revelation, invisibility and visibility, as well as hiding and transparency, it is important to insist that secrecy is characterized by excessiveness. Hence, tracking secrecy's excessiveness informs a methodology that in turn demonstrates how it operates and is sustained. Secrecy emerges through imbricated accretions of material and rhetorical affordances. Informed and perpetuated by such processes, secrets provide a means to "follow secrecy as a practice" (Birchall 2014). In her approach to post-secrecy, Birchall (2011, 141; 2014, 33) not only provides a way of doing justice to the secret but also invites "to stay with the secret as secret."^{31, 32} She demonstrates how revealing and exposing secrecy are not the only means to access it. Birchall's (2014) invitation is particularly relevant to help align La Hague's nuclear history with secrecy's dynamics. Her emphasis on

30 Michelle Murphy (2006, 10) points out that the nuclear industry has turned itself into a "domain of imperceptibility" in which dimensions of the material world are made invisible, unnoticed, and incomprehensible."

31 Birchall points out how the turn was adopted after Snowden's affair and Wikileaks revelations.

32 As Susan Maret (2016) writes, secrecy displays attractive and seductive forces. Revisiting Simmel's essay (1906), Maret points to his "charm of secrecy."

defining “the aesthetics of the secret” pertains to the relation between power and politics that, quoting Rancière, means nothing less than “a delimitation of spaces and times, of the visible and the invisible, of speech and noise that simultaneously determines the place and the stakes of politics as a form of experience” (Birchall 2014, 25). Building from Rancière’s “distribution of the sensible” as an innervated political background, Birchall (2014, 25) offers fascinating threads from which to apprehend secrecy and secret making. Consequently, eschewing the binarism of concealment versus revelation, Birchall provides conceptual tools to deflect the transparency turn adopted by the state and stakeholders in connection to the nuclear repository. In France, in the aftermath of the Chernobyl disaster, authorities mobilized transparency as a way to respond to public unease touching on nuclear issues. As anti-nuclear opposition was mounting, transparency was reclaimed by authorities to reestablish a hegemonic narrative able to counter contestation and public defiance. Instead of opening up channels of information, the transparency turn brought an additional layering of foreclosure, while shaping public opinion’s sensitivities towards nuclear topics.

Shifting attention from secrecy’s hermeneutics to its aesthetics, Birchall (2014, 25) invites us to cease perceiving “the secret as a problem to be solved through revelation and interpretation,” but to apprehend how “the secret ‘itself’ is [...] situated within a distributive regime and imaginary of what collectivities and subjectivities the secret makes available (rather than those that it closes down).” By exploring the secret as an aesthetic object, Birchall (2014, 29)

probes its inherent characteristics. Secrecy's inherent unknown qualities, as much as its obfuscating ways of resisting cognitive judgement are turned into affordances. Lacking knowledge and interrupted cognition means an "aesthetic response or field opens up." Thus, engaging with the realm of sensations and experiences evocatively arising when confronting the CSM repository, sensations present us with ways to apprehend it. Remaining attentive to its boundaries and liminalities that enforce distance and ensure the repository remains inaccessible, one can engage at a material level with its secluded and shielded existence. Inaccessible to journalists and researchers, the repository comprises a foreclosed and hermetic structure, protected by security systems. The waste repository's façading, its manned and technological surveillance, combined with the discrepancies laid open in archives and scientific literature, highlight unknown and suppressed information that culminate by offering an excess of limits and deceptions. Sets of bordering experiences are exemplified by the CSM's awkward anchoring within the landscape: its physical boundaries, infrastructural liminalities and architectural sheltering. They combine to make opacity and obfuscation into the realm of the visible.³³ Thus, by removing oneself from the expectation of "uncovering" facts and of "revealing" information (dependent on state authorities' will or ability to allow access to

33 Birchall (2014, 33) extensively draws her conceptual approach from artists' projects, such as Trevor Paglen and Jill Magid, who, in their work, magnify not only how secrecy is withheld but how its "unpresentability" is imposing itself around us. Joanna Zylinska (2021, 232) points out that Paglen's projects, such as *The Other Night Sky* (2010-2011), focuses "on the way in which the logic of transparency promoted by the socio-political apparatus translates into global surveillance while also creating zones of opacity that hide the actual operations of power."

archives), such an approach opens up other possibilities. They strategically invite to stay with La Hague's opacity and secrecy.

Staying with the entangled layers of infrastructures of secrecy offers a way of approaching the repository along the lines of the history of military buildings. The CSM's tumulus shape is conceived as a sarcophagus intended at protecting waste canisters from rain and atmospheric exposure.³⁴ Its angular and high façades bear constant parallels to existing sepultures.³⁵ Uncannily merging vernacular and futurist traditions, the CSM appears as a composite of tumulus-like structure and brutalist modernist design, combining depth and hollowness, stillness and intimidation. Projecting its 20 meters (about 66 feet) high facades into the sky, the CSM techno-industrial building alludes to its invisible vast cavities filled with canisters and concrete blocks. As such, it retains a family resemblance to military architecture, and more particularly bunkers and defense infrastructures.³⁶

34 There are fascinating similarities to be drawn from exploring the technological infrastructures and architectural solutions implemented all over the globe to contain nuclear waste and isolate radio-toxic fuels at disaster sites or test sites. The urge to bury waste and dig deep into geological strata has been analyzed by Kyveli Mavrokordopoulou (2021) in her doctorate entitled: *Habiter, Extraire, Enfouir: Imaginaires Nucléaires dans l'art Contemporain (1970-2020)*. Also see Walters (2008), Graham (2016), Galison and Moss (2015). Aside from digging and burying, a complementary move sees the erection of sarcophagi and a tumulus such as the Runit Dome (Barad 2019, 526) or Chernobyl reactor 4's double containment systems (Mycio 2005), and at multiple sites in the American deserts. See Centre for Land Use Interpretation's (2012) *Perpetual Architecture*.

35 For an analysis of the continuity between religious tombs, military bunkers, and nuclear vaults, see Virilio (1994).

36 Many similarities can be drawn between the CSM and military bunker's architecture, particularly their shared infrastructural layering and organization, as well as their positioning within a landscape. As with other buried military architecture, that of military forts, blockhaus, and fortifications, the CSM's visible parts are counterbalanced by invisible foundations dug deep into the ground. Incongruous in scale, shape, and appearance, the CSM draws similarities with the close-by Atlantic Wall's defense systems of WWII bunkers. It shares a common aura with

In architectural terms, the CSM addresses the request for security against external threats with steep elevated blind slopes stretching over a rectangle of 600 meters (about 1968 feet) by 200 meters (about 656 feet) in width. Inaccessible and buried beneath the structure stands the whole drainage, piezometers, and monitoring stations that facilitate the collection of samples and measurements that remain as the single mode of controlling the radiation activity and dispersion of isotopes.

However, such design imperatives aiming for containment embody the technical choices that undermined its containment logics. Between 1991 and 1997, a bituminous lid was added to the repository. Until then, waste canisters and barrels had been left unprotected, but paradoxically visible and accountable for. Furthermore, the grassy slopes directing rainwater downward into collection gutters weakened the structure's foundations and containment capabilities. Until the 1990s, rainwater had been in direct contact with contaminated canisters and containers. Drainage systems were in place, but contaminated fuels were often washed over. A series of important leaks were explained by broken pumping systems that had let water run afield. Waste repositories should be considered from the perspective of their hydraulic functioning and subsequent failings, and as such be principally perceived as "wet sites" where liquids, toxic fuels, and contaminated rainwater require constant maintenance and attention (Högselius 2022). In turn, underneath the repository, natural aquifers kept pushing upwards, towards the surface,

abandoned military ruins and bunkers that were investigated by Paul Virilio (1994) in *Bunker Archeology*.

allowing for prolonged contact with zones that became compromised.

Inside the vault, access to buried masses of piled waste is impossible. The waste tumulus resembles a densely packed pyramid of concrete encasings which are unreachable. Once the lid cover was put in place, a material layer shielded its content and metaphorically ensured that all disappeared from view. The vault, precisely designed to address security breaches and the desire for containment, is also conceived as a protective layer that keeps out of view what used to be in the open. The lid enmeshes engineering constraints with environmental protection and censorship. Sealing waste from view bestows that radioactive loads are no longer containable or controllable.

In Search of its Own Containment

In this closing section, after briefly turning to Beck's analysis of risk which are characterized by complex industrial systems and, in the case of nuclear technologies, endless maintenance, I establish connections between the oozing quality of radioactive stored fuels and secrecy. Both demonstrate the incapacity of containment systems to control and silence their affordance.

In the aftermaths of the Three Miles Island and Chernobyl accidents, risk has come to irreversibly redefine how, since the 19th-century, industrial societies rely on technical complex infrastructures. Written two years before the Chernobyl accident, Charles Perrow's (1984) *Normal Accidents* demonstrated that overly complex systems such as nuclear reactors contain within them the

statistical probability of their future disasters.³⁷ In his analysis of risk, Perrow pioneered an approach in which infrastructures and complex industrial systems inevitably engender accidents with planetary-scale consequences. The inevitability of nuclear accidents is also preponderantly an outcome of their timescales. The lengthy periods implied to develop these technologies are in turn, extended by endless decommissioning decades.³⁸ In continuity with nuclear reactors, radioactive waste also invokes the endless uncertainties of managing and containing leaking materials. Throughout its sixty years of existence, the CSM highlights several sets of open-ended issues. Dating from a period when regulations were lax and security measures nascent, the military waste that was buried into the trenches actively redraws durational boundaries that collapse together past, present, and future times. For Perrow (1984, 12), risk not only informs modern industrial society but directly interacts with issues of power. One of its most sophisticated incarnations relates to nuclear secrecy regimes that enforce invisibilization, foreclosure, and control. The CSM nuclear history balanced successive yet contradictory moves of disclosure and curtailing of data about the radioactive spills. During the 1990s, information was progressively made more accessible. However, access to information met state

37 Perrow writes (1984, 5) that “multiple and unexpected interactions of failures are inevitable. This is an expression of an integral characteristic of the system, not a statement of frequency.” While he did not explicitly address waste management from nuclear systems, this seems like an important omission given that waste management is an intrinsic part of the entire complex system of nuclear power or nuclear engineering, and should not be viewed as a separate enterprise.

38 Several reactors in France, which passed the 50-year benchmark, are currently being extended in the context of the current energy crisis. The country disposes of 56 running reactors at 18 various nuclear plants.

actors' immediate counter-move aiming at deflecting information and instating incremental opacity, concealment, and normalization.

There is a literal parallel to be drawn between the vault symbolically concealing a hidden chronology of accidents and Deleuze and Guattari's analysis of secrecy understood as a containment system. In *A Thousand Plateaus*, Gilles Deleuze and Félix Guattari apprehend secrecy as a relational assemblage that implies certain transient qualities. For both writers, secrecy is foremost "a content that has hidden its form in favor of a simple container" (Deleuze and Guattari 1987, 287). It remains indistinguishable from two interdependent incidental moves: interruption and betrayal, that "are nonetheless an essential part of it" (Deleuze and Guattari 1987, 287). They insist on the importance of the container on which inwards and outward forces are exercised; "something must ooze from the box, something will be perceived through the box or in the half-opened box" (Deleuze and Guattari 1987, 287). For the theorists, secrecy does not equate with absence or with voiding. On the contrary, secrecy manifests as an affordance. Endeavors of hiding, concealing, and erasing are highly productive and engage with multiple formations that pertain to a multiplicity of relations with the political, the environmental, the social, and the imaginary.

Nuclear waste and toxic fuels saturate and overflow the material and physical containment systems that are built to guarantee their seclusion from the rest of the world. Based on successive similar scenarios at various nuclear repositories, it is essential to remember that nuclear materials fail the

assumptions of technical containment models designed to isolate them from the surrounding world. As Peter van Wyck (2005, 27) states, nuclear materials can neither be completely accumulated (contained), nor *spent* (disposed). It tends to drift. The duration over which it must be maintained and protected spatially is too long, thus “it seeks its own disposal” (Wyck 2005, 27).

The fruitful dynamic between what is contained and what contains is a useful way to address nuclear waste. In La Hague, containment and secrecy co-evolved in asymmetrical relations, in a continuous and iterative manner, issues of leaks and uncertainties tamper with the site and thus, reinforce the necessary disguise of long-term effects and past mishandling.

An interesting manifestation of this dynamic lies in the impressive slopes that bestow the repository’s singular silhouette. Covered with immaculate lawns, they were built during the 1990s along with the repository’s lid. Slopes facilitate the collection of rainwater with the help of a canalization system that redirects it towards a reservoir. But defying gravity and structural counterforces, slopes weaken the infrastructure’s foundations. Thus, the need for constant and perpetual maintenance pertains to a series of material assemblages requesting scrutiny and remediation. This perpetual attention takes the forms of elementary regular endeavors: cutting the grass growing on the roof lid to prevent shrubs to root their way inside the vaulted structure, continuously pumping and redirecting contaminated effluents towards the pipeline joining the sea, the daily shore of radiological monitoring. The CSM engages with an excess of tasks, data, and regulatory procedures.

Protean by essence, nuclear secrets are too vast for their own containment systems. In the case of the CSM, its radioactive contents ended up informing technical solutions that were incrementally developed for three decades until the lid completion, meaning that nuclear secrecy took particular forms at CSM that was distinctive from other sites elsewhere in the world. The secrecy regime's dysfunctional handling of radioactive waste has shaped the exterior layers designed to hide waste from view. As such, the CSM's monumentality displays crushing ambivalence, physical mass, and intimidation. A grassy tumulus emerged to deal with the piles of containers and the specific history of that waste's production, while Sellafield in the UK and Hanford in the US took the form of pits to store their waste. The architectural and technical prowess of the CSM's vault works as a lure, communicating a sense of stillness and power, yet nonetheless its structure and infrastructural systems are constantly eroded by geological tensions that compromise and weather its integrity and its operability.

Conclusion

The CSM has become on its own terms a material nuclear marker for the past accidents whose consequences are still unravelling. Uncannily, the facility disrupts the chronology assumed by nuclear repository sites, where markers and informational signals are created afterward to herald their existence to future generations. Expected to last centuries, La Hague's repository exists as an exceptional body of evidence. Its sculpted infrastructure testifies to its historical process, its permanent failure, and its ability to project into the future

its significant load of dangerousness. Three sets of entry points align when exploring the CSM's infrastructure of secrecy. The first one is informed by the leaks dispersing chemical evidence and as such puncturing at various levels and scales the concealing systems that have remained in place since the opening of the repository. The second issue faced by the CSM relies on an oversized structure inviting structural slips to take place. Consequently, the repository requests continuous attention and repetitive maintenance to consolidate some of the vault's slopes.

As the paper has demonstrated, by addressing the structure, one can address not only its radioactive content but the ways in which its toxic history has been voided. The site's maintenance weaves relational patterns connecting the site with its environment, with the local population living in its vicinity, with state authorities, and finally with its Cold War legacy. These endeavors ensure that the repository's infrastructure is under constant scrutiny. Its physical contours as well as the administrative work required to deflect its presence and the environmental damages it causes provide materials and regulatory threads from which to question the site and its history. Opaque and silent, the CSM billows in a peculiar atmosphere, soundscape, and allure that eventually suggests how it is perceived and narrated.

The layering of military defensive and tomb-like architecture points to the ability of nuclear secrecy regimes to yield and shape their own physical, material, and imaginary witnessing. The CSM dwells with two forms of coercive expansion: primarily, state violence, or *raison d'état*, that is divided between

violence against nature and violence against the peninsula's inhabitants; and secondly, violence against the facts themselves (Weizman 2021, 124). By concealing that those accidents took place, violence enforces amnesia. Nuclear secrecy evolved, engendering its own historiography. From the 1980s, secrecy regimes adapted while La Hague's nuclear installations were repurposed from their military role to commercial refueling expertise. A Cold War remnant, nuclear secrecy adapted to the French industrial and commercial model of private and state partnerships.

Advancing an epistemological and methodological proposition about La Hague nuclear secrecy slightly alleviates the frustration of working with limited information and archives. It addresses the low iconicity of the slow accident in the making, which consequently invites events to slip out of attention and care. Past and present accidents, happening at the thresholds of visibility, are impossible to ignore due to a number of independent actors monitoring the area. Their data provides researchers and the public with ways to tentatively reassemble narratives. The excessive-quality of accidents leak minutiae of information, but once reassembled can formulate proposals to address scale, facts, and events, even while simultaneously acknowledging that an hermeneutic approach will inevitably remain incomplete. Incidents and leaks bring with them, write Eyal Weizman and Matthew Fuller (2021, 153), a transformative field of action, a collision of vectors that possess the potential to reveal their underlying forces and to impose their visibility in significant ways. Thus, incidents are the "points through and from which larger causal threads

and field causalities can be traced and reconstructed” (Weizman and Fuller (2021, 153). Accidents and incidents also direct attention to the general political and social context that substantiated their occurrence, and as such, they help delineate the contours of secrecy. Hence, nuclear secrecy is also defined as an effect in, and a product of, relations between efforts at intentional information control on the one hand, and architecture, engineering, and maintenance on the other. Thus, nuclear secrecy at CSM took a unique physical form, but one that also offers productive methodological insights for understanding nuclear secrecy’s forms elsewhere in the world.

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