

Sellafield and British Nuclear Culture, 1945-1992: Nuclear Imaginaries in the Rural Periphery.

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List of Abbreviations.

ANT	Actor-Network-Theory
BNFL	British Nuclear Fuels Limited
CEGB	Central Electricity Generating Board
CND	Campaign for Nuclear Disarmament
DoE	Department of Energy
FoE	Friends of the Earth
FOI	Freedom of Information
ITV	Independent Television
LLC	Local Liaison Committee
MAFF	Ministry of Agriculture, Fisheries and Foods
MAGNOX	Magnesium Oxide Nuclear Reactor
MoS	Ministry of Supply
NATO	North Atlantic Treaty Organisation
NCCL	National Council for Civil Liberties
NDA	Nuclear Decommissioning Authority
NFU	National Farmers' Union
NGO	Non-governmental organisation
NIMBY	Not-in-my-backyard
NRPB	National Radiological Protection Board
PERG	Oxford Political Ecology Research Group
SASRA	Sellafield Area Sports and Recreation Association
SCRAM	Scottish Campaign to Resist the Atomic Menace
STIM	Sociotechnical Imaginary
STS	Sociotechnical Studies
THORP	Thermal Oxide Reprocessing Plant
TNT	Trinitrotoluene
UKAEA	United Kingdom Atomic Energy Authority
USAAF	United States Army Air Force

Abstract.

Responding to developments within the field of British nuclear culture, this thesis uses the concept of the sociotechnical imaginary (STIM) to trace the social and cultural history of the Sellafield nuclear complex in Cumbria between 1945 and 1990. Drawing upon oral histories of the people who built, worked at, and lived alongside Britain's largest nuclear complex, this study identifies distinct forms of cultural expression particular to the local area, as rural citizens responded to nuclear developments by framing their rural identities and unique experiences of nuclear science in relation to a set of contested and dynamic 'nuclear imaginaries.'

I will examine the evolution of public attitudes towards nuclear technologies, showing how social responses were structured and given shape by a series of imagined nuclear futures which were created and embedded into British cultural life. Examining the early years of the British nuclear project, I will demonstrate how a 'utopian nuclear imaginary' was cultivated within government at the end of the Second World War, becoming embedded within society as nuclear technologies were imagined as heralding a series of desirable social, political, and economic futures.¹ I will go on to trace how these imaginaries were subject to contest and redefinition by ordinary people, who resisted the proliferation of nuclear technologies, forging 'dystopian' imaginaries which challenged and entered into competition with the utopian imaginary propagated by government. Exploring the dynamic interplay between these two imaginaries, the following chapters will not only historicise the nature of public responses to nuclearisation, but uncover the social processes behind their creation, ultimately pointing

¹ S. Jasanoff, 'Future Imperfect: Science, Technology, and the Imaginations of Modernity', in S. Jasanoff, and S. Kim, (eds.), *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power* (Chicago: University of Chicago Press, 2015), p. 4.

towards the immense power of ordinary people as agents of social change, capable of substantiating, challenging, and redefining 'top-down' narratives of sociotechnical progress.

This echoes recent historiographical trends within the field of nuclear culture, which have pointed to the significance of the localised context in shaping our understanding of public responses to nuclearisation during the twentieth century. Furthermore, this also corroborates recent studies of rural Britain, which have demonstrated the agency of rural 'peripheral' communities to challenge the socio-spatial inequalities and power relations emanating from the urban core. Appropriating these two insights, this thesis ultimately demonstrates the plurality of cultural responses to the nuclear age, the presence and power of sociotechnical imaginaries to shape and inform these responses, and the agency of ordinary people to resist, challenge, and redefine dominant cultural assumptions about nuclear technologies and their place within British society.

Introduction.

As the radioactive dust settled amidst the desert haze on the morning of July 16 1945, the scientists and military personnel of the Allied Forces' 'Manhattan Project' witnessed the first successful detonation of the atom bomb, destined to devastate the Japanese cities of Hiroshima and Nagasaki less than a month later. This devastating example of nuclear fission marked the birth of a new technology afresh with a teeming multitude of potential scientific, military, and civilian applications. It at once signalled the dawn of a new epoch dominated by the spectre of nuclear technologies and their geo-political permutations. Engaging with this process from the British context, this thesis will consider the impact of nuclear technologies (specifically weapons and power production) upon British life between 1945 and 1992, using

the Sellafield nuclear complex in West Cumbria as a lens to observe this process at both national and local scales.²

Despite Sellafield's central role in the production of nuclear technologies and technical expertise, the tight restrictions upon access to the site and the transmission of information has meant that no comprehensive study has even been conducted upon the social and cultural history of the plant.³ This has not gone unnoticed within the existing historiography, with the late Jeff Hughes asking "where are the sociological studies of Harwell, Windscale and Aldermaston? [...] where are the British people in these histories, the workers who made nuclear technologies, the people whose lives were shaped by them, overtly or covertly?"⁴ Answering this call by placing an overdue emphasis on the significance of the people who built, worked at, and lived alongside nuclear technologies as part of the fabric of nuclear society, this project aims to redress the balance of historiography in favour of the ordinary

² The term Sellafield will be used throughout to refer to the entire nuclear complex, encompassing both the plutonium production site known as Windscale, and the power producing plant known as Calder Hall. Until 1981 the entire plant was known as Windscale, when it was renamed Sellafield as part of a rebranding exercise. Despite this, I will use the name Sellafield throughout, referring to Windscale specifically when referring to the plutonium production plant, and Calder Hall when referring to the power production site.

³ A few notable studies have focused on specific elements of the plant's history, for example Brian Wynne, who has produced two studies examining the regimes of lay/expert knowledge in the region, and a more comprehensive treatment of social attitudes towards nuclear expansion in the twenty-first century. Elsewhere, Lorna Arnold has published a book devoted to the events of the Windscale Fire, which forms one of the subsequent chapters within this study, and Sally Macgill has examined media responses to the radiation controversies of 1983, a subject also examined in subsequent chapters. See, B. Wynne, 'Misunderstood Misunderstanding: Social Identities and Public Uptake of Science', *Public Understanding of Science*, 1.3 (1992), pp. 281- 304; B. Wynne, 'May the Sheep Safely Graze? A Reflexive View of the Expert-Lay Knowledge Divide', in S. Lash, B. Szczyński and B. Wynne, (eds.), *Risk, Environment, and Modernity: Toward a New Ecology* (London: Sage, 1998); B. Wynne, C. Waterton and R. Grove-White, (eds.), 'Public Perceptions and the Nuclear Industry in West Cumbria', Centre for the Study of Environmental Change Lancaster University, 2007, pp. 1- 78,

<www.csec.lancs.ac.uk/docs/Public%20Perceptions%20Nuclear%20Industry.pdf> [accessed 29 June, 2018]; L. Arnold, *Windscale 1957: Anatomy of a Nuclear Disaster* (London: Palgrave, 2007); S. Macgill, *The Politics of Anxiety: Sellafield's Cancer-Link Controversy* (London: Pion Ltd, 1987).

⁴ J. Hughes, 'What is Nuclear Culture?: Understanding Uranium 235', *British Society for the History of Science*, 45.4 (2012), p. 501.

individuals who were as much a part of Britain's nuclear story as the technologies they produced.

Local citizens' stories and experiences lie at the heart of this project. Using the framework of the sociotechnical imaginary to understand how citizens imagined and conceived of nuclear futures, it has been possible to simultaneously explore the richness of cultural life during the nuclear age and the respective roles of the state and citizenry in the co-production of post-war 'nuclear' society. This has also led to a greater appreciation of the role geographically and socially 'peripheral' communities play within national cultural life. Originating in a sense of intrigue into the potential role that the remote Western Cumbrian peninsula may have played in the production of British nuclear culture, the project argues that Sellafield and the surrounding areas played a key role in shaping British social responses to nuclearisation. Sellafield helped embed nuclear technologies into the fabric of British life by inextricably linking these technologies with imaginaries of social, (geo)political, military, and economic prosperity at both local and national levels. The utopian imaginary then came under challenge as a series of incidents at the plant revealed the inherent radiobiological, environmental, socio-cultural, and moral dystopias that accompanied the development of nuclear technologies.⁵

Offering Sellafield as a multi-layered and nuanced case study of post-war British (nuclear) culture, I argue that Sellafield's chronology very much mirrored, and in turn co-produced, British cultural responses to nuclear technologies. Heralded as the apotheosis of a

⁵ The framework of the sociotechnical imaginary (STIM) explores how citizens imagined a future characterised by nuclear technologies. Aligning the focus on utopias and dystopias within political theory and cultural studies, this shows how the public responded to nuclear developments by imagining them as representative of a future which was utopian and desirable, or dystopian and undesirable. The STIM concept will be explored in greater detail in a subsequent section of this introduction.

new post-war world order, nuclear technologies (and by extension, Sellafield) symbolised what Ian Welsh described as “peak modernity” to a British public reeling from the hardships of prolonged war with Nazi Germany, and the decline of Britain’s colonial status.⁶ It was in this context that the nuclear project at Sellafield became imbued with a national importance by the late 1950s, as a signifier of Britain’s international status, its ability to defend itself from foreign aggression, and a seemingly limitless source of cheap energy during a period of profound energy shortages throughout post-war Europe. In this context, the public unveiling of Sellafield in 1956 helped embed an imaginary of nuclear utopianism at both national and local scales, as nuclear technologies became inextricably wrapped up in a series of desirable national and regional imagined futures.

Despite limited localised opposition from disaffected individuals, this imaginary subsisted for the first decade of the plant’s operation. It was only in 1957, when a fire broke out in one of the piles used to produce military grade plutonium that the early fervour and patronage surrounding the use of nuclear technologies came under scrutiny. Whilst the fire exposed the vulnerability of the British public to the dangers of radioactive contamination, national confidence in the nuclear project was sustained by the government’s suppression and cover-up of the true severity of the incident and the imaginary of nuclear utopianism survived largely unscathed at the national level. Despite this, the local population’s key role in tackling the fire and managing the radioactive aftermath gave them an intimate awareness of the dangers of nuclear technologies. They were aware of how close to a full meltdown the plant had been, and the true severity of the radiobiological contamination endured by the local people and environment. These experiences, coupled with the government’s suppression of the incident in the public domain, induced an undercurrent of hostility and a deep-seated cynicism amongst

⁶ I. Welsh, *Mobilising Modernity: The Nuclear Moment* (London: Routledge, 2000), p. 17.

sections of the local population, for whom the fire espoused an alternative dystopian future. This exposed the potential hazards of nuclear power production and the state's scant regard for their welfare in the relentless pursuit of fissile material.

In the aftermath of the Windscale fire, local citizens increasingly challenged the utopian credentials of nuclear technologies, pointing to the fire as evidence that these technologies could go wrong. This contributed to an emerging unease amongst local citizens as the fire's radiobiological effects upon workers and residents exposed the dangers of radioactive contamination. Fears regarding contamination were exacerbated in the years 1960-1963, when it transpired that a series of unplanned releases of Strontium 90 had taken place over the previous seven years, and that the UKAEA (United Kingdom Atomic Energy Authority), who operated and ran the plant had, since 1956 deliberately raised discharge levels "as part of a deliberate and organised scientific experiment."⁷ Throughout this period, growing local concerns about the dangers of radioactivity coalesced with broader international debates about the dangers of fallout from nuclear weapons testing, and the levels of radiation in the atmosphere.

Much like the trajectory of the Cold war itself, the period from the late 1960s into the mid 1970s was largely a quiet period in Sellafield's history.⁸ The decade from 1963 onwards saw the formation of a new public limited company called BNFL (British Nuclear Fuels Limited), who took over reprocessing and fuel fabrication duties from UKAEA in 1971, and arguably represents the least turbulent era in the site's history. Within much of this period

⁷ Welsh, *Mobilising Modernity*, p. 88.

⁸ During this period, the Nuclear Non-Proliferation Treaty signaled a period of détente in the Cold war arms race, as geopolitical tensions between the major superpowers cooled somewhat, despite a series of bitterly contested proxy-wars such as Vietnam (1955-1975) and the Second Indochina war (1953-1975).

Sellafield functioned away from the attention of the majority of British society, much as the Cold war experienced a temporary détente as tensions between East and West warmed slightly. Despite this, the radioactive discharges regularly flowing from Sellafield's pipeline into the Irish Sea became a major point of contention within the growing ecological movement, which had set its sights on reducing marine radioactivity. The 1963 Partial Nuclear Test Ban Treaty had conclusively established that levels of global radiation posed a threat to human and environmental life and could not continue to rise. This argument had particular traction amongst the international community, for whom Sellafield's discharges spoke to the British government's cavalier attitude towards the marine disposal of radioactive waste, with its dumping practices off the coast of Spain and Portugal already a major source of political contention.⁹ With the 1972 London Convention regulating the pollution of sea by dumping practices, Sellafield's increasing radioactive discharges stood diametrically opposed to prevailing international wisdom and consensus regarding the undesirability of the sea as a means of radiological 'dilution.' The tone was effectively set for the next decade of Sellafield's history, as public attitudes towards radioactive discharges became increasingly hostile and egregious throughout the 1970s.

Whilst such sentiments were largely found within the ecological and environmental movements at the start of the 1970s, by the middle of the decade public attitudes towards nuclear power had begun to shift in response to a series of agreements which saw Sellafield store and reprocess foreign nuclear waste. Embodied in the *Daily Mirror's* 1975 publication of an article which depicted Sellafield as the "nuclear dustbin of the world", social and environmental arguments over the reprocessing of foreign fuels and the proposed expansion of

⁹ See J. Hamblin, *Poison in the Well: Radioactive Waste in the Oceans at the Dawn of the Nuclear Age* (New Jersey: Rutgers University Press, 2008).

the Sellafield site reached a climax during the 100-day ‘Windscale inquiry’- an independent judicial review into the 1977 construction of a Thermal Oxide Reprocessing Plant (known as THORP) at Sellafield.¹⁰ As the largest public inquiry in British history at the time, the inquiry functioned as a contact zone between competing nuclear epistemologies and became the forum for competing imaginaries of nuclear (or non-nuclear) futures. Public responses to the Sellafield plant during this period became characterised by a more complex array of subjectivities, as public attitudes were informed by environmental, social, and moral imaginaries, which were extended into broader debates about nuclear reprocessing, atmospheric and marine contamination, and state hegemony. The inquiry saw the imaginary of nuclear utopianism become supplanted by the resistant dystopian renderings of the environmental movement and left-leaning political organisations, for whom nuclear technologies embodied an undesirable social, political, moral, and environmental future.

Public concerns regarding nuclear technologies reached a crescendo in 1983, when an ITV documentary entitled *Windscale: The Nuclear Laundry* published a series of harrowing claims regarding the purported links between nuclear technologies and excess cancer deaths amongst British children. This marked the beginning of an incredibly turbulent period in Sellafield’s history, catapulting the plant to international media attention. Briefly followed by the disastrous ‘beach incident’ of November 1983, whereby the Irish Sea became contaminated by the release of a large quantity of radioactive solvent which washed up along a 70-kilometre section of Cumbrian coastline.¹¹ Together, these two incidents shattered the illusion of nuclear utopianism, exemplifying the dystopian environmental and radiobiological consequences of

¹⁰ *Daily Mirror*, 21 October 1975, p. 1.

¹¹ This incident became known locally as the ‘beach incident’, although the contamination spread along a 70km section of coastline and multiple beaches were affected. The term ‘beach incident’ has been used to align with the name given by local citizens who used this term throughout the oral interviews.

nuclear technologies repeatedly admonished by anti-nuclear groups throughout the Windscale inquiry. At the national level, this saw a swell of resistant public sentiment towards Sellafield and nuclear technologies more broadly, as both incidents embedded a dystopian sociotechnical imaginary which stressed the hazardous environmental effects of nuclear power, emphasised the threat to public health through atmospheric and marine contamination, and inextricably linked radiation, and more specifically Sellafield with an exponential increase in local cancer cases. Locally however, the picture was more nuanced and contradictory, as citizens became socially dislocated between competing scientific claims and imagined futures.

Local citizens were forced to reconcile the presence of a highly toxic environmental contagion with the assurances of the nuclear industry which asserted that no public threat existed. This created a specific set of social conditions whereby the local population were dislocated between competing imagined nuclear futures, simultaneously at risk from the radiobiological and environmental effects of Sellafield, whilst safeguarded by the industry's operational and regulatory procedures which ensured that there was no threat to public health. Responding to this context, local citizens mobilised their innate knowledge of the local environment, their familiarity with aspects of nuclear science, and their experiences of the nuclear industry. Drawing upon this repository of knowledge, local citizens mediated between competing nuclear imaginaries by producing their own locally-specific understandings which were simultaneously the product of these imaginaries and their own experiential knowledge.¹² This contributed to an intensely localised form of nuclear culture which simultaneously acknowledged, resisted, and grappled with the environmental, biological, and socio-cultural

¹² This understanding develops the insights of Brian Wynne's work on Cumbrian sheep-farming communities in the aftermath of the Chernobyl disaster of 1986. The STIM framework offers a new way of thinking through and historicising his findings, observing the role of earlier British environmental incidents in framing social responses to Chernobyl. See Wynne, 'May the Sheep Safely Graze?', in Lash, Szerynski and Wynne, (eds.), *Risk, Environment, and Modernity*.

inequalities wrought by the nuclear industry, whilst recognising the region's dependency upon the plant, and its contribution to the local area.

Thesis Statement.

With its focus upon the production of 'British nuclear culture' and its localised variants, this project operates on a few different levels. First and foremost, this is a social and cultural history of the Sellafield site, born out of the dearth of literature on the social and cultural history of the British nuclear power programme, particularly the ordinary lived experience of everyday nuclear workers, and the lack of engagement with rural experiences of nuclear culture. With the recent historiographical trend towards a deeper appreciation of the range of British nuclear experiences and the localised variants of *nuclear cultures*, the thesis aims to redress the inherent urban bias within this literature and present the significance of rural experiences of the nuclear age.¹³

With this focus, the second key aspect of this research is to consider whether localised nuclear cultures emerged in the West Cumbrian context. I have found that citizens produced their own forms of nuclear culture by framing their experiences, geographies, and identities in relation to a set of sociotechnical nuclear imaginaries.¹⁴ This produced a unique and geographically specific series of cultural responses as citizens engaged with and co-produced diverse visions of desirable, or undesirable nuclear futures.

¹³ These historiographical developments will be considered in greater detail within the literature review.

¹⁴ Again, this will be elaborated on within a subsequent section which aligns the various methodological strands which informed this project.

Thirdly, the thesis identifies not only the range of cultural responses to nuclear technologies but the sociotechnical processes through which these were engendered. By engaging with the range of social responses towards Sellafield we gain a more detailed insight into the production of nuclear cultures as nuclear imaginaries originated and became embedded and resisted within society. This not only provides a framework for understanding the chronology of social attitudes towards nuclear power in Britain, but also the social processes behind their creation. This reflects the increasing engagement between scholars of nuclear history, who are committed to understanding how people responded to nuclear technologies and STS (Science, Technology and Society) studies, which seeks to understand the relationships between scientific knowledge, technological systems, and society. With this in mind, this thesis explores the diverse range of cultural expressions towards nuclear technologies, investigating how these expressions sat alongside and co-produced broader social attitudes towards nuclear technologies, society, and the state.

Literature Review.

Placing an overt focus on the experience of everyday life in a nuclear community, this thesis sits amongst an existing body of work on 'nuclear culture'. Scholars have increasingly eschewed military, political, and scientific approaches to the nuclear age, alternatively favouring social, cultural and psychoanalytical histories which have sought to emphasise the role of ordinary people as key agents of social change. This aligns with the conceptual framework of STIM which draws upon STS to examine the interconnected role(s) of society, state, science, and ordinary people in the production and dissemination of sociotechnical ideas. STIM shows that the physical, social, and ontological components of nuclear technologies are both social *products* and *producers*. Nuclear scholarship is well versed in the concept of nuclear technologies as a social product; many studies exist which historicise the role of nuclear

technologies within culture. In its recognition of these technologies as social agents, the existing literature is somewhat lacking, despite the radical implications this has for our understanding of nuclear culture. We must therefore be attentive to the ways in which nuclear technologies and knowledge both “embed and are embedded in social practices, identities, norms, conventions, discourses, instruments, and institutions- in short, in all the building blocks of what we term the social.”¹⁵

Analysing this process within the context of the nuclear complex at Sellafield, we are able to identify not only the range of cultural responses to nuclear technologies but also the sociotechnical processes through which these materialised. This subtly repositions studies of nuclear culture, aligning the approach of cultural historians who examine *how* everyday citizens responded to nuclear technologies with the conceptual tools of STS scholars, who seek to understand the relationships between scientific knowledge, technological systems, and society. This moves studies of nuclear culture towards a more detailed understanding of the social processes behind their creation. The STIM concept therefore offers a valuable tool for scholars of nuclear culture to interrogate how nuclear knowledge was shaped by the mutual imbrications of science and technology on the one hand, and society on the other. This sits between the work done by Margaret Gowing and Lorna Arnold upon nuclear institutions such as the UKAEA and BNFL and the more recent work of Jeff Hughes, Jon Hogg, and Kate Brown

¹⁵ S. Jasanoff, *States of Knowledge: The Co-Production of Science and Social Order* (London: Routledge, 2004), p. 3.

who have called for a more overt focus upon the role of society and ordinary people in the ‘co-production’ of nuclear meaning-making as agents of social change.¹⁶

Furthermore, I have also drawn upon interdisciplinary insights from cultural geography, highlighting the importance of place in understanding STIMs. Specifically, I have explored the role of space, place, and landscape in the production and embedding of nuclear imaginaries. In particular, I have examined how the spatial and material components of built and natural landscapes helped shape individual and collective identity, giving structure and agency to particular imagined nuclear futures. Identity makes up an important strand of this research project, as the development and operation of the nuclear industry shaped national, regional, and individual identities. These identities in turn, amplified or attenuated particular imaginaries as citizens identified the nuclear industry as representative of both desirable and undesirable futures. This once again identifies the centrality of STIM in understanding how the cultural, spatial, material, and ontological components of nuclear technologies interacted to produce divergent expressions of nuclear culture.

Recent trends within the field of nuclear culture have seen a move away from ‘top down’ histories of the nuclear age instead tracing the social and cultural changes instigated by the development of nuclear technologies. This scholarship originated in America in the 1980s with a series of pioneering research projects which foregrounded cultural studies of the nuclear, without specifically addressing ‘nuclear culture’ as a concept. This subsequently inspired and

¹⁶ M. Gowing, *Britain and Atomic Energy, 1935-1945* (London: Macmillan, 1964); M. Gowing, and L. Arnold, *Independence and Deterrence* (London: Palgrave, 1974); L. Arnold, *Britain and the H-Bomb* (London: Macmillan, 2001); Arnold, *Windscale 1957*; Hughes, ‘What is Nuclear Culture?’, pp. 495- 518; J. Hogg, and C. Laucht (eds.), ‘Introduction: British Nuclear Culture’, *British Society for the History of Science*, 45.4 (2012), pp. 479- 493; J. Hogg, and K. Brown, ‘Introduction: Social and Cultural Histories of the British Nuclear Mobilisation Since 1945’, *Contemporary British History*, 33.2 (2019), pp. 161- 169.

influenced a series of American scholars who considered nuclear culture in greater detail. This movement coalesced with the ‘cultural turn’ of the 1980s, and by the turn of the century there had been a large expansion of historical work examining the approaches, applications, and methods of ‘nuclear culture’.

The earliest work on nuclear culture, and perhaps the most influential within the field, was produced by Paul Boyer’s 1985 seminal work *By the Bomb’s Early Light*, which examined American reactions to the bombings of Hiroshima and Nagasaki, and the nascent vulnerabilities felt within the immediate aftermath and onset of the new ‘Atomic Era.’¹⁷ Whilst the term ‘nuclear culture’ was not coined until the work of Michael Messmer in 1988, Boyer produced one of the first histories which utilised an array of cultural sources, such as books, newspaper articles, radio broadcasts, films, and popular music as historical markers which trace “the nation’s mood” during the latter half of the 1940s.¹⁸ Boyer’s seminal study left an indelible mark on the field of nuclear culture, paving the way for future historians such as Spencer Weart, Allan Winkler, and more recently Jonathan Hogg who has specifically engaged with the British context.¹⁹ Across a series of articles and a monograph, Hogg traces the multitude of public responses to nuclear technologies during the ‘long’ twentieth century, arguing that the interaction between the ‘official’ narratives of the nuclear state and the more ‘unofficial’ narratives of everyday citizens had far-reaching consequences for national culture, as the British public confronted official government narratives with attempts to control, respond, resist, and represent the nuclear nation-state.²⁰ As nuclear historians have continued to move

¹⁷ P. Boyer, *By the Bomb’s Early Light: American Thought and Culture at the Dawn of the Atomic Age* (Chapel Hill: University of North Carolina Press, 1994).

¹⁸ M. Messmer, ‘Nuclear Culture, Nuclear Criticism’, *Minnesota Review*, 30.0 (1988), pp. 161–180.

¹⁹ S. Weart, *The Rise of Nuclear Fear* (Cambridge, Mass: Harvard University Press, 2012); A. Winkler, *Life Under a Cloud: American Anxiety About the Atom* (New York: Oxford University Press, 1993).

²⁰ J. Hogg, *British Nuclear Culture: Official and Unofficial Narratives in the Long 20th Century* (London: Bloomsbury Academic, 2016).

away from political, military, and scientific narratives and towards an understanding of the sociological, cultural, psychological, and ontological resonance of nuclear technologies, the concept of nuclear culture has been repeatedly disputed, interpreted, defined, and re-defined, pushing the ever-expanding theoretical and methodological frames of the field in their attempts to produce and refine a coherent definition of the topic.

The increasingly popularity of nuclear culture has resulted in a number of historiographical literature reviews of the concept which have reviewed the current scope and use of nuclear culture.²¹ Part of a special edition of the *British Journal for the History of Science* which highlighted the lack of coherence regarding definitions of ‘British Nuclear Culture’, Jonathan Hogg and Christoph Laucht sought to re-define the term as the “rich, complex, and contestable... interactions between nuclear science, technology, and British life.”²² More recently, Hogg and Kate Brown produced an introduction to a special issue of *Contemporary British History*, arguing that the social and affective imprint left by the introduction and subsequent permanence of nuclear infrastructure is too often relegated into broad contextual assumptions or journalistic metaphors, such as the ‘shadow of the bomb’ or the ‘mushroom cloud of fear.’²³ They contend that such phrases have been used to explain away the emotions and experiences of a generation, calling for a more thorough understanding of the complexities of the British nuclear story. These developments have seen the field of nuclear culture broaden in scope whilst becoming increasingly nuanced, with scholars engaging not only with the national as a frame of reference but also with the regional and local variants of nuclear *cultures*.

²¹ I recently co-authored a piece for Oxford Online Bibliographies which provided a theoretical and conceptual overview of some of the key texts in the field. See, H. Roberts, E. Gibbs, ‘Nuclear Culture’, Oxford Online Bibliographies: Military History. doi 10.1093/obo/9780199791279-0187.

²² Hogg, and Laucht, ‘Introduction: British Nuclear Culture’, pp. 479- 493.

²³ Hogg, and Brown, ‘Introduction: Social and Cultural Histories of the British Nuclear Mobilisation Since 1945’, pp. 161- 169.

Eschewing the monolithic treatment of individual national contexts, cultural scholars have attested to the pluralism of cultural life within the atomic era, outlining the competing attitudes and ideologies that comprised the period. In particular, Jeff Hughes argued that the definition of nuclear culture is too generalised and should be deconstructed and applied to local experiences and contexts. He critiqued the term's uncritical use as a broad, monolithic category which subsumed highly localised nuclear subjectivities within a catch-all umbrella term.²⁴ His work highlighted the existence of multiple nuclear cultures within Britain during the Cold war and exposed the pluralistic nature of British experiences, with an emphasis on their cultural and geographic variables. Hughes' influential article has seen a move towards localised studies of nuclear culture which have sought to highlight the regional and geographic variants of nuclear cultures. These have attempted to deconstruct ideas surrounding British nuclear culture further by focusing on the localised experiences of citizens nearby Sizewell Power Station, in inner-city London, and in Wales.²⁵ These publications all sought to assert the diversity of British nuclear culture, taking into account local cultures, economies, and ecologies to demonstrate the unique ways nuclear technologies impacted individual communities. Hugely important to my research, this emerging strand of nuclear culture scholarship advocates the exciting potential of intensely localised research centred around nuclear communities or nearby nuclear sites. These offer a more nuanced picture of nuclear culture, acknowledging the key roles geography and experience play in its formation.

²⁴ Hughes, 'What is British Nuclear Culture?', pp. 495- 518.

²⁵ Within the British context, Laucht and Johnes have attempted to diversify the term further, arguing that each of the 'four nations' within Britain developed and experienced their own nuclear cultures. (C. Laucht, and M. Johnes, 'Resist and Survive: Welsh Protests and the British Nuclear State in the 1980s', *Contemporary British History*, 33.2 (2019), pp. 226-245; C. Wall, 'Nuclear Prospects': the Siting and Construction of Sizewell A Power Station 1957-1966', *Contemporary British History*, 33.2 (2019), pp. 246- 273; H. Atashroo, 'Weaponising Peace: The Greater London Council, Cultural Policy and 'GLC Peace Year 1983'', *Contemporary British History*, 33.2 (2019), pp. 170- 186.

Through a focus on the local as a scale of enquiry, these studies have shown that nuclear knowledge and meaning making occur on an intensely localised level, often in interaction with national narratives. This thesis examines this assertion, tracing the production and evolution of social attitudes towards nuclear technologies in the immediate vicinity of the Sellafield nuclear complex. Lying at the heart of both nuclear weapons and energy production, Sellafield offers a nuanced case study to interrogate the local as a scale for the production of nuclear culture, whilst providing a rich historiographical insight into the complexities and ‘hidden histories’ of the British nuclear story. This acknowledges the current historiographical bias towards both urban histories of the nuclear age and histories of nuclear weapons. Scholars have thus far been captivated by the “fabulously textual” nature of the nuclear bomb, and despite limited work in this context, the history of nuclear power has all too often been treated as a passing concern or subsumed within analysis of nuclear weapons.²⁶ By focusing on the history of Sellafield as a nuclear power producing site, this thesis hopes to redress this imbalance and assert the significance of nuclear power as fuelling nuclear culture. Similarly, by focusing on a rural site the project bucks the trend of spatial studies of the nuclear age which are favourably weighted towards the urban context.

²⁶ J. Derrida, ‘No Apocalypse, Not Now (Full Speed Ahead, Seven Missiles, Seven Missives)’, *Diacritics*, 14.2 (1984), p. 23. For examples of the limited work that has been done on the socio-cultural history of nuclear power, see Wall, ‘Nuclear Prospects’, pp. 246- 273; F. Zonabend, *The Nuclear Peninsula* (Cambridge: Cambridge University Press, 1993); B. Wynne, ‘Misunderstood Misunderstanding’, pp. 281- 304; X. Fang, ‘Local People’s Understanding of Risk from Civil Nuclear Power in the Chinese Context’, *Public Understanding of Science*, 23.3 (2014), pp. 283– 298; G. Hecht, *The Radiance of France: Nuclear Power and National Identity After World War II* (Cambridge: MIT Press, 2009). Scholars are also increasingly interrogating the various elements of the nuclear fuel-cycle, see J. Hogg, “*Keep Orkney Active Not Radioactive*”: *Resistance to Uranium Mining on the Orkney Islands, 1971–1980* (Palgrave: forthcoming); G. Hecht, *Being Nuclear: Africans and the Global Uranium Trade* (Cambridge: MIT Press, 2012); K. Bickerstaff, “‘Because We’ve Got History Here’”: Nuclear Waste, Cooperative Siting, and the Relational Geography of a Complex Issue’, *Environment and Planning A*, 44.0 (2012), p. 2611– 2628; R. Benford, H. Moore, and J. Allen Williams, ‘In Whose Backyard?: Concern About Siting a Nuclear Waste Facility’, *Sociological Inquiry*, 63.1 (1993), pp. 30- 48.

During the Cold war, the city functioned as a strategic environment, both through its status as a potential enemy target and as a nexus for nuclear knowledge and meaning-making. Providing a useful introduction to the emerging field of the ‘nuclear city’, Matthew Farish and David Monteyne have examined the ways in which broader Cold war politics permeated the urban environment, presenting the city as a hub for anti-nuclear protest, public civil defence initiatives, battle simulations, and council interventions in national nuclear policy-making.²⁷ Whilst Matthew Farish has examined the role of the city as a strategic environment during the Cold war, thinkers such as Susanne Schregel and Eric Singer have explored the relationship between civil defence and local resistance within the city, as urban spaces became grounds for conflict between different social and political agendas.²⁸ Meanwhile, rural spaces served largely as the infrastructural framework for governmental nuclear and foreign policy, with nuclear power plants, weapons research centres, airfields, and long and short-term storage facilities located away from urban centres and in remote, often intensely rural locations.

Despite its huge infrastructural contribution to Britain’s nuclear history, the rural environment has received scant scholarly attention. The limited scholarship that does exist recognises the cultural significance of rurality, and has begun to trace the divergent nuclear attitudes, beliefs, and identities adopted by rural citizens, which are often more complex and

²⁷ M. Farish, and D. Monteyne, ‘Introduction: Histories of Cold War Cities’, *Urban History*, 42.4 (2015), pp. 564- 583.

²⁸ Scholars have also focused upon post-war urban planning, which saw the physical landscape and architecture of the city reimagined and redefined to adapt to the developing technologies of the nuclear age. Here, Hornsey has looked at the experience of London and the ways in which the city adapted new urban planning initiatives in the Cold War age. For further reading, see R. Hornsey, “‘Everything is Made of Atoms’: The Reprogramming of Space and Time in Post-war London”, *Journal of Historical Geography*, 34.0 (2008), pp. 94– 117. Elsewhere, Jennifer Light has investigated how military techniques and technologies informed strategies designed to tackle urban problems. See J. Light, *From Warfare to Welfare: Defence Intellectuals and Urban Problems in Cold War America* (London: John Hopkins University Press, 2003); also M. Farish, ‘Disaster and Decentralization: American Cities and the Cold War’, *Cultural Geographies*, 10.2 (2003), pp. 125– 148; S. Schregel, ‘Nuclear War and the City: Perspectives on Municipal Interventions in Defence (Great Britain, New Zealand, West Germany, USA, 1980-1985)’, *Urban History*, 42.4 (2015), pp. 564- 583; E. Singer, ‘Civil Defence in the City: Federal Policy Meets Local Resistance in Baltimore, 1957–1964’, *Urban History*, 42.4 (2015), pp. 547- 563.

nuanced than urban scholarship has made explicit. Much of this work highlights the vulnerability of rural communities to radioactive fallout from nuclear weapons and from the activities of the military-industrial complex, most of which was situated in rural areas. Using the nuclear bunker as a medium for analysis, Luke Bennett has explored how the dangers of fallout brought Cold war anxieties directly into rural communities by breaking down an existing urban/rural binary and contradicting spatial notions of urban centres as attack targets.²⁹ Similarly, Chris Perkins and Martin Dodge have argued that the verticality of satellite imagery served to regulate rural fears about nuclear attack by selectively removing rural military bases, nuclear and civil defence infrastructure and security installations from topographic maps and doctoring aerial images.³⁰ Another recent study by Rosanna Farbøl considers the rural environment's strategic military and civil defence function, examining the role of custom-built 'ruin towns' in Denmark which were used as a setting to culturally imagine and materially prepare for a post-nuclear attack scenario.³¹

Despite the apparent dearth of rural nuclear studies in the British context, there has been a degree of scholarly engagement with the nuclear bunker.³² Nuclear bunkers were often built in secret, remote locations in order to protect civil defence groups and ministers; whilst individual families often took it upon themselves to build and construct permanent or make-shift bunkers within the domestic dwelling. Historians have thus attempted to map the

²⁹ L. Bennett, 'Cold War Ruralism: Civil Defence Planning, Country Ways and the Founding of the UK's Royal Observer Corps' Fallout Monitoring Posts Network', *Journal of Planning History*, 17.3 (2017), pp. 205- 225.

³⁰ C. Perkins, and M. Dodge, 'Satellite Imagery and the Spectacle of Secret Spaces', *Geoforum*, 40.0 (2009), pp. 546- 560.

³¹ R. Farbøl, 'Ruins of Resilience: Imaginaries and Materiality Imagineered and Embedded in Civil Defence Architecture', in M. Cronqvist, R. Farbøl, and C. Sylvest, (eds.), *Cold War Civil Defence in Western Europe: Sociotechnical Imaginaries of Survival and Preparedness* (London: Palgrave MacMillan, [forthcoming 2021]).

³² For examples of studies on rural testing sites in the US, see J. Masco, *The Nuclear Borderlands: The Manhattan Project in Post-Cold War New Mexico* (Princeton: Princeton University Press, 2006), p. 12; V. Jones, *Manhattan, the Army and the Atomic Bomb* (Washington DC: Government Printing Office, 1985); P. Hales, *Atomic Spaces: Living on the Manhattan Project* (Chicago: University of Illinois Press, 1997).

meanings and representations of the nuclear bunker both during the Cold war and in the post-Cold war era. Luke Bennett has examined the physical, affective and symbolic role of nuclear bunkers during the Cold war, considering the uses and meanings of these nuclear spaces through notions of meaning-making, place-attachment, hobby practices, social materiality and trauma studies.³³ His previous work presented the nuclear bunker as a form of ‘cultural ark’, revealing through its form and content official efforts to assuage the public whilst ensuring the ongoing continuity of governance, offering an example of the British nuclear state in microcosm.³⁴ This study develops the insights contained within this work, acknowledging that rural citizens often held radically different attitudes towards nuclear technologies than their urban counterparts. As I will argue, due to the increased contact and familiarity with (and threat posed by) nuclear installations such as Sellafield, rural citizens experienced these technologies in different ways, producing intensely localised forms of nuclear culture which were the product of social imaginaries, socio-cultural identities, geographies, and experience, which form the major historical themes which inform my project.

There is a considerable amount of literature on identity in the nuclear context, with scholars turning their attention to the ways in which nuclear technologies both shaped and were shaped by notions of national identity.³⁵ Despite this, very few have interrogated the role of nuclear technologies in shaping individual or localised notions of identity. The limited

³³ L. Bennett (ed.), *In the Ruins of the Cold War Bunker: Affect Materiality and Meaning Making* (Maryland: Rowman and Littlefield, 2017).

³⁴ L. Bennett, ‘The Bunker: Metaphor, Materiality and Management’, *Culture and Organization*, 17.2 (2011), pp. 155–173.

³⁵ Gabrielle Hecht and Nick Ritchie have examined the Scottish and French contexts to argue that nuclear technologies co-produce shared notions of national identity, whilst studies by Baylis and Stoddart and Hymens have argued that nuclear decision-making was often the product of state leaders’ conceptions of national identity. See Hecht, *The Radiance of France*; N. Ritchie, ‘Nuclear Identities and Scottish Independence’, *The Non-proliferation Review*, 23.5 (2016), pp. 653–675; J. Baylis, and K. Stoddart, *The British Nuclear Experience: The Roles of Beliefs, Culture and Identity* (Oxford: Oxford University Press, 2014); J. Hymens, *The Psychology of Nuclear Proliferation: Identity, Emotions and Foreign Policy* (Cambridge: Cambridge University Press, 2002).

literature on this topic has thus far focused on studies of the technical identities of nuclear workers at the Livermore National Laboratory and in US, British, and Canadian contexts, whilst Kate Brown and Lindsay Freedman have explored the ways in which urban communities embraced nuclear identities.³⁶ In particular, Freedman observed that the US metropolis Oak Ridge in Tennessee developed a self-identification as the ‘Atomic City.’³⁷ Others, such as Joseph Masco have identified that nuclear technologies impose upon both individual and collective conceptions of identity and reveal the systems of power within society. In his 2006 study, *The Nuclear Borderlands*, Masco argues that “a close analysis of where nuclear projects are situated and how they are executed reveals a hidden aspect of the nuclear age, namely, the nuclear state's equation of citizenship [...] the social contexts informing nuclear projects therefore necessarily evoke questions about historical presence and identity, often of race and rights, always of citizenship and sacrifice.”³⁸ Masco goes on to argue that exposure to radiation has a profound impact upon individual identity, dislocating irradiated bodies from their past selves, “creating new social beings, and with them, new tactile experiences of everyday life.”³⁹

Through its subject focus on individuals who lived alongside and experienced nuclear technologies and radiation, this project develops these insights, arguing that local citizens responded to the context of nuclearisation by producing and expressing distinct forms of identity. Citizens constructed a sense-of-self which was the product of social representations of, and their own engagement with nuclear technologies and the state that controlled them. This

³⁶ S. Johnston, *The Neutron's Children: Nuclear Engineers and the Shaping of Identity* (Oxford: Oxford University Press, 2012); H. Gusterson, *Nuclear Rites: A Weapons Laboratory at the End of the Cold War* (California: University of California Press: 1998); K. Brown, *Plutopia: Nuclear Families, Atomic Cities, And the Great Soviet and American Plutonium Disasters* (Oxford: Oxford University Press, 2013).

³⁷ L. Freedman, *Longing for the Bomb: Oak Ridge and Atomic Nostalgia* (Chapel Hill: The University of North Carolina Press, 2015).

³⁸ J. Masco, *The Nuclear Borderlands*, p. 12.

³⁹ *Ibid.*, p. 32.

interpretation rests upon Roy Baumeister and Mark Muraven's interpretation of identity as “adaptation to social, cultural, and historical context.”⁴⁰ This advocates that individuals form an identity in response to a specific socio-cultural context (such as nuclearisation), producing a sense-of-self which allows them to exist within this context. This understanding places a greater emphasis on the role of experience in shaping nuclear culture, as citizens drew upon their experiences of nuclear technologies in the production and performance of coherent ‘selves’ and identities informed by the nuclear context.

Drawing heavily from the content of pre-existing (externally conducted) oral history interviews and those personally conducted, this project will demonstrate that local individuals held a unique set of experiences of living nearby or working alongside a nuclear facility, which shaped the cultural responses they held towards these technologies. Through the construction, day-to-day operation, management, or simply residing nearby nuclear facilities, ordinary people were (and are) implicated in the operation of nuclear facilities. This has been made clear within the existing literature, with Kate Brown examining the transnational links between two atomic cities in America and Russia, divided by politics and ideology, yet united through their nuclearity. Her study tells the stories of Ozersk in the Urals and the American nuclear facility in Richland, arguing that the shared experiences of nuclear production transcended ideological differences between the two cities and their inhabitants, inextricably linking them through their nuclear past and toxic legacies.⁴¹

Amongst nuclear workers and residents there often exists a set of shared knowledge, ways of working, collective experiences, and understandings which (whether implied or made

⁴⁰ R. Baumeister, and M. Muraven, ‘Identity as Adaptation to Social, Cultural, and Historical Context’, *Journal of Adolescence*, 19.0 (1996), pp. 405- 415.

⁴¹ Brown, *Plutopia*.

explicit) combine to form an operational culture amongst workers and communities linked to nuclear sites. Some of the existing research in this area focuses explicitly upon the Sellafield region, such as Brian Wynne's study which looks at the experience of sheep farmers in the Lake District, or Lorna Arnold's examination of both official and unofficial experiences of the 1957 Windscale fire.⁴² Adopting a sociotechnical approach to the rural nuclear context, Brian Wynne uses the experiences of Cumbrian sheep farmers to argue that lay expertise is often refuted, dismissed, and castigated by scientific and professional authorities who claim an 'exaggerated certainty' over the experience-based knowledge of lay peoples. Wynne argues that public trust in nuclear expertise is therefore characterised by lay experiences of dependency, alienation, and a perceived lack of agency, whilst remaining heavily mediated by the conduct of the industry.⁴³ Much of the literature in this field has come from sociology or STS and often focuses on the Eastern European context, with scholars such as Olga Kuchinskaya arguing that Belarussian citizens who experienced the Chernobyl disaster hold special knowledge about radiation.⁴⁴ This has been corroborated by Thom Davies' study within the exclusion zone surrounding Chernobyl, which found that radiation victims often contest official conceptions of radiation through local knowledge, shared memory, and informal activity."⁴⁵ Furthermore, Kate Brown's recent study of the exclusion zone has contested the narrative of ecological regeneration that has been noted in these accounts, attesting instead to the Soviet Union's suppression of the true radiobiological and environmental consequences of

⁴² Wynne, 'Misunderstood Misunderstanding,' pp. 281- 304; Arnold, *Windscale 1957*.

⁴³ Wynne, 'May the Sheep Safely Graze?'

⁴⁴ O. Kuchinskaya, 'Articulating the Signs of Danger: Lay Experiences of Post-Chernobyl Radiation Risks and Effects', *Public Understanding of Science*, 20.3 (2011), pp. 405– 421.

⁴⁵ T. Davies, 'A Visual Geography of Chernobyl: Double Exposure', *International Labour and Working-Class History*, 84.1 (2013), p. 116.

the incident. This she argues, has had contemporary ramifications upon reactor programmes throughout the world and the handling of reactor incidents, such as at Fukushima in 2011.⁴⁶

The majority of the work that focuses on the role of experience in shaping responses to nuclear technologies comes from the wider literature on studies of risk. Originating from Ullrich Beck's seminal 1986 study on 'risk society', many historians and sociologists have examined the ways in which nuclear experiences changed ideas surrounding risk and risk perception.⁴⁷ Unusually within nuclear studies, most of this research has thus far focused specifically on nuclear power, with studies identifying the role of experience in shaping lay perceptions of risk; specifically identifying the risk/benefit trade-off reasoning used by people living close to nuclear power plants.⁴⁸ Other works have focused upon the quantification of risk in relation to the proximity of a nuclear power plant. For example, Ian Welsh examined the NIMBY (not-in-my-backyard) phenomenon and the ways in which risk affected residents living in differing proximity from 'nuclear risks', whilst a host of other scholars have identified

⁴⁶ K. Brown, *Manual for Survival: A Chernobyl Guide to the Future* (New York: W.W. Norton and Company Ltd, 2019)

⁴⁷ U. Beck, *Risk Society: Towards a New Modernity* (London: SAGE Publishing, 1992); K. Parkhill, D. Venables, and P. Simmonds, 'From the Familiar to the Extraordinary: Local Residents' Perceptions of Risk When Living With Nuclear Power in the UK', *Transactions of the Institute of British Geographers*, 35.1 (2010), pp. 39- 58; D. Venables, N. Pidgeon, K. Parkhill, (et al.), 'Living with Nuclear Power: Sense of Place, Proximity, and Risk Perceptions in Local Host Communities', *Journal of Environmental Psychology*, 32.0 (2012), pp. 371- 383; F. Diaz-Maurin, 'Chronic Long-term Risk of Low-level Radiation Exposure: Bridging the Lay/expert Divide', *Bulletin of the Atomic Scientists*, 74.5 (2018), pp. 335- 339.

⁴⁸ Fang, 'Local People's Understanding of Risk', pp. 283– 298; S. Malin, 'When is Yes to the Mill Environmental Justice? Interrogating Sites of Acceptance in Response to Energy Development', *Analyse & Kritik*, 36.2 (2014), pp. 263- 286.

geography as a vital factor in shaping social attitudes towards risk.⁴⁹ These insights have informed my understanding of the role of geography in the production of nuclear culture, as proximity, space, and place intersect to inform the range of cultural responses towards nuclear technologies.

‘Space’, ‘place’, and ‘landscape’.

The project draws upon a number of insights from cultural geography to conceptualise the role of the physical environment within and around Sellafield as an important social agent in the production and dissemination of nuclear imaginaries, cultures, and identities. Previous historical scholarship has attested to the vital significance of place within both Cold war and nuclear history. Gabrielle Hecht has argued that “it is impossible to view nuclear technology as a separate whole that exists apart from the social, political, and spatial relations that bring it to life.”⁵⁰ Likewise, Becky Alexis-Martin and Thom Davies remarked that it is becoming increasingly “important to examine how nuclear technology interacts with space and place, inhabiting a wide range of geographic scales.”⁵¹ Despite this, historical studies within the existing literature have tended to reduce nuclear places to “mere sites or settings for human

⁴⁹ I. Welsh, ‘The NIMBY Syndrome: Its Significance in the History of the Nuclear Debate in Britain’, *The British Journal for the History of Science*, 26.1 (1993), pp. 15- 32; Benford, Moore, and Allen-Williams, ‘In Whose Backyard?’, pp. 30- 48; Fang, ‘Local People’s Understanding of Risk’, pp. 283– 298; W. Freudenburg and D. Davidson, ‘Nuclear Families and Nuclear Risks: The Effects of Gender, Geography, and Progeny on Attitudes toward a Nuclear Waste Facility’, *Rural Sociology*, 72.2 (2007), pp. 215– 243; M. Lima, ‘On the Influence of Risk Perception on Mental Health: Living Near an Incinerator’, *Journal of Environmental Psychology*, 24.0 (2004), pp. 71– 84; J. Eiser, J. van der Plight, and R. Spears, *Nuclear Neighbourhoods: Community Responses to Reactor Siting* (Exeter: University of Exeter Press, 1995); J. Baxter, and D. Lee, ‘Understanding Expressed Low Concern and Latent Concern Near a Hazardous Waste Treatment Facility’, *Journal of Risk Research*, 7.7-8 (2004), pp. 705- 729; Bickerstaff, “‘Because we’ve got History Here””, p. 2611– 2628; K. Bickerstaff P. Simmonds, ‘Absencing/Presencing Risk: Rethinking Proximity and the Experience of Living with Major Technological Hazards’, *Geoforum*, 40.0 (2009), pp. 864– 872.

⁵⁰ Hecht, *Being Nuclear*.

⁵¹ B. Alexis-Martin, and T. Davies, ‘Towards Nuclear Geographies: Zones, Bodies, and Communities’, *Geography Compass*, 11.9 (2017), p. 2.

action”, largely omitting discussions of the power of place in shaping everyday behaviour and culture.⁵² Whilst historical approaches have been guilty of prioritising history over place, the literature from geography, psychology, and sociology has tended to neglect the “meaning of a place at a particular historical moment.”⁵³ Acknowledging these oversights, I will apply a new conceptual framework that integrates geographic work on the meaning of ‘space’ with more recent scholarship on ‘landscape’ to argue that the physical infrastructure of the Sellafield project played a vital role in co-producing and embedding nuclear imaginaries. This makes a further point about the utility of spatial studies of nuclear culture, which are lacking within the British context. By engaging in the significance of nuclear spaces in the shaping of the British nuclear story, this project hopes to add a new dimension to studies of nuclear culture, calling for a more thorough appreciation of the ways in which the physical environment has shaped and been shaped by the production of British nuclear culture.

This approach follows the work of Doreen Massey, who asserted that places should be treated “in terms of the social relations which they tie together”, offering a unique point at the intersection between social relations “constructed on a far larger scale than what we happen to define for that moment as the place itself.”⁵⁴ By treating Sellafield as a place, we begin to see how it performed cultural work within local and national contexts. This rests upon W.J.T. Mitchell’s understanding of ‘landscape’, a term he used to describe how space and place functioned as an adjective rather than a verb, “not as an object to be seen or be read” but “as

⁵² M. Page, *The Creative Destruction of Manhattan* (Chicago: University of Chicago Press, 2001), p. 252. A notable exception to this is Linda Ross’ recently completed PhD thesis, which examines the physical and social environments of the Dounreay nuclear complex in Scotland. See, L. Ross, ‘*Nuclear Fission and Social Fusion: The Impact of the Dounreay Experimental Research Establishment on Caithness, 1953-1966*’, PhD thesis, (University of the Highlands and Islands, 2019), available at <<https://pure.uhi.ac.uk/en/studentTheses/nuclear-fission-and-social-fusion>> [accessed 22 January 2020].

⁵³ Page, *The Creative Destruction*, p. 253; Alexis-Martin and Davies, ‘Towards Nuclear Geographies,’ pp. 1- 13.

⁵⁴ D. Massey, *Space, Place and Gender* (Cambridge: Polity Publishing, 1994), pp. 153ff.

commodity and potent cultural symbol” actively at work within society.⁵⁵ Mitchell’s definition argues that, when locations are viewed as landscapes, the cultural work that space and place perform is revealed. If space tells us what actions happen within a place, landscape tells us that these actions have a cultural significance because they reveal the power relations that exist within space, whilst actively perpetuating them. Sellafield therefore exists in both material and cultural realms. It is neither mere bricks and mortar nor an area of pure subjectivity but a cultural site actively engaged in the production of social attitudes towards nuclear technologies. This forms a key concept within this study as I seek to interrogate the role of the built and physical environment in the production of nuclear culture. This identifies the interactions between the built, constructed landscapes of the nuclear industry with the natural landscapes of the rural community in which they were located as a key area in the formation of nuclear identity and the structuring of imagined futures.

Scholarship from cultural geography has shown that the places we inhabit form a key role in the way in which we perceive ourselves and the identities we construct. Specifically, Doreen Massey has shown that identities are inextricably linked with spatiality, whilst Matless has claimed that landscape functions “as a vehicle of social and self-identity.”⁵⁶ Exploring this concept in the English context, David Matless argues that the English landscape functions as a vehicle for specific projections of national identity, showing that both the built and seemingly ‘natural’ world around us function in the production of socio-cultural identities. This insight forms a key contribution within this project as I seek to foreground the role of place in characterising attitudes towards nuclear technologies. Whilst Matless’ work focuses on the national scale, a number of historical works have engaged with this theoretical slant in an

⁵⁵ W. Mitchell, *Landscape and Power* (Chicago: University of Chicago Press, 2002), pp. x, 1.

⁵⁶ D. Massey, *For Space* (London: Sage, 2005); D. Matless, *Landscape and Englishness* (London: Reaktion, 2016), p. 29.

increasingly localised context, examining the role of specific locations in the production of rural identity. Research in this area has seen individual sites identified as key producers of rural identities, with Mark Riley exploring the farm as a nexus for community memory and identity, and Marianna Dudley analysing the Severn Bore as a place in which (counter) cultural knowledge and identities intersect.⁵⁷

Dudley is one of a number of scholars who have interrogated the social imprint left by militarised landscapes throughout Britain. In her comparative research on five military bases, she identified that Jeffrey Sasha Davis' idea of 'double erasure' characterised the experiences of communities evicted from military sites throughout the UK. Here, she argued that the military erased the social histories of the lands they inhabited, then sought to minimise the visibility of their presence within them, preferring to depict the environmental biodiversity within the lands they occupied.⁵⁸ This informed my approach to researching the Sellafield site, which found that local farming communities were physically and culturally written out of the landscapes in which they occupied, as their interests (both material and cultural) were subsumed in favour of the machinations of the military-industrial nuclear complex. Whilst Dudley's research identifies the gradual 'greening' and rise of environmentalism within the MoD, I found that farmers' losses were then subsumed within discourses of state protection and Britain's post-war ascendancy. The military presence was not erased from the site, but was symbolically legitimated by reference to the military and political needs of the nation. In this

⁵⁷ M. Riley, 'Emplacing the Research Encounter: Exploring Life Histories', *Qualitative Inquiry*, 16.8 (2010), pp. 651 - 662; M. Riley, and D. Harvey, 'Oral Histories, Farm Practice and Uncovering Meaning in the Countryside', *Social and Cultural Geography*, 8.3 (2007), pp. 391- 417; M. Dudley, 'River of Many Voices: Oral and Environmental Histories of the Severn', in K. Holmes, and H. Goodall, (eds.), *Telling Environmental Histories: Intersections of Memory, Narrative and Environment* (London: Palgrave MacMillan, 2017), pp. 81-106.

⁵⁸ M. Dudley, *An Environmental History of the UK Defence Estate: 1945 to the Present* (London: Bloomsbury, 2014), p. 164; J. Davis, J. Hayes-Conroy, and V. Jones, (eds.), 'Military Pollution and Natural Purity: Seeing Nature and Knowing Contamination in Vieques, Puerto Rico', *GeoJournal*, 69.0 (2007), pp. 165– 79.

way, the military presence became an accepted part of everyday life in the local area, informing localised identity by foregrounding the plant's contribution to the prosperity of the nation.

Elsewhere, Chris Pearson, Peter Coates, and Tim Cole have examined how militarised landscapes play an important role in shaping national and regional identities, as control over, and the use and purpose of land prioritises certain interests and subjugates certain groups.⁵⁹ This has been explored in the nuclear context by Andrew Blowers, who argues that nuclear technologies signify and perpetuate rural identities by inscribing a set of unequal power relations upon 'peripheral' host communities from urban 'centres'. He attests that nuclear infrastructure contributes to a specific socio-cultural identity amongst host communities who identify these developments within a broader sense of powerlessness from mainstream political decision-making and society.⁶⁰ Taking inspiration from this context, we can see how the remoteness of the Sellafield site informed the way in which local citizens conceptualised the nuclear project and their status within British society. Marianna Dudley's recent article on the production and development of wind power in Orkney has shown that energy production had the means of subverting traditional 'core'/'periphery' power structures and disrupting the flow of power from the urban centre to the rural 'edgelands' or 'periphery'.⁶¹ For some, Sellafield became a means of connecting the remote West Cumbrian region with the wider nation, serving as an altruistic representation of West Cumbria's central importance within post-war British

⁵⁹ C. Pearson, P. Coates, and T. Cole, (eds.), *Militarized Landscapes: From Gettysburg to Salisbury Plain* (London: Continuum Publishing, 2010); C. Pearson, 'Researching Militarized Landscapes: A Literature Review on War and the Militarization of the Environment', *Landscape Research*, 37.1 (2012), pp. 115- 133; C. Pearson, 'Reservoirs, Military Bases and Environmental Change: Joining the Dots', in P. Coates, D. Moon, and P. Warde, (eds.), *Local Places, Global Processes* (Oxford: Windgather, 2016), pp. 188- 198.

⁶⁰ A. Blowers, *The Legacy of Nuclear Power* (London: Routledge, 2016); A. Blowers, and P. Leroy, 'Power, Politics and Environmental Inequality: A Theoretical and Empirical Analysis of the Process of Peripheralisation,' *Environmental Politics*, 3.2 (1994), pp. 197- 228; A. Blowers, 'Why Dump on us? Power, Pragmatism and the Periphery in the Siting of New Nuclear Reactors in the UK', *Journal of Integrative Environmental Sciences*, 7.3 (2010), pp. 157- 173.

⁶¹ M. Dudley, 'The Limits of Power: Wind Energy, Orkney, and the Post-war British State', *Twentieth Century British History*, 31.2 (2020), pp. 316- 229.

society. For others, the remote siting of the Sellafield complex mirrored the region's socio-economic dependence (and subservience towards) the 'core'. By siting the complex about as far from major urban centres as is physically possible within the relatively dense geographies of England, the nuclear complex reproduced the socio-spatial inequalities of the periphery by locating a potentially hazardous industry within a rural area seemingly deemed of less value to society. This committed the region to a long-term reliance upon a single state-run industry and overrode centuries of historical land-use and local attachments to place. This served to reproduce the socio-cultural identities of the region as 'peripheral' - at once *a part of* British society as an energy producer and *apart from* the mainstream as the expendable host of a dangerous new industry. As I will go on to demonstrate, this subjective identity became embroiled within imagined visions of the future, attenuating dystopian nuclear imaginaries by speaking to an undesirable local future of cultural, economic, environmental, and radiobiological subjugation at the hands of the nuclear state.

This insight dovetails with a growing body of work examining the rural identities of communities 'on the edge lands' or 'periphery.'⁶² Some of this literature is concerned with the socio-economic inequalities of energy production, with studies by Dudley and Hogg focusing on the issue of wind energy and uranium mining in the Scottish island of Orkney, whilst Rebecca Wheeler has examined how windfarms have impacted rural notions of identity in Cumbria, Cornwall, and Norfolk.⁶³ In particular, Dudley uses the case study of Orkney to highlight the "influence of geographical edges as materially and imaginatively capable of

⁶² M. Kuhn, 'Peripheralization: Theoretical Concepts Explaining Socio-Spatial Inequalities', *European Planning Studies*, 23.2 (2015), pp. 367- 378. The term 'edge lands' was introduced in 2002 by Marion Shoard, see (M. Shoard, 'Edgelands' in J. Jenkins, (ed.), *Remaking the Landscape* (London: Profile Books, 2002).

⁶³ Hogg, "*Keep Orkney Active Not Radioactive*"; R. Wheeler, 'Reconciling Windfarms with Rural Place Identity: Exploring Residents' Attitudes to Existing Sites', *Sociologia Ruralis*, 57.1 (2017), pp. 110- 132.

disrupting a narrative of one-way power emanating from the centre.”⁶⁴ The fourth and fifth chapters of this study in particular show how environmental and grass-roots activism from the periphery came to challenge the state’s handling of nuclear technologies, with the environment mobilised as a key contact zone between disaffected locals and the state. This sits within an emerging body of work on ‘energy landscapes’, which seeks to historicise the relationships between energy production and the public. At the forefront of this literature is Rebecca Wright, who has recently written that energy production has a complex and nuanced history which is inherently ingrained within the social and emotional life of the British public.⁶⁵ Other studies of the ‘periphery’ have focused upon the impact of environmental disaster upon rural identities, specifically, work by Tim Cooper and Anna Green on the Torrey Canyon oil spill of 1967 has shown that the state’s handling and treatment of the local environment and people perpetuated identities of difference between the Cornish public and the rest of British society.⁶⁶ Serving as both the site of a major environmental disaster (Windscale 1957) and as a semi-militarised landscape engaged in the production of energy, my treatment of Sellafield has been greatly informed by these studies which advocate the utility and exciting potential of marrying historical environmentalism and cultural geography, particularly when examining the role of place in producing elements of identity and culture.

Focusing on the way in which geography, identity, and experience shape the production of nuclear culture, this project reflects recent methodological shifts within the field of nuclear culture, which have seen scholars interrogate not only the range of cultural expressions of the

⁶⁴ Dudley, 'The Limits of Power', p. 316.

⁶⁵ R. Wright, 'Mass Observation and the Emotional Energy Consumer', *Canadian Journal of History*, 53.3 (2018), pp. 423- 449.

⁶⁶ A. Green, and T. Cooper, 'Community and Exclusion: The Torrey Canyon disaster of 1967', *Journal of Social History*, 48.4 (2015), pp. 892- 909; T. Cooper, and A. Green, 'The Torrey Canyon Disaster, Everyday Life, and the “Greening” of Britain', *Environmental History*, 22.1 (2017), pp. 101- 126.

nuclear, but also the way in which these cultures were co-produced within society as ordinary citizens produced nuclear knowledge. The most recent literature on nuclear culture has refined and broadened the field, starting to trace the ways in which nuclear knowledge “both embeds and is embedded in social practices, identities, norms, conventions, discourses, instruments and institutions.”⁶⁷ This definition reflects a growing engagement with STS, which is engaged with understanding the relationships between scientific knowledge, technological systems, and society. Taking inspiration from this cross-disciplinary context, this thesis is located within this broader trend, sitting across the field of nuclear culture and broader STS literature, specifically the work of Sheila Jasanoff and Sang-Hyun Kim and their notion of the sociotechnical imaginary (STIM).

Using the STIM Model in Nuclear History.

Seeking to understand the evolution and permanence of nuclear technologies as part of the cultural framework of British life during the twentieth century, I have employed the framework of the ‘sociotechnical imaginary’ as an outline for analysis.⁶⁸ Coalescing with very recent work in the field of civil defence history, this concept offers an analytical framework that showcases the dynamic interplay between science, technology, materiality, culture, and politics in contemporary society. Jasanoff has shown that STIM “helps explain a number of otherwise troublesome problems: why do technological trajectories diverge across polities and

⁶⁷ Hogg, and Brown, ‘Introduction: Social and Cultural Histories of the British Nuclear Mobilisation Since 1945’, pp. 161- 169.

⁶⁸ For their full works on STIM, see S. Jasanoff, ‘Imagined and Invented Worlds’, in S. Jasanoff, and S. Kim, (eds.), *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power* (Chicago: University of Chicago Press, 2015); S. Jasanoff, and S. Kim, ‘Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea’, *Minerva*, 47.2 (2009), pp. 119- 146; S. Jasanoff, ‘Future Imperfect: Science, Technology, and the Imaginations of Modernity’, in Jasanoff, and Kim, (eds.), *Dreamscapes of Modernity*, pp. 1- 33; S. Jasanoff, *States of Knowledge: The Co-Production of Science and Social Order* (London: Routledge, 2004), p. 3.

periods [history]; what makes some sociotechnical arrangements more durable than others [culture]; how do facts and technologies transcend and reconstruct time and space [geography]; and what roles do science and technology play in connecting the individual's subjective self-understanding to a shared moral and social order [identity]?"⁶⁹ STIM therefore aligns with the key themes which lie at the heart of this research project and can be used to investigate the areas of history, scale, cultural production, geography, and identity.

Specifically, I will use STIM to show how social attitudes towards nuclear technologies emerged, were embedded and resisted over time. This offers a new lens through which to consider the chronology of social attitudes towards nuclear technologies throughout the twentieth century and also the social processes behind their creation. This thesis therefore aims to show the analytical potential of this interdisciplinary approach for scholars of nuclear history, identifying not just the diverse range of cultural expressions towards nuclear technologies, but also how these expressions sat alongside and co-produced broader social attitudes towards nuclear technologies, society, and the state.

Taking its lead from the terms 'sociotechnical', understood as the interplay between science, technology, and social life, and 'imaginary', a set of collective beliefs about "futures that should or should not be realised", the 'sociotechnical imaginary' refers to the social processes through which society desires and prioritises certain futures above others.⁷⁰ In her most recent formulation, Jasanoff defines sociotechnical imaginaries as:

⁶⁹ Jasanoff, 'Future Imperfect', in Jasanoff, and Kim, (eds.), *Dreamscapes of Modernity*, p. 5.

⁷⁰ *Ibid.*, p. 6. This builds upon Benedict Anderson's notion of the nation state as an "imagined community", held together through the imaginations of people who perceive themselves to be members, and Charles Taylor's idea that these structures are sustained by collective practices, stories, and ideas. See, B. Anderson, *Imagined Communities* (London: Verso, 1983), and C. Taylor, *Modern Social Imaginaries* (Durham: Duke University Press, 2003).

“collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order through, and supportive of, advances in science and technology.”⁷¹

This definition aligns the focus on utopias and dystopias within political theory and cultural studies and offers up a “sophisticated understanding of the role of science and technology in social life.”⁷² Underpinning this definition is the idiom of ‘co-production’, through which nuclear technologies appear as an active social agent capable of diverse cultural work. Co-production can be understood as a two-way dynamic through which “scientific knowledge... both embeds and is embedded in social practices, identities, norms, conventions, discourses, instruments, and institutions.”⁷³ Through this rubric, nuclear “knowledge and its material embodiments [are] at once products of social work and constitutive of forms of social life.”⁷⁴ In other words, nuclear knowledge and material artefacts are both social products and social producers. This is an important point. As Peter Bennesved and Casper Sylvest note, whilst “it is a common inclination to identify social effects of specific technologies [...] the reverse dynamic- how social practices, norms, identities and institutions shape specific understandings of our responses to a technology- appears less habitual.”⁷⁵ In recognition of this, the project observes how nuclear technologies were in turn co-produced by society, using the life-cycle model as a structure to observe interactions between nuclear science and British society.

⁷¹ Jasanoff, ‘Future Imperfect’, in Jasanoff, and Kim, (eds.), *Dreamscapes of Modernity*, p. 4.

⁷² M. Cronqvist, R. Farbøl, and C. Sylvest, ‘Introduction: New Directions in Civil Defence History,’ in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*, p. 9.

⁷³ Jasanoff, ‘Future Imperfect’, in Jasanoff, and Kim, (eds.), *Dreamscapes of Modernity*, p. 3.

⁷⁴ S. Jasanoff, ‘The Idiom of Co-Production’, in S. Jasanoff (ed.), *States of Knowledge: The Co-Production of Science and Social Order* (London: Routledge, 2004), pp. 2f.

⁷⁵ P. Bennesved, and C. Sylvest, ‘Embedding Preparedness, Assigning Responsibility: The Role of Film in Sociotechnical Imaginaries of Civil Defence’, in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*, p. 29.

Having made some suggestions regarding the analytical potential of the STIM model within studies of nuclear culture, I will now outline its key utility within the context of this project, specifically using the life-cycle model of STIM as a framework for understanding the trajectory of social responses to nuclear technologies within Britain and the spread and flow of nuclear ideas across both time and space. This approach was greatly informed by a series of discussions and roundtables during August 2019 and February 2021 at two separate conferences which led to the formation of the *Cold War Civil Defence* book project.⁷⁶ In these discussions, it was proposed that the life-cycle model offered a framework exploratory and spacious in nature; something to thinking with(in) rather than a theory or concept to be mechanically applied. It was an important distinction that the theory was not to become a straitjacket. With this in mind, the life-cycle model offers a heuristically useful structure for analysing the operation and life-cycle of STIMs.⁷⁷ By understanding how nuclear ideas originated, were embedded into society, and encountered resistance, we gain a greater insight into the temporality of nuclear knowledge, charting not only how cultural attitudes towards these technologies evolved, but why they did so.

Attempting to give shape to this process, Jasanoff offers an explorative structure for understanding the life-cycle of sociotechnical imaginaries. Compartmentalising this process into four distinct phases, Jasanoff explores how imaginaries “*originate* in the visions of single individuals or small collectives”, rising to the status of an imaginary when “the originator’s

⁷⁶ M. Cronqvist, R. Farbøl, and C. Sylvest, (eds.), *Cold War Civil Defence in Western Europe: Sociotechnical Imaginaries of Survival and Preparedness* (London: Palgrave MacMillan, [forthcoming 2021]).

⁷⁷ This also borrows from developments contained within previous drafts of the manuscript introduction and email exchanges between the author and one of the editors. ‘Personal Correspondence between H. Roberts and R. Farbøl,’ dated 26 February 2019; 26 March 2019; 7 October 2019.

vanguard vision comes to be communally adopted” through a process known as *embedding*.⁷⁸ Here, imaginaries become interwoven into the fabric of everyday life as “collectively held, institutionally stabilised, and publicly performed visions of desirable futures.”⁷⁹ These imaginaries are then subject to contest and *resistance* by individuals and social groups, who may oppose any part of these imaginaries, ranging from “specific policies to visions of the future and their underlying social norms.”⁸⁰ This can be traced within large organisations or within the subtle activities of ordinary people within daily life, remembering James Scott’s point that “those with power... are not, however, in total control of the stage. They may write the basic script for the play but, within its confines, truculent or disaffected actors find sufficient room for manoeuvre to suggest subtly their disdain for the proceedings.”⁸¹ The fourth and final stage is *extension*, which deals with how imaginaries are moved from one spatial setting to another, often with the help of “translation agents” who redefine these imaginaries in the process of applying them within another context.⁸² In this thesis, the embedding and resistance phases are particularly useful in helping us reveal the British public’s complicated relationship with nuclear technologies and helping us understand how these technologies represented a series of desirable political, social, and cultural futures, whilst also forming a fertile site of political, environmental, and cultural resistance.

⁷⁸ Jasanoff, ‘Future Imperfect’, in Jasanoff, and Kim, (eds.), *Dreamscapes of Modernity*, p. 4.

⁷⁹ *Ibid.*, p. 4.

⁸⁰ Cronqvist, Farbøl, and Sylvest, ‘New Directions’, p. 12.

⁸¹ J. Scott, *Weapons of the Weak: Everyday Forms of Peasant Resistance* (Yale: Yale University Press, 1987), p. 26.

⁸² S. Jasanoff, ‘Imagined and Invented Worlds’, in S. Jasanoff, and S. Kim, (eds.), *Dreamscapes of Modernity*, p. 333. Elaborating on this concept, Jasanoff and Kim co-authored a piece comparing nuclear power in trans-national contexts. (See, S. Jasanoff, and S. Kim, ‘Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea’, *Minerva*, 47.2 (2009), pp. 119- 146.) The extension stage of the life-cycle model does not feature heavily within the project, owing to the treatment of the concept within the aforementioned study, and its limited utility within the context of an extremely localised project.

The life-cycle model structures our understanding of social attitudes towards nuclear technologies by displaying their evolution as part of a process. To this end, previous scholars have produced useful models that attempt to understand the historical arc of attitudes towards nuclear technologies, dividing the second half of the twentieth century into distinct ‘ages’- those of ‘innocent expectation’, ‘doubt’, ‘anguish’, and ‘public justification’; or ‘discourses’- ‘trust in technology’, ‘danger and distrust’, ‘consensus and co-operation’, and ‘security.’⁸³ Instructive as these are, they divide the nuclear half-century into neat categorisations which fail to account for the complexity of these positions, nuances of scale, and largely omit the role of ordinary citizens in shaping these changes. These represent a more socially deterministic approach which sees this periodisation as the product of single events rather than complex, conflicting, and competing social forces. The lens of the sociotechnical imaginary simultaneously challenges the chronologies these models offer, and conceives of shifting attitudes, not as products of random events, but of discernible social forces in the life-cycle and evolution of nuclear power as a sociotechnical imaginary.

This approach sits within a nascent body of work applying STIM in multiple national and historical contexts. Over the last two years several journal articles have appeared which examine STIM in areas such as marine diplomacy (Robinson and Orsini), public ‘crisis discourses’ (Kalmbach, Marklund, and Åberg), industrial development (Schiølin), airspace (Lawless), governmentality (Smallman), and climate change (Levidow and Raman, and

⁸³ T. O’Riordan, ‘The Prodigal Technology: Nuclear Power and Political Controversy’, *The Political Quarterly*, 59.2 (1988), pp. 161- 177; Blowers, *The Legacy of Nuclear Power*.

Sovacool et al).⁸⁴ In particular, two special issues have focused on the role of imaginaries in connecting social and technological orders.⁸⁵ Christopher Lawrence examines how satellite and remote sensing of nuclear facilities in South-West Asia fed into American national imaginaries of global transparency and temperate foreign policy.⁸⁶ Maxime Polleri has also focused on nuclear science, examining public controversies of nuclear power and radiation in post-Fukushima Japan. Polleri argued that “there is an increasing need for studies which are attentive to the ways in which nuclear infrastructure, its governance and the rationalisation of radioactive contamination risks are enmeshed in specific ways”, as well as a more detailed interest in how these relationships manifest at ground level amongst ordinary citizens; both of which align with the research aims for this project.⁸⁷

⁸⁴ S. Robinson, ‘Scientific Imaginaries and Science Diplomacy: The Case of Ocean Exploitation’, Special Issue: Global Perspectives on Science Diplomacy, *Centaurus*, [forthcoming], pp. 1- 21; D. Orsini, ‘Signs of Risk: Materiality, History, and Meaning in Cold War Controversies over Nuclear Contamination,’ *Comparative Studies in Society and History*, 62.3 (2020), pp. 520– 550; K. Kalmbach, A. Marklund, and A. Åberg, ‘Crisis and Technological Futures: Experiences, Emotion, and Action,’ *Technology and Culture*, 61.1 (2020), pp. 272-281; K. Schiølin, ‘Revolutionary Dreams: Future Essentialism and the Sociotechnical Imaginary of the Fourth Industrial Revolution in Denmark’, *Social Studies of Science*, 50.4 (2020), pp. 542– 566; C. Lawless, ‘Assembling Airspace: The Single European Sky and Contested Transnationalities of European Air Traffic Management’, *Social Studies of Science*, 50.4 (2020), pp. 680- 704; M. Smallman, “Nothing to do with the Science”: How an Elite Sociotechnical Imaginary Cements Policy Resistance to Public Perspectives on Science and Technology Through the Machinery of Government’, *Social Studies of Science*, 50.4 (2020), pp. 589- 608; L. Levidow, and S. Raman, ‘Sociotechnical Imaginaries of Low-Carbon Waste-Energy Futures: UK Techno-market Fixes Displacing Public Accountability’, *Social Studies of Science*, 50.4 (2020), pp. 609- 641; B. Sovacool (et al.), ‘Imagining Sustainable Energy and Mobility Transitions: Valence, Temporality, and Radicalism in 38 Visions of a Low-Carbon Future’, *Social Studies of Science*, 50.4 (2020), pp. 642- 679.

⁸⁵ At the time of writing, one of these issues has not yet been published, but an advanced copy of one of the articles can be accessed online. (S. Robinson, ‘Scientific Imaginaries and Science Diplomacy: The Case of Ocean Exploitation’, Special Issue: Global Perspectives on Science Diplomacy, *Centaurus*, [forthcoming], pp. 1- 21. The other is detailed in the citation above.)

⁸⁶ C. Lawrence, ‘Heralds of Global Transparency: Remote Sensing, Nuclear Fuel-cycle Facilities, and the Modularity of Imagination’, *Social Studies of Science*, 50.4 (2020), pp. 508- 541.

⁸⁷ M. Polleri, ‘Post-political Uncertainties: Governing Nuclear Controversies in Post Fukushima Japan’, *Social Studies of Science*, 50.4 (2020), p. 571.

Many of these studies have acknowledged that imaginaries are “typically contested, changeable, flexible and loose around the edges.”⁸⁸ Indeed, in a forthcoming edited collection, Marie Cronqvist and Matthew Grant recognise that “more attention has to be paid to the quotidian, messy, and partial ways [STIMs] were understood and sometimes rejected in everyday life”, arguing that ordinary life was characterised by a distinct “fuzziness” as STIMs were enacted and played out amongst ordinary people.⁸⁹ At the crest of this new wave of thinking, this forthcoming edited collection looks at the role of sociotechnical imaginaries of survival and preparedness, examining how imaginaries of Cold war civil defence manifested in various national contexts throughout Western Europe.

Focusing on West Germany, Britain, the Netherlands, Denmark, Switzerland, Sweden, and NATO affiliated nations such as the US, this edited collection explores how civil defence was imagined, communicated, and structured particular ways of thinking about nuclear war. This demonstrates that nuclear war was seen as plannable, containable, and survivable through structured and co-ordinated national response procedures. Some of these articles examine imaginaries of civil defence, rooted in Second World War notions of aerial bombardment and shelter defence systems.⁹⁰ Meanwhile, Casper Sylvest and Peter Bennesved have shown how visual media such as civil defence films played an important role in embedding imaginaries of preparedness and survivability, pointing to the significance of the visual (and moving) media

⁸⁸ S. Sismondo, ‘Sociotechnical Imaginaries: An Accidental Themed Issue’, *Social Studies of Science*, 50.4 (2020), p. 505.

⁸⁹ Farbøl, ‘Ruins of Resilience’ in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence*, p. 5; M. Cronqvist, and M. Grant, ‘Remembering Desirable Futures? Civil Defence Memories and Everyday life in Sweden and the United Kingdom’, in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*, pp. 7, 26.

⁹⁰ I. Björnsson, “‘...Order on their Home Fronts:’ Imagining War and Social Control in 1950s NATO”, in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*.

in “structur[ing] the imagination of nuclear war and ways of surviving such a catastrophe.”⁹¹ Adopting a similar approach that focuses on the role of material structures in giving “mass and solidity” to nuclear imaginaries, Rosanna Farbøl explores how Danish ‘ruin towns’ embedded the imaginary that nuclear war was survivable. She shows how these sites served as “a stage for enacting and performing a future war, whereby the merely imagined was given a concrete, tangible expression [which] added materiality, spatiality, realism and presence to what was largely speculative, discursive and imaginary.”⁹² Elsewhere, Jonathan Hogg explains that imaginaries of civil defence were firmly located within particular social, geographical, and discursive contexts. He argues that whilst sociotechnical imaginaries often originated at official or state level, these imaginaries were “strengthened and made durable once [they] became intertwined with localised contexts and, of course, individuals working within them.”⁹³ This assertion corroborates the central claim of this thesis, that ordinary people act as major agents of social change, helping co-produce, embed, resist, and redefine sociotechnical imaginaries of nuclear technologies, producing multiple geographic, social, and discursive contexts which require a greater degree of historical engagement if we are to understand the plurality of British cultural responses to the nuclear age.

Methodological Reflections.

In order to investigate the range of cultural responses to the nuclear plant at Sellafield, this study uses an interdisciplinary approach whereby cultural archives synthesise with a range

⁹¹ P. Bennesved, and C. Sylvest, ‘Embedding Preparedness, Assigning Responsibility: The Role of Film in Sociotechnical Imaginaries of Civil Defence’, in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*, p. 3.

⁹² Farbøl, ‘Ruins of Resilience’ in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*, pp. 1- 28.

⁹³ J. Hogg, ‘Normalising Nuclear War: Narrative Scenarios, Imaginative Geographies and Sites of Leisure in 1950s Britain’, in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*, p. 9.

of oral history sources, acting as “subversive strands of knowledge” which contrast official nuclear narratives and offer new interpretations of the British nuclear age.⁹⁴ To mitigate any distortion within the source material a number of different sources were analysed in conjunction with each other, derived from a combination of pre-recorded oral history interviews, personally conducted oral interviews, newspaper articles, and archival sources. These included internal government paperwork, legal transcripts, industry reports and inter departmental communication, and materials from anti-nuclear pressure groups and NGOs.

Archives.

The archival material relating to the history and operation of the Sellafield site, and of British nuclear history itself is located in three main repositories. In Cumbria, the Workington and Whitehaven archives hold hundreds of records relating to the site’s construction, operation, and management, alongside hundreds of microfiche reels of newspaper records from the local *West Cumberland Times and Star* and *West Cumberland News*. The bulk of the material relating to the early history of the British nuclear weapons, and civil nuclear programme however exists down in The National Archives in Kew. As various files have become available through declassification and FOI requests, this archive (whilst typically erratic and scattered) has grown to a substantial size, providing an excellent resource for researchers. The third repository is situated in the North of Scotland in Wick, at the newly constructed Nucleus Archive. This facility opened in late 2015, designed to house the various nuclear records that previously existed in various locations across Britain, in one location. This site has been open to the public since 2017. However, the process of collecting, collating, and cataloguing the various records scheduled to be housed there is conservatively expected to take a minimum of

⁹⁴ Davies, ‘A Visual Geography of Chernobyl’, p. 127.

five years. Consequently, these materials were unavailable for the duration of the project. This placed a heavier reliance upon the records housed in Cumbria and at the National Archives.

The Whitehaven Archives and Local Studies Centre has an impressive array of documentation covering the history of the Sellafield site. This archive was particularly useful for housing copies of original planning applications for the village of Seascale, the notes of the Local Liaison Committee (LLC) which documented relations between the plant and locals, copies of official pamphlets produced by the UKAEA and BNFL, various parish records, and the legal transcripts from the Windscale inquiry which forms one of the chapters of the study. Relevant folders were obtained through a key word search of the archive's catalogue and through consultation with the archivists, who were able to identify a number of collections which held articles relating to Sellafield, specifically within the minutes of Council meetings and local land applications.

By far the majority of the de-classified records relating to Sellafield are housed within the National Archives, notably in the AB series of documents. Unfortunately, during the Christmas break in my first year of study, this entire collection was withdrawn from the shelves at the National Archives without prior warning and remain unavailable at the time of writing. It later emerged that the Nuclear Decommissioning Authority (NDA), the government body responsible for the records had requested that the records be withdraw pending a security review process.⁹⁵ This move demonstrated the “ineluctable, even agonistic vulnerability of

⁹⁵ This decision was the subject of a parliamentary exchange between the M.P. for the constituency of Edinburgh North and Leith, Deidre Brock M.P. and the Secretary of State for Business, Energy and Industrial Strategy, Richard Harrington M.P. This exchange can be found here. ‘Nuclear Power and Nuclear Weapons: Public Records’ <<https://questions-statements.parliament.uk/written-questions/detail/2019-02-13/220931>> [accessed 21 February 2019].

archives to political whim and social upheaval” and the susceptibility of the researcher to the mandates of historical curators.⁹⁶

The files withdrawn exist in two parts, firstly the ES series, which are the records of the Atomic Weapons Establishment, which concern the research, development and testing of Britain’s atomic weapons programme. Secondly, the AB series are the records of the United Kingdom Atomic Energy Authority, largely concerning the civilian nuclear energy programme. Totalling thousands of files, these two series have been withdrawn in their entirety, with no indication given regarding their future availability.⁹⁷ This created a significant obstacle in my research and regrettably consumed a considerable amount of time, as repeated attempts to obtain these records were pushed back. In total, 39 FOI requests were submitted for key documents- all of which were rejected. Whilst the archive may serve as “a site for knowledge production, [and] an arbiter of truth” this shows that it must also be understood as “a mechanism for shaping the narratives of history” which serves not as the sum of all texts but what Michel Foucault described as “a monument to particular configurations of power.”⁹⁸ In this context, this thesis cannot help but be a product of the structures of power which govern access to nuclear knowledge in the UK. Herein I encountered something of the exclusion from the zones of knowledge which control nuclear meaning-making endured by the historical actors at the centre of this study. I therefore became a part of the histories I was writing, not only through the selective interpretation of historical material inherent within any historical study,

⁹⁶ A. Burton (ed.), *Archive Stories: Facts, Fictions, and the Writing of History* (Durham, NC: Duke University Press, 2005), p. 3.

⁹⁷ Speculation ranges from whether the NDA had realised there was something within the files which should not be made publicly available, or whether an audit was taking place prior to the files being moved to the new facility at Wick. The deafening silence of the NDA on this matter despite national media attention has done nothing to dispel the former. For press reports on this issue, see R. Booth, ‘British Nuclear Archive Files Withdrawn Without Explanation’, *Guardian*, 23 December 2018 <[theguardian.com/world/2018/dec/23/british-nuclear-archive-files-withdrawn-without-explanation](https://www.theguardian.com/world/2018/dec/23/british-nuclear-archive-files-withdrawn-without-explanation)> [accessed 24 December 2018].

⁹⁸ A. Stoler, ‘Colonial Archives and the Arts of Governance’, *Archival Science*, 2.0 (2002), pp. 90- 96; Burton, *Archive Stories*, pp. 2- 6.

but as an active participant in the hegemonic power structures of nuclear governance, as the historical ‘truth(s)’ I uncovered were, at least in part, a distorted vision of the past.⁹⁹

The archive serves “not as a transparent window into the past, but as an instituted site of memory construction.”¹⁰⁰ It may be better understood as a screen onto which power relations are inscribed in accordance with state values and ethnographies. Here, political decision-making behind-the-scenes at the NDA controlled the archive’s contents and imposed upon the project by dictating “what can and cannot be said, and what will and will not be remembered.”¹⁰¹ It is clear that even in the era of digitization and file sharing, where one might expect data to be more accessible and to move about more freely, the historical archive remains an “archive of choices.”¹⁰² It is the product of overt practical, political, and economic decision making about what to preserve, what to make accessible, and what to keep hidden from public view. Responding to this context, I sought to bypass the hegemonic narratives of the archive by reading ‘against the grain’, identifying and examining alternative data sets, eschewing conventional search methods, and examining the quotidian minutiae of the archive to discern patterns of inclusion, from which it was possible determine what was *not* said and had been redacted by the NDA.¹⁰³ It thus became possible to circumvent the political obstacles hampering my research by identifying copies of the missing material duplicated in other files and categorised according to different search criteria and keywords.

⁹⁹ H. White, *Tropics of Discourse: Essays in Cultural Criticism* (Baltimore, MD: The Johns Hopkins University Press, 1979), pp. 126f; K. Haltunnen, ‘Self, Subject, and the “Barefoot Historian”’, *The Journal of American History*, 89.1 (2002), pp. 20- 24.

¹⁰⁰ J. Hellbeck, *Revolution on My Mind: Writing a Diary Under Stalin* (Massachusetts: Harvard University Press, 2009), p. 417; Stoler, ‘Colonial Archives and the Arts of Governance’, p. 87.

¹⁰¹ P. Fritzsche, ‘The Archive and the Case of the German Nation’, in A. Burton (ed.), *Archive Stories: Facts, Fictions, and the Writing of History* (Durham, NC: Duke University Press, 2005), p. 186.

¹⁰² C. Armstrong, M. Evenden, and H. Nelles, *The River Returns: An Environmental History of the Bow* (Montreal: McGill Queens Press, 2014), p. 19.

¹⁰³ For further reading on working ‘against the grain’ of the archive, see A. Stoler, *Along the Archival Grain: Epistemic Anxieties and Colonial Common Sense* (Princeton: Princeton University Press, 2009).

Taking a more lateral approach to the process of data collection, I decided to adapt my search method, amending key word searches and filters to get at the information via alternative routes. For instance, I found a number of papers relating to the 1983 ‘beach incident’ within a folder categorised under ‘Greenpeace’ which alluded to, and in a couple of instances quoted material from the withdrawn files. Similarly, by searching within the folders of government departments such as the Department for the Environment (DoE), the Ministry of Agriculture, Fisheries and Food (MAFF), the Ministry of Housing and Local Government, and the Prime Minister’s Office it was possible to obtain sufficient information and source material without access to the blocked files. Likewise, in some cases books by Lorna Arnold, Peter Hennessy, and Ian Welsh quoted from, or detailed material within these files.¹⁰⁴ Having identified several records prior to their censorship, it was also possible to search for the same documents in the Whitehaven archive, where a number of items had been photocopied and were held in a very dusty (and seemingly forgotten) filing cabinet. Approaching the source material via this unconventional ‘through the back door’ approach allowed me to circumvent the significant obstacles posed by the loss of the National Archive files and discover alternative material which offers up a series of new findings about everyday life and the cultural impact of the plant upon the local region. Despite these efforts, the withdrawal of archival material placed a greater emphasis on the oral history component of my research and the analysis of newspaper articles. This indirectly (but pleasingly) realigned my research efforts with the study’s initial objectives

¹⁰⁴ L. Arnold, *Windscale 1957*; P. Hennessy, *The Secret State: Whitehall and the Cold War* (London: Penguin, 2003); Welsh, *Mobilising Modernity*.

and its focus on the everyday histories of the people who built, worked at, and lived alongside the world's first commercial nuclear power plant.¹⁰⁵

Newspapers.

The newspaper articles were identified through the search functions of the UK Press Online (which includes *Daily Mirror*, *Daily Express*, *Daily Star*, *Sunday Express*, and *Star on Sunday*), the *Daily Mail* historical archive, the *Times* digital archive, and the *Guardian* and *Observer* digital archive database, where multiple keyword and date-range searches were performed. Local newspaper articles were sourced from the Workington Library which houses microfiche reels of the *Whitehaven News*, [West Cumberland] *Times and Star*, *Evening News and Star*, *North-Western Evening Mail*, and the [West Cumberland] *News and Star*.¹⁰⁶ Here, articles were identified by date, with searches performed between 1946, the year in which the Sellafield site was first being planned for development and 1984, as the year following the 'beach incident' and the point at which articles about the plant dwindled in number.

The use of newspaper articles has been informed by studies of nuclear language and literature, which have applied poststructuralist theories of discourse analysis to uncover the linguistic tropes and rhetorical devices contained within nuclearised language. This has given rise to a rich vein of scholarship examining newspaper narratives in British, Indian, and Italian

¹⁰⁵ The collapse of the Soviet Union in 1991 threw into dispute the validity of this claim, with suggestions that the Soviet plutonium production plant 'Mayak' near the town of Kyshtym could hold this claim. See, D. Soran, and D. Stillman, 'An Analysis of the Alleged Kyshtym Disaster', (Los Alamos National Lab: New Mexico, 1982), <<https://www.osti.gov/servlets/purl/5254763>> [accessed June 2018]; See also, K. Brown, *Plutopia*.

¹⁰⁶ Brackets indicate where a newspaper changed its name within the period.

contexts, particularly focusing on the themes of fear and hope.¹⁰⁷ Elsewhere, studies by Alison Young and Adrian Bingham have placed particular emphasis on deconstructing British newspaper narratives and discourse, analysing media depictions of anti-nuclear protest and nuclear weapons, whilst Jonathan Hogg has expanded upon Gabrielle Hecht's use of the term 'nuclearity' to understand how nuclear symbols and motifs were transmitted, circulated, and (re)produced within newspapers, pointing to the formation of a post-war British identity directly inflected by this context.¹⁰⁸ In particular, Hogg has argued that newspaper articles play an important role in shaping and reflecting public opinion; "often pitched at what is assumed to be the dominant worldview or to appeal to an assumed set of shared opinions." He argues that newspaper articles might be used as "a window into the social creation and reinforcement of [nuclear] meaning."¹⁰⁹ This project sought to develop these insights by analysing the spread and flow of nuclear narratives at both national and local levels, and paying attention to the use of language, syntax, and imagery to deconstruct the role of the media in embedding, resisting, and extending particular nuclear imaginaries. This was also informed by the aforementioned study by Peter Bennesved and Casper Sylvest which examines the role of media communication in structing and embedding social imaginaries of preparedness and survivability through civil defence.¹¹⁰

¹⁰⁷ R. Kaur, 'Atomic Schizophrenia: Indian Reception of the Atom Bomb Attacks in Japan', *Cultural Critique*, 84.0 (2013), pp. 70- 100; L. Ciglioni, 'Italian Public Opinion in the Atomic Age: Mass Market Magazines facing Nuclear Issues (1963-1987)', *Cold War History*, 17.3 (2017), pp. 205- 221; T. Miyazaki, 'The View from Under the Mushroom Cloud: The *Chugoku Shimbun* Newspaper and the Hiroshima Peace Media Centre', *International Review of the Red Cross*, 97.0 (2015), pp. 527- 542; G. Feighery, "A Light out of this World": Awe, Anxiety, and Routinization in Early Nuclear Test Coverage, 1951-1953', *American Journalism*, 28.3 (2011), pp. 9- 34.

¹⁰⁸ J. Hogg, "'The Family that Feared Tomorrow": British Nuclear Culture and Individual Experience in the Late 1950s', *The British Journal for the History of Science*, 45.4 (2012), pp. 535- 549.

¹⁰⁹ Hogg, *British Nuclear Culture*, pp. 8- 11.

¹¹⁰ P. Bennesved, and C. Sylvest, 'Embedding Preparedness', in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*, unpaginated at time of writing.

Oral History.

Through analysis of oral histories, newspaper reports, and primary documentation from a number of different archives throughout the UK, this research aims to provide a holistic and nuanced overview of the public responses to the nuclear project at Sellafield at both national and local level. The oral history strand to my research method offers insights into one of the key research aims of the project, exploring if, how, and where host communities co-produced nuclear technologies, acting not as passive absorbers but active components in the production and dissemination of nuclear culture. Examining this process, I conducted a series of oral interviews with local residents and utilised existing oral histories with community members, drawing upon both my own interviews and those obtained from existing repositories, such as the voluminous ‘Sellafield Stories’ project, which I will cover shortly. Combining this synthesis of new and existing oral histories provided a historical richness that sheds light upon what Hogg has referred to as “the hidden histories” of the Cold war, understood as those individual voices which represent the plurality of British experiences of the conflict.¹¹¹ Instead of relying purely upon my own interviews, which were hampered by time constraints due to archival restrictions and the COVID-19 pandemic, these oral materials synthesised, acting as “subversive strands of knowledge” which contrast with official nuclear narratives and offer new interpretations of the British nuclear age.¹¹²

At the onset of the study, it was intended to interview around twenty or so individuals who lived in close proximity to the Sellafield plant or had worked there between 1947 and 1990. It was hoped that this would allow for a sufficient range of responses which would not only prove representative of the nuanced nature of local opinion towards the plant but provide

¹¹¹ Hogg, “The Family that Feared Tomorrow,” p. 538.

¹¹² Davies, ‘A Visual Geography of Chernobyl’, p. 127.

a sufficient depth of material for analysis. However, during the research process I was able to gain access to a repository of interviews conducted between 2009 and 2010 as part of a multi-million-pound oral history project known as ‘Sellafield Stories.’ At the time it was commissioned, this was the largest oral history project conducted in the UK, containing interviews from over a hundred local residents and former employees who had been invited to share their life-histories. This formed part of a legacy project commissioned as the former operating company British Nuclear Fuels Ltd (BNFL) was broken up and control of the plant was taken over by the NDA. This collection formed a short published volume entitled *Sellafield Stories*, authored by journalist Hunter Davies who collated thirty of these interviews into a short manuscript which documented individuals’ personal recollections and anecdotes about living alongside and working at the plant.

This book formed a useful start-point for the project. However the transcripts from these interviews proved much more valuable as the overwhelming majority of material collated as part of this project was excluded from the final manuscript and remained untouched in storage boxes at the local Whitehaven Archives and Local Studies Centre, where the project had been based. As part of my research, I was able to gain access to these interviews, and their accompanying transcripts, audio, and video files. These insights are yet to be explored in any detail within the historiography and represent a rich and varied composition of responses to the nuclear condition from individuals varying from construction workers, teachers, police officers, process workers, farmhands, nuclear scientists, scientists’ wives, and plant management. Owing to the vast number of interviews which had been collated, the quality and ethical practice adhered to by the interviewers, and the lack of scholarly analysis of these sources, the decision was taken to utilise this existing resource and conduct a smaller number of individual interviews than originally planned, preferring instead to produce a hybrid

approach which saw the existing narratives of the ‘Sellafield Stories’ project analysed alongside a smaller sample of personal interviews.¹¹³ By analysing these oral histories alongside an array of other primary source materials, it became clear that the pre-existing ‘Sellafield Stories’ interviews already offered a strong indication of the localised and marginalised local voices sought by the project, fulfilling the research aim to not only document and capture the historical memories of Britain’s first ‘nuclear community’ but to bring these memories into a co-constructed and democratic narrative, attentive to the ways in which ordinary people shaped, and were shaped by the development of nuclear technologies throughout the second half of the twentieth century.¹¹⁴

In addition, a small number of interviews were found within existing national archives and contributed towards the overall research project. Specifically, the ‘National Life Stories’ collection at the British Library featured a small number of interviews with individuals who had worked at or lived by the plant, as did the ‘Oral History of the Electricity Supply in the UK’ and the ‘Oral History of British Science’ projects. These interviews were conducted at a similar time to the ‘Sellafield Stories’ project, between 2010 and 2015. Local archives were also a useful source of interview transcripts, with the Ambleside Oral History Group having conducted several interviews with local residents between 1986 and 2013, providing a valuable insight into the attitudes of older members of the local population who were not alive to feature in the ‘Sellafield Stories’ project. Selective use was also made of question-and-answer extracts collated in 1983 as part of a sociological study of local attitudes by Sally Macgill and a 1990 study by local anti-nuclear activist Jean McSorley entitled *Living in the Shadow: The Story of*

¹¹³ The methodological implications of this decision will be examined in the following section.

¹¹⁴ Riley, ‘Emplacing the Research Encounter’, pp. 651- 662.

the People of Sellafield.¹¹⁵ This monograph featured interviews with a number of disaffected locals who opposed the nuclear industry, and as such provided a useful repository for anti-nuclear attitudes. However, care was taken to ensure that these punctuated my own research rather than imposing an anti-nuclear spin or politicising the project. With this in mind, I have utilised this resource sparingly and with great care, largely where gaps appeared in my own interviews and the ‘Sellafield Stories’ project. This resource was particularly useful in relation to the early years of Sellafield’s history where few individuals are still alive to share their memories and throughout the chapter on the Windscale Inquiry of 1977 which did not feature heavily in the interview process, as respondents frequently chose to structure their nuclear life-histories around major flashpoints, such as the Windscale Fire of 1957 and the leukaemia controversy and ‘beach incident’ of 1983. I also drew upon a recent local history study where residents had been invited to share their memories of growing up in Seascale by way of contributing to an online message board, where contributors could respond to or create particular discussion topics, such as ‘The Great Fire of Windscale’, ‘Farms of Seascale’, and ‘Seascale School.’ Something of an exercise in nostalgia for local residents, this discussion board yielded a number of fascinating insights and memories of growing up next to Sellafield and was later turned into a book called *Atom Kids: The Oral History of Seascale*.¹¹⁶ Whilst this study may not resemble the conventional model of oral history as practiced by the historian, this study represented a hugely valuable resource and functioned as a form of multi-layered

¹¹⁵ Macgill, *Politics of Anxiety*; J. McSorley, *Living in the Shadow: The Story of the People of Sellafield* (London: Pan Books, 1990).

¹¹⁶ J. Rushworth, *Atom Kids: The Oral History of Seascale* (Surrey: Rushworth Press, 2017).

group interview, as locals chose which memories to convey and structured discussions of growing up near Sellafield.¹¹⁷

Whilst these materials functioned as an incredibly valuable resource in my research, I was able to conduct four separate interviews with members of the local community. These interviews were conducted in neutral venues and residents' homes in accordance with their preferences, with full ethical approval provided by the University of Liverpool. As part of this process, the storage of oral transcripts was permitted for a three-year period via the university's encrypted M-Drive system, with all interviewee names anonymised as standard. A further four interviews were planned, but ill health, the bereavement of a key gatekeeper within a local anti-nuclear group, and the COVID-19 pandemic meant that these were unable to take place. The call for interviewees was published by the Beacon Museum in Whitehaven and the Industrial History of Cumbria Group. However, more success was obtained through word of mouth and a 'snowballing' process whereby respondents recommended and introduced me to potential interviewees, who comprised of three men and one woman aged between 50 and 90.¹¹⁸ Of the interviews which did not take place due to ill health, the unfortunate passing of one interviewee and his family's wishes to withdraw from the project, and the interruption of the COVID-19 pandemic, the participants comprised of three women aged between 47 and 84, and one man in his fifties. Whilst the interviewees for the 'Sellafield Stories' project relied upon volunteers,

¹¹⁷ Furthermore, with the increasing power of digital and social medias, this represents something of a methodological shift amongst grass-roots oral history, as the internet is increasingly facilitating the interview process through sites such as StoryCorps and the Social Voice Project, which are growing in popularity as a tool for researchers and local historians alike. This was reflected in the Oral History Society's 2020 Annual Conference, which aimed to "reconsider the relationship between oral history and the media" taking into account the growth of digitised story-telling platforms and their significance within the academy. <https://www.ohs.org.uk/wordpress/wp-content/uploads/OHJ_48-1_p21_OHSconf2020_advert.pdf> [accessed March 6, 2020]. For further reading on this evolving practice, see D. Boyd, 'Designing an Oral History Project: Initial Questions to Ask Yourself', *Oral History in the Digital Age*, 40.1 (2012), pp. 1- 167; M. Frisch, 'Oral History and the Digital Revolution: Toward a Post-Documentary Sensibility', in R. Perks, and A. Thompson (eds.), *The Oral History Reader* (London: Routledge, 2006), pp. 102- 122.

¹¹⁸ D. Ritchie, *Doing Oral History: A Practical Guide* (Oxford: Oxford University Press, 2003).

interviewees were recruited through access to gatekeepers in local institutions such as the Women's Institute, a local Church, and the Rotary Club. This meant that I was able to interview a number of people who had or perceived that they had little to say about the nuclear industry, as opposed to the contributors for the 'Sellafield Stories' project, who had self-identified as having a connection to the industry. This enabled a more nuanced insight into local attitudes, as it became clear that people who did not feel as if they had anything of any value to contribute to the project yielded a range of fascinating quotidian insights that provided a more well-rounded and accurate impression of everyday attitudes within the local community and contributed to the overall value of the project.

'Sellafield Stories'

Instructive as these oral histories were, the interviews from the 'Sellafield Stories' database formed the bulk of the material analysed, which necessitated an appreciation of the theoretical implications this had for the thesis. The project originated as an oral history in the 'reminiscence' model, which prioritises the recording of oral interviews "for the sole purpose of recovering voices and placing them on the historical record."¹¹⁹ This type of history was pioneered by the work of early oral historians such as Studs Terkel during the Great Depression of the 1930s.¹²⁰ These type of studies are often not bolstered by a huge degree of theoretical engagement; indeed, it is not their purpose or objective to do so, instead placing the emphasis on the retrieval of historical information before the voices, histories, and information held by their respondents are lost. In utilising this source, I have interpreted the data using what is known as the 'theoretical model' of oral history, which fuses together the 'reminiscence model'

¹¹⁹ L. Abrams, *Oral History Theory* (Oxford: Routledge, 2016), p. 15.

¹²⁰ As one of many writers employed by the Federal Writers' Project between 1936 and 1940, Terkel and his colleagues were responsible for recording the voices and narratives of ordinary Americans from differing regions, occupations, and ethnic backgrounds. (Abrams, *Oral History Theory*, p. 155.)

with informed theoretical insights which help decoding oral material. As the ‘Sellafield Stories’ project was not created for an academic audience, it was important to subject the material to the required levels of theoretical rigour, paying close attention to the way in which the material was collated and interpreted. Through this approach, it was possible to both focus on the memories shared during the interviews and observe the subjectivities and identities held by respondents as they articulated these memories. As oral historian Lynn Abrams has argued, the oral encounter functions as a conduit for the articulation of the self or multiple selves; “the interview becomes a process in which the respondent actively fashions an identity. And even in an interview where the declared aim is merely to gather information it is rare for the respondent not to reveal something of themselves.”¹²¹

This project takes the middle ground between theoretical and evidential approaches, stressing the significance of the (often overlooked) ‘reminiscence model’, particularly within nuclear and Cold war studies, where many individuals who lived through the early atomic age are now entering old age and whose stories are at risk of disappearing from the historical record completely. Conducted around a decade prior to my study, the ‘Sellafield Stories’ interviews were a vital source of information on the early years of the civil nuclear programme and the plant’s development, providing a rich dearth of information and memories which are increasingly difficult to preserve as historical actors pass away. Occasionally side-lined by the academy, community histories such as these play a major role in the production of histories of nuclear culture and, when combined with the required theoretical understanding of oral historians, offer an incredibly rich data set which not only adds to our understanding of British

¹²¹ *Ibid.*, pp. 23, 33.

nuclear experiences but in many cases challenges the existing historical record.¹²² This study has been informed by theoretical insights from practitioners of oral history, through which I have applied a new frame of analysis to the field of British nuclear culture, fusing existing oral history approaches with interdisciplinary research methods to create a new cultural history of the nuclear complex at Sellafield.

Inherent within the field of oral history is the pitfall of translation, as material is translated from one medium into another for analysis. This represented a potential problem for this study, as the majority of interviews had been conducted by other people and I could exercise no control over the process of translation, nor the mediums in which the interviews were translated. To overcome this problem, I analysed the material in all available formats, drawing upon the written transcriptions, the accompanying audio files, and where available video files. Scholars of oral history have acknowledged that each of these forms represents a mutation of the original interview, each of which highlights different elements of the interview performance and produces something of a slippage between them.¹²³ The most widely recognised format used in oral history is the interview transcript, a written piece which attempts to codify the aurality of the interview. However, the text of the transcript is not beyond reproach, as its textual nature introduces specific distortions upon the source material and forces it to conform to linguistic and syntactic norms, which may not have occurred in the original interview. Whilst transcripts are highly accessible, Abrams has argued that “there can only be a semblance of similarity... between the narrative as told and the narrative as written

¹²² For examples of similar projects in the global context, see A. Maurer, and R. Hogue, ‘Introduction: Transnational Nuclear Imperialisms’, *Journal of Transnational American Studies*, 11.2 (2020), pp. 25- 43; B. Alexis-Martin, E. Waight, and M. Blell, *Nuclear Families: A Social Study of British Nuclear Test Veteran Community Families* (Southampton: University of Southampton/The Nuclear Community Charity Fund, 2019), <nucleargeography.com/uploads/1/0/1/2/101217312/nuclear_families_report_-_becky_alexis_martin_2.pdf> [accessed 3 January 2020].

¹²³ D. Dunaway, ‘Transcription: Shadow or Reality?’, *The Oral History Review*, 12.0 (1984), pp. 113- 117.

down; something happens in the process of speech being translated into text.”¹²⁴ Portelli takes this one step further, remarking that “expecting the transcript to replace the tape for scientific purposes is equivalent to doing art criticism on reproduction, or literary criticism on translations.”¹²⁵ Whilst the interview is a “multi-layered communicative event,” the transcript does not reproduce the subtleties conveyed within speech.¹²⁶ Despite attempts to recreate the vocal nuances from the audio file the “tone and volume range and the rhythm of popular speech carry implicit meaning and social connotations which are not reproducible in writing.”¹²⁷ This induces a loss of historical meaning, as the transcript, by its very nature, focuses on recording the words spoken verbatim (or as close as possible). Specifically, the oral qualities of the interview can be easily overlooked once the interview has been transcribed and the ease of working with this format dominates. To overcome the pitfalls of analysing transcript material alone, the accompanying audio and, in some cases video files were analysed in conjunction with the transcripts in order to obtain a more nuanced insight into the nature of interviewees’ responses.¹²⁸

Early oral historians failed to give orality any great consideration, treating the interview as a means of accessing historical information, as opposed to thinking about the interior

¹²⁴ Abrams, *Oral History Theory*, p. 13.

¹²⁵ A. Portelli, ‘What Makes Oral History Different?’, in R. Perks and A. Thomson (eds.), *The Oral History Reader* (Routledge, London, 2006), p. 33.

¹²⁶ V. Yow, *Recording Oral History: A Guide for the Humanities and Social Sciences* (California: Walnut Creek, 2005), pp. 157- 87.

¹²⁷ Portelli, ‘What Makes Oral History Different?’, pp. 33f.

¹²⁸ Video files were only available for a number of the interviews, where interviewees had consented to being filmed for the duration of the interview. During the project, storage of these files transferred from a dedicated Sellafield Stories website, hosted by the Whitehaven Local Studies and Archive Centre, to the online Cumbria Archive Service Catalogue. In this transition, the video and audio files became unavailable. Following correspondence with archivists at Whitehaven, I was informed that these will only be available direct from the centre from now on. The text transcripts can be accessed here:

<<https://archiveweb.cumbria.gov.uk/calmview/TreeBrowse.aspx?src=CalmView.Catalog&field=RefNo&key=S>> [accessed 22 May 2020].

qualities of the interview, such as the specific speech employed by the historical subject.¹²⁹ Despite this, the orality inherent within the interview can reveal “important attributes of the story, the contents, the practice of telling and the culture which produces it.”¹³⁰ Here, speech analysis facilitated a greater degree of interpretation as the speed of speech often conveyed something of the narrator’s emotional state, where interviewees slowed down to add greater emphasis or struggled to convey specific memories, or sped up to display a greater degree of familiarity and ease with a topic, or even a desire to gloss over certain points. For example, discussions around childhood leukaemia cases in the nearby region often caused interviewees to speak slowly, or in broken sentences as they sought to arrange and convey their feelings and memories in a coherent manner. The following example came from a mother recalling her experiences of the Windscale fire: “Oh, Oh, Oh, I cannot tell you the, Oh, it was, it was horrendous. It was horrendous... Because we didn’t know, we didn’t know...”¹³¹ Here, pauses played an important role in the meaning of speech, as sporadic or irregular pauses emphasised emotional subject matter, whilst other interviewees introduced heavy rhythmic pauses in their speech when conveying their memories of Sellafield’s early years, relating the story in the form of a pioneering, epic narrative; “I was a government servant and I’d been given a job to do... I didn’t feel any qualms about working for the bomb at all.”¹³² Since interviews can shift between these styles, listening to the form and cadence of speech revealed “variations in the narrator’s attitude towards his or her material”, whereby it became possible to identify something of the respondent’s emotional state when discussing certain topics, as previously coherent and eloquent respondents underwent discernible changes in their pattern of speech

¹²⁹ Abrams, *Oral History Theory*, p. 19.

¹³⁰ *Ibid.*

¹³¹ M. Davies, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 16 December 2010, pp. 22f.

¹³² D. Wooley, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 6 August 2010, pp. 8f.

when discussing issues such as the levels of radiation they had absorbed.¹³³ Throughout the project, I used both the audio file (when available) and the transcript in conjunction during the analysis stage. Working from the interviews in their transcribed form, I returned to the audio file to analyse specific dialogue in order to gain a more accurate insight into the oral performances within the source material. In this way, I have attempted to retain as much of the source's true form as possible, quoting material in a manner that both reproduces the words said and the way in which they were said, without burying the overall meaning within layers of linguistic notation.

By paying close attention to the construction of the narrative, it was possible to gain an insight into the process of identity formation, as various interviewees articulated a specific sense of self during the interviews, constructing their narrative in such a way as to say something about how they perceived themselves or wished to be perceived. This offered a window into the socio-cultural identities inherent within the local community as interviewees constructed and performed elements of their identity in the interview setting. The ability to reveal the underlying identities that subtly unfold throughout the interview process is one of the key values of an oral history approach. Indeed, oral historians have tended to be “more theoretically promiscuous than most in the historical profession”, committed to the pursuit of elements such as identity, subjectivity, memory, and narrative- now commonly understood as playing a major role in the construction of historical material.¹³⁴ Specifically, the interviews uncovered both historical and present subjectivities as respondents chose to “dig deep, to reflect

¹³³ A. Portelli, ‘The Peculiarities of Oral History’, *History Workshop Journal*, 12.1 (1981), p. 99.

¹³⁴ A. Portelli, ‘Oral History as Genre’, in M. Chamberlain, and P. Thompson (eds.), *Narrative and Genre: Contexts and Types of Communication* (London, 2004), p. 23.

on the inner self, to reconcile any conflicts and then to reconstruct the self as a coherent whole in the form of a single narrative.”¹³⁵

In the telling of their life-histories, respondents perform their history to an audience in the interview context, becoming ‘narrators’ of key life events in front of an interviewer who may be able to discern performative techniques which reveal something of the narrators’ relationship to their past, and their sense of self. Oral historian Lynn Abrams has argued that “narrative is not merely the content of the story, but the telling of it” through the specific arrangement and dramatisation of the story, by way of “emphases, embellishments, cadences, structure, digressions, [and] silences.”¹³⁶ It is not necessary to be a scholar of linguistics to observe these subtleties, but oral historians should observe “how people shape their narratives in order to make a point.”¹³⁷ These performances often draw upon a variety of narrative forms which “suit the story they are telling and the meaning they wish to impart.”¹³⁸ For example, some respondents structured their memories around how little they knew about the plant, fashioning an identity as the unwitting victims of a government conspiracy: “we didn’t really realise what it was then, it was just gonna make electric for everybody.”¹³⁹ Likewise, others produced a narrative which reflected Sellafield’s role in the Cold war, framing their memories around the need to “contribute to the nation” providing “what we needed for our stock of plutonium and our standing as a nuclear power.”¹⁴⁰ The manner in which these memories are conveyed reveals something of the narrator’s sense-of-self, alternatively telling the story from the perspective of Cold war heroism and victimhood. In his oral history of Holocaust survivors,

¹³⁵ Abrams, *Oral History Theory*, p. 33.

¹³⁶ *Ibid.*, pp. 106f.

¹³⁷ *Ibid.*, pp. 128f.

¹³⁸ *Ibid.*, p. 108.

¹³⁹ E. Dawson, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 13 July 2010, p. 23.

¹⁴⁰ T. McNerney, ‘An Oral History of the Electricity Supply in the UK’, interviewed by T. Lean, 7 October 2014; B. Snelson, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 1 July 2010, p. 4.

Lawrence Langer noted that interviewees positioned themselves within the narrative in different ways.¹⁴¹ By being attentive and sympathetic to the narrative structures and performances of his interviewees, Langer showed that whilst his subjects were performing their life-histories in radically different ways, each was “telling a version of the truth as they grasped it,” communicating the story as they understood, experienced, and remembered it.¹⁴² These choices are of significance to the oral historian, who “ought to be conscious of the performance shapes and forms that oral narratives assume” as these insights reveal something of the meanings the narrator (and perhaps the wider collective) ascribe to their life-history.¹⁴³ Here, the ‘Sellafield Stories’ project was particularly instructive as citizens drew upon a set of collective and individual identities when narrativising particular aspects of their history, revealing not only the socio-cultural identities they assumed at particular moments in time, but also a historical sense-of-self as they look back on and reconceive of these events in the present.

Tracing the intersection between individual and collective memory, the oral encounter revealed specific cultural identities amongst the local community, disclosing how and where nuclear technologies had produced a collective sense of self amongst the local community. Multiple narratives sounded the same themes as specific memories, experiences, and subjectivities were collectively appropriated and specific “system[s] of knowledge” appeared.¹⁴⁴ Abrams has argued that narrators look to wider culture to “construct a memory story with which he or she can feel comfortable at that moment... often one in which the story

¹⁴¹ L. Langer, *Holocaust Memories: The Ruins of Memory* (Yale: Yale University Press, 1993), p. xi.

¹⁴² *Ibid.*

¹⁴³ Abrams, *Oral History Theory*, p. 130. This aspect of oral history research has been informed by performativity theory, which observes the act of performance in everyday life and its role in constituting individual identity.

¹⁴⁴ J. Cruikshank, *The Social Life of Stories: Narrative and Knowledge in the Yukon Territory* (Lincoln, Nebraska, 2000).

told coheres with larger cultural understandings.”¹⁴⁵ In this instance, some interviewees subsumed their memories of issues such as radiation sickness or industrial injury within a wider context of the Cold war, remarking that the period was one in which “they had to be men and take the risks.”¹⁴⁶ This allowed the more harrowing or disturbing elements of their job to be more comfortably internalised within wartime notions of military necessity, bravery, and a belief in the need to ‘do your bit’ in the post-war arms race. These individual memories were subsumed within a deeply embedded (and imagined) collective narrative of the Cold war as a military and domestic conflict, producing a collective identity shaped by notions of triumphalism, pioneering spirit, and a sense of heroism amongst Sellafield workers during its early operation.¹⁴⁷

Likewise, the interview encounter intensified and highlighted individual memories that stand in opposition to and challenge collective or dominant narratives. For example, interviews with farming communities identified a clear narrative of farmers as having been subjugated by the nuclear industry, systematically stripped of their land and exposed to excessive amounts of radiation.¹⁴⁸ This narrative emerged strongly within interviews amongst farming families and was markedly absent from interviews with people employed by the plant, who often used the oral encounter to convey divergent attitudes regarding factors such as the plant’s large

¹⁴⁵ Abrams, *Oral History Theory*, p. 66.

¹⁴⁶ C. McCourt, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 17 September 2010, p. 19.

¹⁴⁷ T. McInerney, ‘An Oral History of the Electricity Supply in the UK’, interviewed by T. Lean, 7 October 2014; B. Snelson, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 1 July 2010, pp. 4, 28; C. McCourt, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 17 September 2010, p. 19; J. Richardson, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 10 June 2010, p. 14; F. Graham Brightman, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 1 July 2010, p. 2; D. Wooley, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 6 August 2010, pp. 8f.

¹⁴⁸ K. Mawson, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 6 August 2010, pp. 6f, 16, 21; E. Dawson, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 13 July 2010, pp. 29f, 37; D. McConnell, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 8 February 2010, p. 13; E. Robson, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 19 March 2010, p. 18.

contribution to the local economy.¹⁴⁹ By observing the dynamic interaction between individual and collective memories, which memories are appropriated by the collective and which ones remain individual, it was possible to gauge the identity and sense-of-self that a specific narrator or a group wished to have attributed to them. This strand of analysis showed that nuclear identities were not homogenous even at the local level, but rather that citizens drew upon particular imaginaries and visions of the future and fashioned an individual or collective sense-of-self which allowed them to comfortably co-exist within that context. This moves us towards a more nuanced understanding of how nuclear imaginaries shaped individual and collective identities, and in turn, how these identities co-produced or attenuated particular imagined nuclear futures.

Chapter Outline.

The thesis is made up of five core chapters, each of which follows the chronological story of the Sellafield plant and its varied engagements with the British public. These chapters are sequential and build upon and reference one another to reveal the dynamic interrelationship between nuclear technologies and British society throughout the second half of the twentieth century. Chapters One and Two explore how, born out of the context of the Second World War, nuclear technologies became enmeshed within a series of imagined desirable social, (geo)political, and military futures which originated within government and became embedded into the fabric of British society. The chapter will show how the pursuit of nuclear science became embroiled within notions of modernity and national identity, serving a strategic geo-

¹⁴⁹ J. Farrell, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 20 January 2010, p. 11; A. Barnes, 'Sellafield Stories: Oral History Project', interviewed by G. Wilkinson, 4 August 2020, p. 18; N. Bell, 'An Oral History of British Science', interviewed by P. Merchant, 10 January 2013; M. Kipling, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 7 January 2010, p. 3.

political function as signifier of Britain's continued superpower status. It will then explore how these intertwined with notions of regional identity, offering a social, political, military, and economic panacea within the context of heightening Cold war geopolitics, domestic austerity, energy shortfalls, and a regional economy devastated by the financial depression of the inter-war years. This focus helps unravel how the local and the national intersected in the production of nuclear culture, as the imaginary of nuclear utopianism propagated at state level assimilated with a series of local social processes such as long-term unemployment, historically harsh working conditions, and poor wages to embed an imagined utopian future of regional and national prosperity enshrined through the pursuit of nuclear technologies.

Chapter Two takes an overt focus on the built nuclear environment, examining how the physical infrastructure of the Sellafield plant and associated developments within the neighbouring village of Seascale dovetailed with post-war ideals of domestic regeneration and urban modernity, publicly performing and physically embodying an imaginary of nuclear utopianism within the physical and cultural landscape of British life.¹⁵⁰ In keeping with the actor-network theory (ANT) concept of non-human things having agency, and the work of spatial theorists such as W.J.T. Mitchell who argue that landscapes and places can perform cultural work, I will show how the physical structure of Sellafield, and the myriad of infrastructural developments such as housing, roads, railways, and supply networks embedded the imaginary of nuclear utopianism within a localised corner of British society, disseminating and publicly performing this imaginary at national and international level through the national

¹⁵⁰ Jasanoff, 'Future Imperfect', in Jasanoff, and Kim, (eds.), *Dreamscapes of Modernity*, p. 6.

media and official governmental and royal endorsement.¹⁵¹ The STIM model therefore offers a unique angle upon the geographic component of this study, attentive to the ways in which space functions in the production of sociotechnical systems as both a product and producer of imaginaries, and an active agent in embedding (and resisting) nuclear imaginaries.

Chapter Three traces the events of the Windscale fire in 1957 to show how the local public began to challenge and resist the imaginary of nuclear utopianism, as a series of operational and political shortcomings resulted in a fire in one of the piles used to produce plutonium for the British nuclear weapons project, massively contaminating the local population with radioactive fallout. This chapter details how the incident animated forms of opposition at the local level, as citizens resisted the government's handling of the incident and subsequent attempts to cover-up the fire by minimising its impact and placing the blame upon local employees. The chapter shows that whilst the government was able to maintain control over the form and content of nuclear imaginaries at the national level through a policy of suppression and fabrication, at the local level the imaginary of nuclear utopianism came under increasing scrutiny and became supplanted by attitudes of more ardent scepticism and hostility. STIM therefore allows us to interrogate scale, in keeping with the ruminations of nuclear scholars who have called for a more thorough investigation of how localised nuclear thoughts operated at the level of the nation. Using this focus, we see how nuclear technologies became “enmeshed in performing and producing diverse visions of the collective good, at expanding scales of governance from communities to the nation-state,” providing a more nuanced insight

¹⁵¹ Mitchell, *Landscape and Power*; For further reading on ANT, see B. Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory* (Oxford: Oxford University Press, 2005); for criticisms of this concept, see L. Winner, ‘Upon Opening the Box and Finding it Empty: Social Constructivism and the Philosophy of Technology,’ *Science, Technology and Human Values*, 18.0 (1993), pp. 362- 378; H. Collins, and S. Yearley, ‘Epistemological Chicken’, in A. Pickering (ed.), *Science as Practice and Culture* (Chicago: University of Chicago Press, 1992), pp. 301- 326.

into the complexities of the British nuclear story, and the emergence of multiple, competing imaginaries which entered into productive tension with one another at differing geographic scales.¹⁵² Observing this process, it becomes clear that the local population responded to the fire by producing their own imagined nuclear futures, characterised by the injurious consequences of radiation exposure and their callous treatment at the hands of the state. This fed into the production, dissemination, and embedding of a resistant dystopian imaginary, through which sections of the local population asserted the undesirable social and destructive radiobiological consequences of nuclear technologies, increasingly resisting these technologies and the supremacy afforded to them by the state.

This focus leads into Chapter Four, which traces how the localised resistance encountered in the aftermath of the Windscale fire dovetailed with the emergence of the ecological and environmental movements throughout the late 1960s and early 1970s. As I will demonstrate, these two processes helped embed resistant social, political, moral, and environmental imaginaries at both local and national level. This chapter points to the Windscale inquiry of 1977 as a historical yardstick between the dominant imaginary of nuclear utopianism which subsisted for much of the first three decades of the nuclear age and the resistant dystopian imaginaries which characterised the 1980s. The chapter shows how the Windscale inquiry highlighted the emergence of new kinds of resistance towards nuclear technologies, predicated on their utility, the methods of governance that sustained them, their environmental and ecological impact, and the visions of the future that they entailed. Acknowledging the role of identity in embedding resistant imaginaries, I explore how local citizens resisted the expansion of the Sellafield site as not only potentially hazardous to their wellbeing but as another example of their ‘peripheral’ status in society, as the recipients of “everyone else’s

¹⁵² Jasanoff, ‘Future Imperfect’, in Jasanoff, and Kim, (eds.), *Dreamscapes of Modernity*, p. 11.

unwanted nuclear waste” and hazardous industrial processes.¹⁵³ In this context, the issue of reprocessing drove a wedge between the local population and the government, casting a subjective binary between the ordinary public and a nefarious and autocratic ‘nuclear state.’ In this example, the STIM framework shows how science and technology shape identity by positioning the individual either within or outside shared visions of desirable (or undesirable) futures, and correspondingly, how these identities amplify or attenuate these visions of the future. Elucidating the role of science and technology “in connecting the individual’s subjective self-understanding to a shared moral and social order,” this aligns STIM with the research aims of this project and within broader studies of nuclear culture by exploring the interrelationship between social imaginaries and identity.¹⁵⁴

The final chapter of this study, Chapter Five, shows how two major incidents at Sellafield in 1983 dissolved the imaginary of nuclear utopianism at the national level. Allegations regarding the plant’s excess marine and atmospheric discharge and its carcinogenic effects upon the local community embroiled the plant in a public relations scandal, particularly through the purported links between radiation and the high number of cancer cases amongst local children. The imbrication of nuclear power with childhood leukaemia and excess cancer deaths embedded a dystopian sociotechnical imaginary which stressed the hazardous environmental effects of nuclear power, emphasised the threat to public health through the contamination of the marine and atmospheric environments, and inextricably linked radiation, and more specifically Sellafield, with an observed excess of cancers. The chapter will go on to examine the localised context, revealing that this this process was more diverse and nuanced at the local level, as citizens were forced to mediate between the dystopian imaginary which

¹⁵³ Wynne, Waterton and Grove-White, (eds.), ‘Public Perceptions and the Nuclear Industry in West Cumbria’, p. 38.

¹⁵⁴ Jasanoff, ‘Future Imperfect’, in Jasanoff, and Kim, (eds.), *Dreamscapes of Modernity*, p. 7.

emerged in the national media, and the assurances provided by BNFL, which assured them that the plant represented no threat to public health. In this section, I explore how local citizens became caught between competing imagined nuclear futures and responded to this context by producing their own locally specific forms of nuclear knowledge which were simultaneously the product of these imaginaries and their own experiential knowledge of nuclear technologies. This once again reinforces the central argument that ordinary people (despite their socio-geographic status) function as active agents of social change, capable of substantiating, challenging, disrupting, and redefining hegemonic, state-ordained imaginaries of sociotechnical progress, and popular forms of cultural resistance.

The final section offers some suggestions by way of conclusion, pointing to the role of the Sellafield nuclear power facility in shaping and co-producing social attitudes towards nuclear technologies throughout the second half of the twentieth century. Emphasising the significance of the localised, rural context in shaping our understandings of the production and performance of nuclear culture, the thesis ultimately calls for a more detailed understanding of the ways in which culture interacts with science and technology in the production of sociotechnical systems. This points to the concept of the ‘nuclear imaginary’ as an instructive framework for understanding the chronology and mechanics of social attitudes towards nuclear technologies. This aligns the emerging work on sociotechnical imaginaries with more established insights from nuclear studies, employing recent conceptual and theoretical insights from STS to demonstrate the centrality of ordinary people and localised contexts in the production of nuclear culture. In so doing, this project responds to one of the central questions within the cultural historiography of the nuclear age, answering calls for further engagement in the localised variants of nuclear culture, and going some way towards resolving the late Jeff Hughes’ desire for “theoretically informed social and cultural histories of nuclear Britain” akin

to those in the American context.¹⁵⁵ In his insightful 2012 article, Hughes asked “has British nuclear historiography stalled?”¹⁵⁶ I hope to demonstrate that not only is nuclear historiography well and truly alive, but to highlight the radical potential for future studies through a broader critical engagement with theoretical insights from science and technology studies. By appropriating these insights, we gain a far greater appreciation for the role of nuclear technologies in everyday life throughout the nuclear age, tracing how nuclear science embedded itself and became embedded in “social practices, identities, norms, conventions, discourses, instruments and institutions- in short, in all the building blocks of what we term the social.”¹⁵⁷ Tracing this process in the early years of the British nuclear project, the following chapter will demonstrate how initial social responses to nuclear technologies drew upon, and in turn co-produced an imaginary of a utopian social, (geo)political, and military order; substantiated through Britain’s pursuit of nuclear technologies.

¹⁵⁵ Hughes, ‘What is Nuclear Culture?’, pp. 501f.

¹⁵⁶ *Ibid.*

¹⁵⁷ Jasanoff, *States of Knowledge*, p. 3.

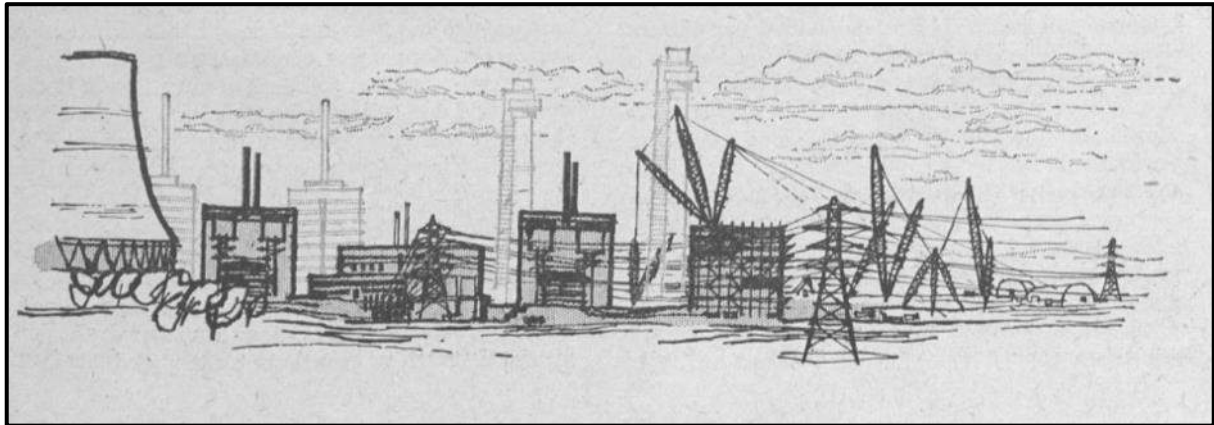


Fig. 1.0: 'The Engineering of Calder Hall', *The Economist*, 181.5904 (20 October 1956), p. 92.

1: The Utopian Dream.

This chapter will argue that social responses to nuclear technologies were characterised by overt public support during the early years of the post-war period. Exploring nuclear weapons and civil power production through the concept of the sociotechnical imaginary, this chapter identifies the creation and embedding of a utopian nuclear imaginary within British society, as nuclear technologies became inextricably linked with a series of desirable military, (geo)political, social, and economic futures at both national and local levels. I will show how this imaginary originated within government ministers in Whitehall and became embedded into the social and cultural fabric of British life. Understood as the process through which an imaginary becomes institutionalised within popular consciousness and public life, the embedding stage of the STIM life-cycle occurs when “the merely imagined is converted into the solidity of identities and the durability of routines and things.”¹⁵⁸ Applying this definition, I will show how the pursuit of nuclear science became enmeshed within Britain’s geo-political aspirations, simultaneously enshrining Britain’s position within a fractious post-war order,

¹⁵⁸ Jasanoff, ‘Imagined and Invented Worlds’, in Jasanoff, and Kim, (eds.), *Dreamscapes of Modernity*, p. 323.

showcasing its technological and scientific prowess through notions of modernity, and providing energy for the fuel-strapped nation.

The chapter will argue that the pursuit of nuclear technologies at Sellafield fed into notions of national and regional identity. This helped embed an imaginary of nuclear utopianism, rooted in imaginaries of Britain's colonial past, a post-colonial future, and perceived identity as a civilising nation. This interpretation points towards the role of identity as a social agent and a vital component in embedding, stabilising, and publicly performing an imagined desirable nuclear future at both national and local levels. It also offers a new interpretation of the role of specific nuclear sites such as Sellafield as social agents in the co-production of nuclear culture. Through its physical form, and as a cultural symbol of modernity, Sellafield embodied both nuclear ideas and material reality, consolidating and embedding the ideological construct of nuclear utopianism within British social life. As the nation's first plutonium production facility and the world's first nuclear power plant, I argue that Sellafield publicly performed and helped embed "a desirable [nuclearised] future" predicated upon notions of Britain's geo-political power, political autonomy, and cultural ascendancy.¹⁵⁹

Engaging with recent developments within studies of nuclear culture, I will explore nuclear imaginaries at both national and local contexts, pointing to the distinct sociotechnical processes through which imaginaries became embedded at different scales. Specifically, I will demonstrate how nuclear imaginaries interacted with notions of identity, showing how the successful construction and operation of the Sellafield plant sat alongside and contributed towards a strong sense of local identity. This helped embed the imaginary of nuclear

¹⁵⁹ Jasanoff, 'Future Imperfect', in Jasanoff, and Kim, (eds.), *Dreamscapes of Modernity*, p. 6.

utopianism at the local level, as the plant became embroiled within imagined futures of local prosperity and socio-economic recovery following a period of post-industrial decline. I will also explore the vital role of secrecy in this process, showing that the state's control over the dissemination and flow of nuclear knowledge was a key component in embedding utopian nuclear imaginaries.

I demonstrate that secrecy operated on three registers. Firstly, I trace how the scientific and operational cultures of the plant mirrored and drew upon wartime principles of military secrecy. This symbolised the vital role of the plant and local community in national defence and contributed to a proud sense of local identity. This subjective identity helped embed the imaginary of nuclear utopianism at the local level as workers looked to their pivotal role in the defence of the nation within the context of escalating Cold war tensions. Secondly, I will demonstrate how tight restrictions on the dissemination of nuclear information allowed the state to subsume less desirable elements of the industry such as radioactive contamination and the destructive capacity of nuclear weapons, and to accentuate desirable ones such as energy production and the role of isotopes within medical science. Thirdly, I show how the suppression of radiation knowledge allowed the state to cultivate a public image of nuclear safety, through which Sellafield appeared as a desirable and secure form of employment in the context of the region's traditional and dangerous heavy industries. This leads into the final strand of the chapter which examines how these facets interacted with the localised context of mass unemployment, low wages, and poor job security to embed a desirable imagined future of regional prosperity attained through the pursuit of nuclear science.

Examining how this process played out at the local level reveals how the local and the national intersected in the production of nuclear culture, as the imaginary of nuclear utopianism

propagated at state level assimilated with a series of local social processes, such as long-term unemployment, historically harsh working conditions, and poor wages to embed an imaginary of nuclear prosperity within British society. Social responses to nuclear technologies were therefore characterised by the dynamic interplay between public concerns at both local and national levels, as the nuclear project appealed to a diverse range of political, cultural, and socio-economic registers at multiple scales. This simultaneously highlights the utility of thinking about nuclear technologies through the lens of the sociotechnical imaginary to understand the cultural work they performed, and the interaction between the local and the national context in the production of British nuclear culture.

1.1: The Origins of Nuclear Utopianism.

The position occupied by nuclear technologies within British social and cultural life in the post-war era was inextricably bound up in their military origins during the closing chapters of the Second World War.¹⁶⁰ In July 1945, a team of Allied scientists working at Los Alamos as part of the ‘Manhattan Project’ produced the first successful detonation of a fissile nuclear weapon. Codenamed ‘Gadget’, the twenty-two-kiloton nuclear device exploded in the New Mexican desert at the USAAF Alamogordo Bombing and Gunnery Range, witnessed by a team of scientists and military personnel who had devoted the previous thirty-four months to the

¹⁶⁰ Jasanoff’s concept of a STIM’s ‘origins’ is notoriously slippery and difficult to identify. It is important to note that nuclear technologies had their scientific origins in the early work on radioactivity by Henri Becquerel, Pierre and Marie Curie, and the work of successive generations of scientists who sought to harness the power of the atom. Far before the first nuclear weapon was produced, nuclear technologies also found form in the content of science-fiction writers such as H.G. Wells. This might be more accurately thought of as the cultural origins of nuclear technologies, as they were first imagined and given cultural form by a series of utopian (and dystopian) writers. Either of these may be better conceived of as the foundational ‘origins’ of nuclear imaginaries, yet I will use 1945 as the point at which these expressions were given scientific and material form at Los Alamos. This represents a conscious choice to focus on the utility of STIM as a concept, rather than diluting its analytical potential by focusing too heavily on the minutiae of nuclear history. See, H. Wells, *The World Set Free* (London: W. Collins Sons, 1924).

production of a nuclear device capable of being deployed in the field of war. The ‘Manhattan Project’ was a joint venture between the US, the UK, and Canada which built upon the British government’s ‘Tube Alloys’ research and development programme which had explored nuclear weapons production.¹⁶¹ Put off by the spiralling costs of the initial ‘Tube Alloys’ project and lacking the infrastructure to produce a weapon of their own, the British government entered the ‘Manhattan Project’ following a series of agreements with the US which promised continuing nuclear cooperation after the war, (Quebec 1943, Hyde Park 1944, and Washington D.C. 1945). Despite these treaties, four months after the war ended US Senator Brien McMahon introduced the ‘Atomic Energy Act’ which backtracked on these agreements and prohibited the sharing of nuclear science between the US and her wartime allies. Unanimously passed by the senate and signed into law by President Truman in August 1946, this act rode roughshod over the wartime alliances between the US and UK, blindsiding British politicians who believed they would achieve post-war nuclear capacity in partnership with the Americans.

Cut adrift from the geopolitical security offered by nuclear partnership with the US, Britain faced an uncertain military and political future.¹⁶² Spurned by their former allies who had relied upon their expertise in the production of the bomb, Britain now had to confront the stark reality of its status as a second-rate world power below the US and the USSR.¹⁶³ Into this

¹⁶¹ This group was significantly aided by key emigre scientists, such as Klaus Fuchs, Rudolf Peierls, and Enrico Fermi. For further reading, see C. Laucht, *Elemental Germans: Klaus Fuchs, Rudolf Peierls and the Making of British Nuclear Culture 1939–59* (London: Palgrave Macmillan, 2012).

¹⁶² The loss of American support prompted something of a political crisis within British government, who resented what they considered as a violation of the terms of their entry into the Manhattan Project.

¹⁶³ Britain had contributed key expertise to the overall success of the Manhattan Project and its scientists were highly thought of by their American colleagues. The man later tasked with producing Britain’s independent atomic weapon, William Penney, had worked directly alongside Robert Oppenheimer and was considered one of a small number of scientists “able to offer the soundest advice” to General Leslie Groves. See, B. Cathcart, *Test of Greatness: Britain’s Struggle for the Atom Bomb* (London: John Murray, 1994), p. 39; ‘Penney, William George, Baron Penney (1909–1991)’, *Oxford Dictionary of National Biography* (online ed.), <<https://www.oxforddnb.com/view/10.1093/ref:odnb/9780198614128.001.0001/odnb-9780198614128-e-49920;jsessionid=C8EF2725A7031289B435962BE01183BB>> [accessed February 2018].

context, leading scientists and key politicians such as Ernest Bevin, Clement Atlee, and Winston Churchill asserted that Britain should develop an independent nuclear weapon as a safeguard against hostile foreign aggression and to cement its superpower status within a volatile post-war geo-political climate.¹⁶⁴

The pursuit of nuclear weapons became wrapped up in a series of desirable military and political futures, whereby Britain's military security and international hegemony was enshrined through the production of an independent nuclear weapon. Operating at both military and political levels, this offered a means of asserting geo-political hegemony through an ostensibly military display of force. Describing this process, Gabrielle Hecht has coined the term 'technopolitics', identifying the "strategic practice of designing or using [nuclear] technology to constitute, embody, or enact political goals."¹⁶⁵ She has argued that nuclear weapons served as an "ultimate political trump card", through which nations could define themselves. They offered a means to express superpower status (such as the US in 1945, and the USSR in 1949), assert their declining sovereignty (Britain in 1952, and France in 1960), or challenge international hierarchies (China in 1964, and Israel in the mid 1960s).¹⁶⁶ This directly correlated nuclear weapons and political power, as "geopolitical status seemed directly proportional to the number of nukes a nation possessed."¹⁶⁷ Britain's pursuit of an independent nuclear weapon therefore operated on both (geo)political and military levels, becoming enmeshed within various imagined political, social, and military futures.

¹⁶⁴ M. Gowing, and L. Arnold, *Independence and Deterrence: Britain and Atomic Energy, 1945–1952, Volume 1: Policy Making* (London: Macmillan, 1974), pp. 21, 174, 216; T. Botti, *The Long Wait: The Forging of the Anglo-American Nuclear Alliance, 1945–58* (New York: Greenwood Press, 1987), pp. 61- 75.

¹⁶⁵ Hecht, *The Radiance of France*, p. 56.

¹⁶⁶ G. Hecht, 'The Power of Nuclear Things', *Technology and Culture*, 51.1 (2010), p. 3.

¹⁶⁷ Hecht, *Being Nuclear*, p. 6.

The political dimensions of nuclear capacity have been neatly characterised by political historians John Baylis and Kristan Stoddart, who argue that “as atomic weapons were seen by many to be the last word in weapons... Britain had to have them” to ensure she did not become politically toothless and “totally dependent on the United States.”¹⁶⁸ This was an acute fear amongst political elites who held deep concerns about Britain’s declining colonial status, symbolised by the US’s refusal to share nuclear information and the damning indictment of senators who claimed an Anglo-American nuclear alliance would be like “trading a horse for a rabbit.”¹⁶⁹ Faced with an undesirable future of political and military submission to the US, government ministers perceived nuclear weapons as a military and political necessity for Britain to retain its autonomy and super-power status, allowing Britain to “negotiate with the US government on the basis of equality.”¹⁷⁰ Britain’s possession and mastery of nuclear weapons therefore fused with imagined desirable military and (geo)political visions of the nation’s future, becoming technopolitically coupled with Britain’s international hegemony and its desired status as a world superpower.

Jasanoff has argued that imaginaries are formed when ideas “originate in the visions of single individuals or small collectives” and “come to be communally adopted.”¹⁷¹ In the early Cold war years, a distinct nuclear imaginary began to take shape as the British political establishment communally identified the centrality of nuclear technologies within Britain’s future. Scientist Sir William Penney argued as much, stating that “the discriminative test for a first-class power is whether it has made an atomic bomb- we have either got to pass the test or

¹⁶⁸ J. Baylis, and K. Stoddart, ‘The British Nuclear Experience: The Role of Ideas and Beliefs (Part One)’, *Diplomacy & Statecraft*, 23.0 (2012), p. 339.

¹⁶⁹ *Ibid.*, p. 183.

¹⁷⁰ Gowing, *Independence and Deterrence*, p. 209.

¹⁷¹ Jasanoff, ‘Future Imperfect’, in Jasanoff, and Kim, (eds.), *Dreamscapes of Modernity*, p. 4.

suffer a serious loss of prestige both inside the country and internationally.”¹⁷² No longer simply a military prerogative, a series of senior political officials increasingly saw the production of a British nuclear weapon as a matter of both national security and international reputation. Cabinet member Ernest Bevin admitted to a government select committee, “we have got to get this thing over here whatever it costs... we’ve got to have the bloody Union Jack flying on top of it!”¹⁷³ Similarly, Winston Churchill told the cabinet that Britain “could not expect to maintain its influence as a world power unless it was prepared to develop the most up-to-date nuclear weapons.”¹⁷⁴ This identified the centrality of weapons production within Britain’s geopolitical aspirations, tying the pursuit of the atom bomb within imagined futures of Britain’s military security and international prosperity. Animated by visions of this desirable future, a select group of cabinet members dubbed ‘Gen 163’ took the decision to produce an independent British nuclear weapon in 1947, committing to the production of fissile material and the construction of nuclear reactors for this purpose.

1.2: ‘Windscale’: Britain’s First Nuclear Reactor.

Mirroring the American model at Los Alamos, it was initially believed that the reactor would be cooled by water and would need to be located at least fifty miles from any major urban centre, given the inherent danger of nuclear fission and the quantity of water required.¹⁷⁵ However, new research proposed an air-cooled system which offered much greater efficiency and did not require such vast quantities of water. This made remote regions such as Scotland,

¹⁷² *New York Times*, ‘Lord Penney, 81, Atomic Scientist and Father of British Bomb, Dies’, 7 March 1991 <<https://www.nytimes.com/1991/03/07/obituaries/lord-penney-81-atomic-scientist-and-father-of-british-bomb-dies.html>> [accessed June 2019]; Cathcart, *Test of Greatness*, p. xvi.

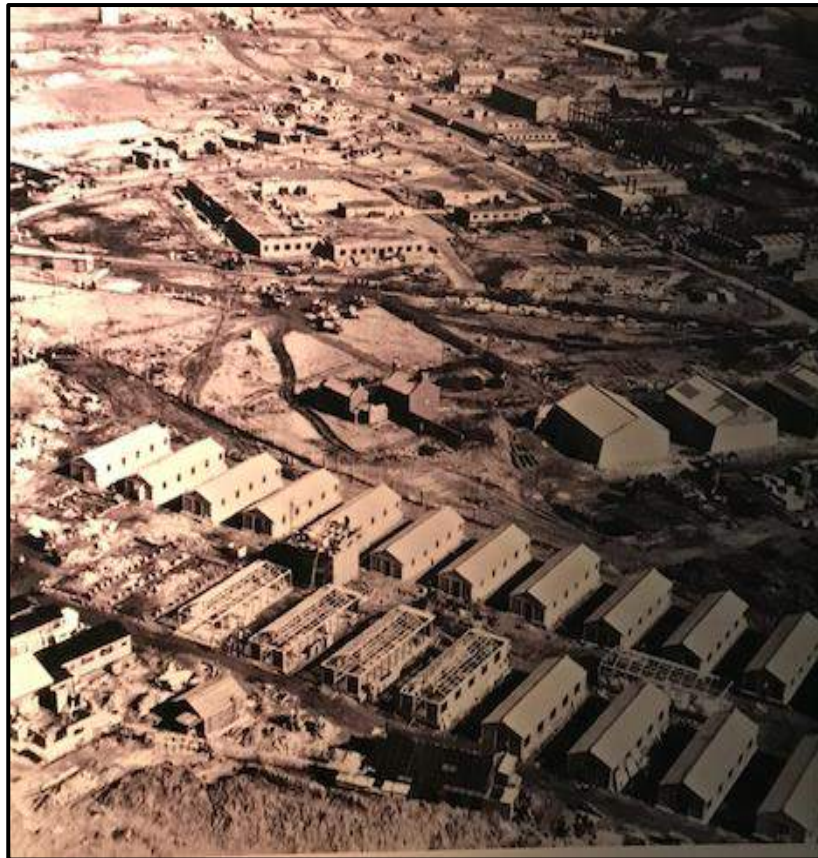
¹⁷³ Cathcart, *Test of Greatness*, p. 25.

¹⁷⁴ P. Hennessy, *Cabinets and the Bomb* (Oxford: Oxford University Press, 2007), p. 48; Gowing, *Independence and Deterrence*, p. 209.

¹⁷⁵ H. Bracey, *Industry and the Countryside: The Impact of Industry on Amenities in the Countryside* (London: Faber and Faber Ltd, 1963), p. 101.

and areas of West Cumbria a viable option for the new reactor.¹⁷⁶ With infrastructural challenges involved in producing the reactor as far north as Scotland, three ordnance factories in West Cumbria between Whitehaven and Millom were identified as possible locations for the new reactor, with the Sellafield site appearing the most promising.¹⁷⁷ Fig. 2.0 shows the Sellafield ordnance factory as it was in 1943, characterised by a disjointed and hastily constructed series of outbuildings and warehouses.

Fig. 2.0: 'Royal Ordnance Factory Sellafield', 1943. With kind permission from the Beacon Museum, Whitehaven.



Despite its suitability the Sellafield site was quickly ruled out, as fabric manufacturer Courtaulds had received council permission to develop a rayon factory there. The second-

¹⁷⁶ Bracey, *Industry and the Countryside*, p. 102.

¹⁷⁷ *Ibid.*, p. 102.

choice Drigg site therefore became the de facto location for the new reactor and was reported in the national press as the site chosen by the Ministry of Supply (MoS).¹⁷⁸ Fearful that a nuclear complex at Drigg would reduce the availability and quality of the manpower available, Courthaulds chose to abandon the Sellafield project and instead moved production to Ireland.¹⁷⁹ This vacancy allowed the MoS to move production back to the preferred site at Sellafield, which was renamed 'Windscale' in order to avoid confusion with the uranium extraction plant 'Springfields' in Preston.¹⁸⁰ In 1947 work began to convert the ramshackle outbuildings of the former ordnance factory into a working nuclear reactor for the express purpose of creating military-grade plutonium for use in Britain's nuclear weapon. Construction ran between 1947 and 1951 when the second of the two Windscale piles was completed and began producing plutonium for the first British nuclear bomb, detonated at Montebello, Australia in October 1952.

1.3: 'Calder Hall': The World's First Commercial Power Plant.

As Windscale demonstrated the viability of producing plutonium for nuclear weapons, attention soon turned to the potential civilian applications of the piles, with the heat from the reactors identified as a potential source of electricity for the National Grid. Whilst Britain's weapons project ran some seven years behind the US, and three years behind the USSR, neither nation had a full-scale reactor designed to produce electricity.¹⁸¹ Consequently, the pursuit of nuclear power was seen as an opportunity for Britain to catch up with the Soviet and American

¹⁷⁸ *Ibid.*

¹⁷⁹ *Ibid.*, pp. 102f; Welsh, *Mobilising Modernity*, pp. 47f.

¹⁸⁰ Early paperwork also refers to the site as 'Winscales.'

¹⁸¹ The USSR had developed an experimental plant at Obninsk in 1954, however this was a pilot plant and designed for technology research purposes ahead of the production of the widely adopted 'RBMK' models of nuclear reactor. See, P. Josephson, *Red Atom: Russia's Nuclear Power Program from Stalin to Today* (Pittsburgh: University of Pittsburgh Press, 2005), pp. 25- 28.

nuclear programmes, simultaneously winning international prestige through the pursuit of nuclear technologies and providing a much needed source of energy in the face of post-war fuel shortages and an ever-increasing public demand for electricity. As part of this process, the Chief engineer responsible for the design and construction of Windscale, Christopher Hinton was tasked with constructing a nuclear reactor on the Sellafield site, capable of producing electrical power by the end of 1956. With the Windscale piles designed to optimise the production of military-grade plutonium, a new reactor named ‘Calder Hall’ was built adjacent to the Windscale piles for the generation of electricity. The image below (Fig. 3.0) shows the Sellafield site in 1956, with the cooling towers of Calder Hall on the right, emitting steam. To their left are the two pencil shaped Windscale piles on the other side of the River Calder.



Fig 3.0: ‘Aerial image of Windscale Works and Calder Hall’, National Archives, (MAF 298/160).

Constructed by the newly formed United Kingdom Atomic Energy Authority (UKAEA) who had taken over operations from the MoS in 1954, Calder Hall was the first of four magnesium oxide (Magnox) reactors built in the UK and began producing energy for the National Grid on October 17, 1956, operating for nearly five decades until 2003.¹⁸²

The construction of Calder Hall represented a key moment in the evolution of social attitudes towards nuclear technologies, as the technopolitical value of the bomb extended into the civil realm and its devastating power was repositioned as a creative, rather than a destructive entity. By transcending the bomb's military origins, representations of Calder Hall produced utopian visions of social, political, and economic life predicated upon the power of the atom as a force for good. This logic was formalised in Eisenhower's infamous 1953 'Atoms for Peace' speech, which advocated peaceful uses of nuclear energy, harnessed for the common good of humanity.¹⁸³ This reflected the specific place science occupied within post-war society as a progressive symbol of modernity. Historian Ian Welsh argued that during this period society placed a large amount of faith in scientific establishments to resolve social, economic, and political problems, with "science seen as having a central part to play in the task of social and economic reconstruction and in the forging of a new world order."¹⁸⁴ Identifying a period between the late 1930s and early 1960s, Welsh coined the term 'peak modernity' to describe how "the ideological objectives of nation states were united behind visions of the planned

¹⁸² The Central Electricity Generating Board (CEGB) also constructed Magnox reactors at eight further sites- although these were engaged solely in the production of energy and not optimised for military use.

¹⁸³ L. Weiss, 'Atoms for Peace', *Bulletin of the Atomic Scientists*, 59.6 (2003), pp. 34- 44.

¹⁸⁴ Welsh, *Mobilising Modernity*, p. 19.

transformation of society by rational, scientific means.”¹⁸⁵ Subsumed within broader notions of scientific prowess and modernity, the prospect of generating power from the atom forged symbolic links between nuclear energy, Sellafield, and Britain’s ongoing prosperity, as nuclear power became intertwined with a series of utopian social, economic, and political imaginaries.

Much like the bomb before it, the pursuit of nuclear energy was something of a double-edged sword, designed to “serve a number of symbolic functions by winning increased public support and increasing Britain’s prestige through the demonstration of scientific and technical prowess.”¹⁸⁶ UKAEA historian Margaret Gowing argues that the decision to produce nuclear energy was made as it would have “a good psychological effect on public opinion... and on prestige vis-à-vis the Americans” whilst historian and journalist Chapman Pincher suggested that it would take “the edge off the destructive aspects of the bomb, which the government regarded as good propaganda.”¹⁸⁷ This was a point corroborated by local citizens, who explained that Calder Hall was designed as a smokescreen to “allay people’s fears about radiation and so on, [which were] tied up with Hiroshima and Nagasaki and the bomb,” thus redirecting public attitudes towards peaceful uses for nuclear technologies.¹⁸⁸ As an act of public legitimisation and geopolitical posturing, the production of nuclear energy represented many of the same foreign policy objectives as the pursuit of the nuclear bomb, yet without its

¹⁸⁵ This belief had its origins in the era of industrialisation, whereby technological and scientific advances powered society’s progress- particularly during wartime, where advances such as radar, the proximity fuse, Barnes Wallis’ ‘bouncing bomb’, and the Spitfire were synonymous with the success of the war effort. As the latest instalment in a long line of scientific advances which promised to improve quality of life, nuclear power functioned as a symbol of modernity offering a seemingly endless supply of cheap energy to power the post-war era; simultaneously signifying Britain’s international technological prowess and generating a vital supply of electricity. For further reading, see Welsh, *Mobilising Modernity*, p. 17.

¹⁸⁶ Welsh, *Mobilising Modernity*, pp. 54f.

¹⁸⁷ Gowing, *Independence and Deterrence*, p. 447f; *Windscale: Britain’s Biggest Nuclear Disaster*, S. Aspinall. London: BBC, 2007.

¹⁸⁸ In this context, the nuclear energy programme not only spoke to a desirable future but also detracted from the potential dystopian consequences of nuclear weapons. (D. Wooley, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 6 August 2010, p. 19.)

dehumanising and destructive aspects. In this way, nuclear power became the flipside of the nuclear coin; what historian Paul Boyer has termed the “sunny side of the atom”, imbued with much of the technopolitical value assigned to the bomb with the added by-product of producing domestic electricity for the National Grid.¹⁸⁹ This aligned the military and (geo)political utopias embodied by nuclear weapons with imaginaries of domestic social and economic prosperity, which had particular salience within the context of post-war austerity, continued rationing, and fuel shortages.

As a domestic source of electricity amid post-war fuel shortages, nuclear power appeared to safeguard Britain’s future energy needs, offering a timely solution to an increasingly bleak long-term energy projection based on a seemingly antiquated reliance on insufficient supplies of fossil fuels. Despite fuel rationing during the 1950s, many major European nations suffered from energy shortfalls as energy demands doubled over a ten-year period. The inadequacy of Britain’s energy supply was thrown into sharp relief by the Suez crisis of 1956, which had proven not only a devastating blow to British prestige, but had highlighted its dependence on fossil fuels from the Middle East, who contributed 90% of European petroleum during the 1950s.¹⁹⁰ The political instability of the Middle Eastern region “sent a panic through both Britain and France” and was a key factor in both nations committing to the large-scale development of nuclear energy in the aftermath of Suez. By 1957, French officials admitted that “[domestic] energy must be produced at any price”, whilst Britain had tripled its investment in nuclear energy, aiming to produce one third of its annual consumption by 1965.¹⁹¹ Fearful of being held to ransom by foreign powers, ministers urged that “the uneven

¹⁸⁹ Boyer, *By the Bomb's Early Light*, p. 299.

¹⁹⁰ Hamblin, *Poison in the Well*, p. 118.

¹⁹¹ *Ibid.*; B. Goldschmidt, *The Atomic Complex: A Worldwide Political History of Nuclear Energy* (La Grange: American Nuclear Society, 1982), pp. 264–272.

distribution of fuel in the world and its rising cost make it absolutely necessary that we take this opportunity” to develop nuclear power, which would serve as a safeguard against West Asian dominance in the energy market.¹⁹² In this way, nuclear power production appealed to a desirable economic and social future whereby Britain could transcend global fluctuations in the energy market and safeguard its own interests by becoming self-sufficient in the production of energy.

Representative of a desirable and autonomous British future, nuclear power production aligned socio-economic and scientific imaginaries together. This projected a harmonious vision of the future whereby advances in nuclear science offered an innovative utopian antidote to challenges within post-war British society. Recalling the mood of the period, interviewees such as Peter Graham described how nuclear power was championed as “the brave new technology that was going to save mankind from the loss of oil.”¹⁹³ Local residents explained that nuclear power was at the cutting edge of science, describing how “nuclear was the glamour industry to get into... it seemed like it was going to blossom up and become the big industry.”¹⁹⁴ Indeed, this narrative was echoed by contemporary scientists, who boldly projected that “a quarter of all Britain’s electricity would come from atomic plants by 1966, a half by 1973, and the whole of Britain would be converted to nuclear power by the end of the century” providing electricity to the nation “at a cost no more than that of a traditional coal power station.”¹⁹⁵ This was also reflected in the writings of social commentators from the period such as Harold Bracey, who described nuclear energy as “the embodiment of futurist expression, representing a modernist

¹⁹² *West Cumberland News*, 29 January 1955, p. 5.

¹⁹³ P. Graham, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 27 February 2010, p. 5.

¹⁹⁴ J. Hall, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 27 May 2010, p. 5.

¹⁹⁵ *News Chronicle*, 18 January 1954; *Whitehaven News*, 30 April 1959.

drive to the new”, in direct contrast to “the old traditional power station.”¹⁹⁶ As a continuation of this logic, specific reactor locations became entwined within imagined visions of the future, with the Sellafield plant projected as a “site for the construction of Britain’s future.”¹⁹⁷ Through its dual function as a producer of military grade plutonium and the UK’s first civil nuclear reactor, Sellafield represented Britain’s defence aspirations and the dawning of a new age of modern energy production, concurrently functioning as a fulcrum for a series of imagined social, economic, military, and political utopias.

1.4: A Desirable National Future.

Having identified the socio-political context out of which nuclear utopianism originated, the following section of this chapter will show how these imaginaries were embedded into national society through the construction and operation of the Sellafield nuclear complex.¹⁹⁸ Specifically, I will demonstrate how the Royal patronage of the Calder Hall power plant helped embed the imaginary of nuclear utopianism by inextricably linking Sellafield with the future prosperity of the nation. Tracing the content of newspaper and government narratives, I will show how the involvement of the monarchy within the nuclear power programme “publicly performed” and “institutionally stabilised” disparate strands of the

¹⁹⁶ Bracey, *Industry and the Countryside*, p. 30. For a critical engagement with the impact of Harold Bracey's study of the impacts of industry on the amenities of the countryside, see J. Sheail, ‘The ‘Amenity’ Clause: An Insight into Half a Century of Environmental Protection in the United Kingdom’, *Transactions of the Institute of British Geographers*, 17.2 (1992), pp. 152- 165.

¹⁹⁷ D. Wooley, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 6 August 2010, p. 3; D. McConnell, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 8 February 2010, p. 3; K. Jay, *Britain's Atomic Factories: The Story of Atomic Energy Production in Britain* (London: HMSO, 1954); Welsh, *Mobilising Modernity*, p. 72.

¹⁹⁸ The same could arguably be said for the atomic weapons research establishment at Harwell, although as an inwards-facing research facility, Harwell was never the public face of nuclear science in the same way Sellafield was.

nuclear imaginary, firmly embedding imagined futures of national prosperity within the nuclear project at Sellafield.¹⁹⁹

Whilst Windscale became operational with very little fanfare or public involvement, the construction of Calder Hall became a major public spectacle used by the political establishment to embed a positive imaginary of nuclear technologies within national society. Whereas Windscale's military functionality was ostensibly a national secret, Calder Hall's role in the production of electricity became a national spectacle, a public demonstration of Britain's post-war socio-economic resurgence. One of the ways in which this was achieved was by publicly associating the newly crowned Queen Elizabeth II with the nuclear project at the opening ceremony of the Calder Hall plant in October 1956. This mobilised "one of the prime sources of symbolic legitimation" within British society, appropriating the vast popularity, cultural gravitas, and moral integrity of the monarch to institutionally stabilise the imaginary of nuclear utopianism within British social and cultural life.²⁰⁰

The Queen's attendance drew a huge amount of international attention. Local newspapers described a media "invasion" of "over 200 representatives of the world's press, a distinguished gathering of scientists and technicians from all parts of the world" who ensured that "the eyes and ears of the world" focused on Sellafield.²⁰¹ Figs. 4.0 and 5.0 are two images captured that day, as the Queen delivered her public address and toured the Sellafield site. The fanfare surrounding the royal opening provided a "dramatic and inspiring" backdrop to the new technology of nuclear power, cultivating an "atmosphere of euphoria."²⁰² This ascribed a "new

¹⁹⁹ Jasanoff, 'Future Imperfect', in Jasanoff, and Kim, (eds.), *Dreamscapes of Modernity*, p. 4.

²⁰⁰ Welsh, *Mobilising Modernity*, p. 41.

²⁰¹ *West Cumberland News and Star*, 16 October 1957; *West Cumberland Evening Star and Mail*, date missing from microfilm.

²⁰² Welsh, *Mobilising Modernity*, p. 58.

kind of political cohesion” upon the nuclear project, invoking “the certainty and splendour of an imperial past and the existing vision of a pioneering science about to deliver future glories.”²⁰³



Fig. 4.0: ‘The Queen’s Address at the Opening of Calder Hall, 1956’, Whitehaven Archive and Local Study Centre, (YBNFL 4/24); Fig. 5.0: ‘Her Majesty Inspecting the Turbine Hall, 1956’, Whitehaven Archive and Local Study Centre, (PH 1446).

The ceremony echoed the eulogistic rhetoric of the 1955 governmental White Paper, which had advocated the heroism of the atomic scientists and the “brilliant discoveries [which] brought us to the threshold of a new age.”²⁰⁴ The Queen’s opening address conveyed a very similar message, emphasising that Calder Hall represented “the making of history,” whilst newspaper reports lauded that Calder Hall was “the biggest, and most successful venture that post-war Britain has taken”, heralding “the beginning of a new epoch.”²⁰⁵ Here Sellafield, and more specifically, Calder Hall, served as a site for expressions of national identity, as the plant

²⁰³ *Ibid.*

²⁰⁴ *Ibid.*, pp. 42, 56f.

²⁰⁵ *The Times*, 18 October 1956; *Whitehaven News*, 17 October 1956; ‘The Engineering of Calder Hall’, *The Economist*, 181.5904 (20 October 1956), p. 92.

became subsumed within notions of national pride and “became articulated with a second Elizabethan age of splendour” in which “British inventive genius has again been demonstrated.”²⁰⁶ A recent article by Karena Kalmbach, Andreas Marklund, and Anna Åberg has shown that imaginaries are characterised by “crucial examinations and redefinitions of the past and present as well as speculative projections into an uncertain future.”²⁰⁷ Developing these insights, we can see how the pursuit of nuclear science became embedded into the fabric of British society through the symbolic legitimisation of the monarchy. This publicly endorsed the nuclear project, speaking to notions of national identity by culturally and historically grounding imaginaries of nuclear power within Britain’s imagined imperial history, a speculative post-colonial future, and its perceived identity as a civilising nation.

Calder Hall appealed to and reproduced particular notions of British identity, with the Queen’s speech inextricably likening the development of nuclear power to Britain’s historical role as a global moral compass. In a carefully crafted address, she advocated that nuclear power would serve “the common good of our humanity”, at once placing Britain at the vanguard of global technological development as a guardian of nuclear morality.²⁰⁸ An excerpt from the transcript of her opening address reads:

“for centuries past, visionary ideals and practical methods which have gone from our shores have opened up new ways of thought and modes of life for people in all parts of the world. It may well prove to have been among the greatest of our contributions to

²⁰⁶ *West Cumberland News*, 29 January 1955, p. 5; Welsh, *Mobilising Modernity*, p. 18.

²⁰⁷ K. Kalmbach, A. Marklund, and A. Åberg, ‘Crisis and Technological Futures: Experiences, Emotion, and Action,’ *Technology and Culture*, 61.1 (2020), pp. 274.

²⁰⁸ *The Times*, 18 October 1956.

human welfare that we led the way in demonstrating the peaceful uses of this source of power.”²⁰⁹

Where the nuclear bomb had appeared as “a terrifying weapon of destruction”, Calder Hall represented nuclear energy’s capacity as a conciliatory force, with Britain as its benign benefactor.²¹⁰ This rhetoric was echoed by the Manager of Sellafield, Mr H.G. Davey, who eulogised that, in learning to harness the power of the atom for civil purposes: “we have learned to tame the brute.”²¹¹ This represented a reframing of the colonial gaze with which Britain had once looked upon the world, with nuclear technologies the untamed ‘savage’ which required humanising by the white, British explorer-scientist, who toiled at the boundaries of human discovery to harness the power of the atom and bring it within the control of ‘civilised’ man.²¹² This discursively rooted the nuclear project within notions of imperialism by symbolically associating nuclear power with British hegemony and imaginaries of national identity. The role of nuclear technologies in shaping imaginaries of national identity has been the subject of a recent study by Christopher Lawrence, who examined how the US’ remote sensing of nuclear facilities in South-West Asia fed into an imaginary of America’s identity at the forefront of fighting nuclear aggression and the ideological concept of ‘terror.’²¹³ Engaging with this approach, we can see how the civil nuclear project appealed to particular notions of British

²⁰⁹ *The Times*, 19 October 1956.

²¹⁰ *The Times*, 18 October 1956.

²¹¹ *West Cumberland News and Star*, date missing from microfilm.

²¹² M. Pratt, *Imperial Eyes: Travel Writing and Transculturation* (London: Routledge, 1992); E. Said, *Orientalism* (New York: Pantheon Books, 1978). For further reading on the subject of nuclear colonialism, see Hecht, *Being Nuclear*; C. Hill, Britain, ‘West Africa and the ‘New Nuclear Imperialism’: Decolonisation and Development during French Tests’, *Contemporary British History*, 33.2 (2019), pp. 274- 289; N. Edwards, ‘Nuclear Colonialism and the Social Construction of Landscape in Alaska’, *Environmental Justice*, 4.2 (2011), pp. 109- 114; D. Endres, ‘The Rhetoric of Nuclear Colonialism: Rhetorical Exclusion of American Indian Arguments in the Yucca Mountain Nuclear Waste Siting Decision’, *Communication and Critical/Cultural Studies*, 6.1 (2009), pp. 39- 60.

²¹³ C. Lawrence, ‘Heralds of Global Transparency: Remote Sensing, Nuclear Fuel-cycle Facilities, and the Modularity of Imagination’, *Social Studies of Science*, 50.4 (2020), pp. 508- 54.

identity rooted in Western notions of imperialism and intellectual superiority over the colonies.²¹⁴ Subjective understandings of what it meant to be British therefore produced particular ways of thinking about nuclear science, helping embed imaginaries of nuclear power as representative of desirable social, cultural, and geopolitical national futures.

Aligning with foreign policy objectives and providing a domestic supply of energy, nuclear technologies simultaneously reduced Britain's dependency on oil-rich nations, appealed to cultural notions of Britain's colonial identity, and consolidated its status as a global superpower. By appealing to notions of Britishness and imaginaries of its former imperial glories, nuclear technologies assimilated neatly into subjective notions of national identity, helping embed desirable imaginaries of a post-colonial future characterised by Britain's renewed supremacy within the field of nuclear science. These imaginaries can be discursively traced throughout the content of official narratives from government and within the atomic science movement. The Chairman of the UKAEA Sir Edward Plowden, described nuclear power as a means of re-asserting Britain's declining colonial status. He tied nuclear technologies to notions of imperialism, espousing that nuclear science offered "a new world to conquer," pointing to the role of nuclear scientists "already rapidly expanding the frontiers" to assert Britain's proper place in the world.²¹⁵ Likewise, government ministers acceded that whilst "Britannia no longer rules the seas, it is a certain fact that she rules the isotopes and the reactors."²¹⁶ This aligned nuclear science with Britain's subjective identity as an exporter of

²¹⁴ This had a particular cultural salience, given the decline of the British Empire and the independence of many former colonies in the aftermath of the Second World War, such as Jordan (1946), Pakistan (1947), Palestine (1948), Sri Lanka (1948), Burma (1948), India (1947), Libya (1951), and Sudan (1956). For further reading, see R. Hyam, *Understanding the British Empire* (Cambridge: Cambridge University Press, 2010); J. Darwin, *The Empire Project: The Rise and Fall of the British World-System, 1830- 1970* (Cambridge: Cambridge University Press, 2009).

²¹⁵ *The Times*, 17 October 1956; J. Jukes, 'Nuclear Energy: A Survey of Britain's Position', *International Affairs*, 32.1 (1956), pp. 273- 282.

²¹⁶ 'House of Commons Paper 569', pp. 132, 146- 149, quoted in Welsh, *Mobilising Modernity*, p. 63.

goods and intellect, formalising the logic of the 1955 ‘White Paper on the Nuclear Power Programme’, which petitioned for a “rapid expansion” of reactor sales both “at home and overseas.”²¹⁷ Through the stewardship of nuclear technologies, government ministers imagined a future whereby Britain served as the international “hub of atom industry.”²¹⁸ In this context, the pursuit of nuclear energy at Sellafield was seen as returning the nation to “the vanguard of technical progress” and restoring Britain’s “proper part in world affairs.”²¹⁹ This imaginary was also informed by the US’ decision to snub an Anglo-American nuclear alliance following the 1946 McMahon Act. In this context, the pursuit of nuclear technologies at Sellafield was seen as a vital component in safeguarding Britain’s future, providing irrefutable proof of its contribution to the Cold war arms race and its suitability as a nuclear partner to the Americans.

In an example of the interrelated relationship of sociotechnical processes, these notions of national identity fed back into imaginaries of political futures, as Calder Hall became embroiled within political efforts to obtain nuclear partnership with the Americans. Indeed, Calder Hall’s successful operation threw into sharp relief Britain’s successes in the face of US atomic isolationism, superseding the US energy programme by arriving well over a year before the USA’s Shippingport Atomic Power Station in Pennsylvania. This was a particular source of pride amongst nuclear engineers and scientists, many of whom had been involved in the ‘Manhattan Project’ before being jettisoned by their former ally. Chief engineer of Calder Hall, Christopher Hinton, triumphantly declared that the British effort had been “absolutely magnificent. We led the world because we were two years ahead of America ... [Having] started four wartime years behind them at Risley, with eighteen people including typists and

²¹⁷ *A Programme of Nuclear Power* (Cmd. 9389, London: H.M.S.O, February 1955), <<http://filestore.nationalarchives.gov.uk/pdfs/small/cab-129-73-c-55-31-31.pdf>> [accessed November 2019].

²¹⁸ *Whitehaven News*, 22 May 1958.

²¹⁹ Jukes, ‘Nuclear Energy’, p. 281.

messengers, ten years later we were two years ahead of them. This had shown the bastards where they got off.”²²⁰ Senior government officials also celebrated this achievement, lauding that “we have got in first, we have got the job going, and we should develop it.”²²¹ Its successful operation appeared as “a complete vindication of British ability in the face of American isolationism” and a critical boost to Britain’s prestige in the midst of the ongoing Suez Crisis, and the defection of two of the ‘Cambridge Spies’ to the Soviet Union, which had severely damaged Anglo-American relations.²²² In this context, the successful operation of Calder Hall projected an idealised vision of British hegemony aimed at restoring her nuclear partnership with the US. Nuclear technologies and more specifically, the Sellafield site represented Britain’s future prosperity, projecting an imagined future of Britain’s geo-political ascendancy and restored status as an imperial superpower.

This section of the chapter has shown how the pursuit of nuclear technologies at Sellafield was rooted in notions of scientific modernity and spoke to subjective understandings of national identity. Offering a means of politically and culturally restoring Britain’s status as a major international superpower, protecting from military threat, and providing a domestic source of energy, Sellafield embedded a series of desirable military, socio-cultural, economic, and (geo)political futures at the national level. The following section of the chapter will show how this process occurred at the local level, as the nuclear industry appealed to diverse sections amongst the West Cumbrian public.

The Sellafield plant also embedded a locally specific vision of a utopian future as a provider of long-term, well-paid, and ostensibly ‘safe’ employment which reinforced the

²²⁰ Jay, *Britain's Atomic Factories*, pp. iff.

²²¹ *West Cumberland News*, 20 December 1947, p. 1.

²²² Welsh, *Mobilising Modernity*, p. 59.

region's subjective relationship with industrial and scientific innovation. Tracing the socio-technical processes at play at the local scale, this points to the significance of understanding how the local and the national interacted in the production of nuclear culture, and how social responses to nuclear technologies were shaped by a combination of national and local contexts.

1.5: West Cumbria.

Windscale's role in the production of the nuclear bomb, coupled with the eulogistic rhetoric which surrounded the opening of Calder Hall informed localised notions of cultural identity, as citizens framed their sense-of-self around the plant's successes. Sellafield served as an immense source of pride amongst the local population, who identified with the plant's successful construction and operation as a central tenet of regional identity. Tracing the emergence and continuation of these identities we can see how representations of Sellafield not only stabilised the imaginary of nuclear utopianism at the national level but actively embedded it into the fabric of West Cumbrian life. This approach develops work on the plurality of cultural responses to the nuclear age, and an increasing engagement with the localised variants of nuclear cultures by scholars of nuclear history.²²³ It also builds on a recent study by Jonathan Hogg, who explained that sociotechnical imaginaries of civil defence were "strengthened and made durable once [they] became intertwined with localised contexts and, of course, individuals working within them."²²⁴ Developing this approach, the following section of the chapter examines the intersection between national and local visions of the future. Public responses to nuclear technologies were the product of the dynamic interplay

²²³ For a select reading of this literature, see Wall, 'Nuclear Prospects', pp. 246- 273; Hogg, *British Nuclear Culture*; Atashroo, 'Weaponising Peace', pp. 170- 186; Hughes, 'What is British Nuclear Culture?', pp. 495- 518; Laucht and Johnes, 'Resist and Survive', pp. 226-245.

²²⁴ J. Hogg, 'Normalising Nuclear War', in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*, p. 9.

between national and localised contexts, as imaginaries of desirable national futures aligned with and co-produced divergent political, social, cultural, and economic imaginaries at the local level. Furthermore, I will explore the role of identity within this process, arguing that nuclear imaginaries interacted with localised notions of identity to embed these imagined futures at the local level. This will examine how nuclear technologies assimilated with and fed into local identities, as the Sellafield plant became a cogent representation of a desirable regional future.

1.6: Construction and Operation.

The pioneering nature of Sellafield's construction and the unprecedented speed at which technological and infrastructural advances were made became a tremendous source of local pride, which fed into imaginaries of the region's future prosperity. Throughout the oral histories locals described the heroic efforts of construction workers to produce such an experimental design within the required timescale. Former workers recounted the "ridiculously short time" between commissioning and construction, remarking that "it was a wonderful achievement, an incredible achievement to design it and built it and have it running."²²⁵ With pride they recalled the technical, infrastructural and scientific difficulties overcome by local workers. They explained that "contractors would say 'we want that building up in six months', so they just ran at it."²²⁶ In particular, residents recalled that "all the plant and equipment had to come in by road... bringing in 16 by 80ft-long heat exchangers through the narrow winding streets was not an easy task."²²⁷ This process is depicted in Fig. 6.0, which shows one of the

²²⁵ D. Wooley, 'Sellafield Stories: Oral History Project', interviewed by J. Lister, 6 August 2010, p. 19; *Whitehaven News*, 18 October 1956; *Whitehaven News and Star*, date unknown, circa 2003, found in Whitehaven Archives and Local Studies Centre, (Nuclear History Folder).

²²⁶ P. McLean, 'Sellafield Stories: Oral History Project', interviewed by J. Lister, 11 February 2010, p. 22.

²²⁷ *Whitehaven News and Star*, date unknown, circa 2003, found in Whitehaven Archives and Local Studies Centre, (Nuclear History Folder).

heat exchangers travelling through the narrow streets of the nearby town of Egremont, whilst Figs. 7.0 and 8.0 show the backbreaking and dangerous work that went into the construction of the Windscale piles.



Fig. 6.0: Heat exchanger passing through Egremont. With kind permission from the Beacon Museum, Whitehaven.



Fig 7.0: Construction of the first Windscale pile, July 1950. (Sellafield Ltd)



Fig. 8.0: Construction workers atop Windscale pile number one, c. 1948. (Sellafield Ltd)

The successes of construction were augmented by media reports which described Calder Hall in epic, pioneering terms as “among the finest achievements of British heavy engineering... and one of which everyone, from the designer to the general labourer, can be justifiably proud.”²²⁸ This helped embed the imaginary of nuclear utopianism within local society by inextricably linking the successful construction of Calder Hall with proud notions of local identity.

The pride associated with construction extended to the running of the plant, which served as an ongoing source of pride both amongst the workforce and the local region, as the cutting-edge nature of nuclear science embedded social imaginaries of the region as a technological and scientific innovator. Former workers explained that work at the plant was “dramatic and inspiring”, providing a “vision of the future [that] was instrumental in my decision to move to Cumbria and joining the nuclear industry.”²²⁹ Interviewees articulated a deep sense of pride at the pioneering nature of their work, commenting that “we were doing things that nobody else had ever done before... Everything you wanted to do, you had to work out how to do it. It was great. It was wonderful.”²³⁰ Workers like Steve Bewsher explained that Sellafield “was a station with a sense of pride. We all had the view that if we were to do a job, we were to do our best.”²³¹ They commented that “what we were doing was at the forefront of science and technology. It was new, exciting, people looked forward to going into work on a Monday morning because there were new things to be discovered.”²³² The trailblazing role of local workers fostered a profound sense of local identity, energized by enthusiastic media narratives and official commendation which stressed “West Cumbrians’ part” in developing

²²⁸ *Whitehaven News*, 18 October 1956; *Manchester Guardian*, 16 October 1956.

²²⁹ ‘The 60th Anniversary of Calder Hall: The Station, the People, the Area’, *Sellafield*, 5.0 (2016), p. 21.

²³⁰ D. Wooley, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 6 August 2010, pp. 6f.

²³¹ ‘The 60th Anniversary of Calder Hall: The Station, the People, the Area’, *Sellafield*, 5.0 (2016), p. 21.

²³² G. Brightman, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 1 July 2010, p. 2.

nuclear energy and firmly entrenched the region's position "in the vanguard of atomic research."²³³ Local journalists enthused that "Cumberland was the pioneer county in atomic power" and that "now the county is known and remembered for its connection with nuclear development."²³⁴ This became entrenched within local identities, as residents emphasised Calder Hall's international influence as "the father of the nuclear family", pointing to the use of its design on fourteen UK reactors, and plants in both Japan and Italy.²³⁵ By projecting the isolated and culturally backward region of West Cumbria to national and international acclaim, Sellafield helped embed utopian visions of social life by contributing to a proud sense of local identity as citizens identified the successes of the nuclear industry with imagined visions of the region's future prosperity.

Local identities were also bound up in ideas about Sellafield's vital role in the defence of the nation. The plant's role as the nation's source of plutonium meant that many workers were immensely proud of their contribution to Britain's nuclear arsenal, constructing a sense-of-self which helped embed nuclear technologies within imaginaries of national defence. This process can be traced through the pages of local newspapers which expounded Sellafield's vital role in the Cold war, lauding the "excellent staff work at the Sellafield atomic energy factory", without which "the intricate plans for the explosion of Britain's first atomic bomb may have come to naught."²³⁶ These notions became internalised as part of subjective identities, as workers and media narratives emphasised the military necessity of their work, and their

²³³ Romantic portrayals of this period of the nuclear industry may, in some measure, be a reflection of the difficulties and controversies that were to follow, yet it is clear that workers took great pride in their work and found in Sellafield an acute sense of collective and individual identity. (*West Cumberland News*, 20 December 1947, p. 1.)

²³⁴ *News Star Supplement*, 14 April 1960, p. 9.

²³⁵ 'The 60th Anniversary of Calder Hall: The Station, the People, the Area', *Sellafield*, 5.0 (2016).

²³⁶ *West Cumberland News*, date unknown, c. 1952-4, Whitehaven Archives and Local Studies Centre, (Nuclear Energy Folder); A. Bingham, 'The Monster'? The British Popular Press and Nuclear Culture, 1945-early 1960s', *British Journal for the History of Science*, 45.4 (2012), pp. 609- 624.

sacrificial role in ensuring Britain's physical security in a period of international threat. This echoes Kate Brown's study of nuclear facilities at Richland in the US and Ozyorsk in the Soviet Urals. Brown recognised that "residents saw the colossal effort to build nuclear weapons as an act of personal sacrifice. They were the front line defending the globe from the horrors of nuclear apocalypse."²³⁷ Similar feelings were held at Sellafield, as citizens described that they had a responsibility to "contribute to the nation" by providing "what we needed for our stock of plutonium and our standing as a nuclear power."²³⁸ Mediated through the wider lens of the Cold war arms race, the realities of plutonium production took on a deeply significant function as a vital component of national security. Embroiled within notions of national identity and civic duty, the plant became a source of honour amongst local citizens who looked to the military functionality of the plant as a source of pride and a feature of local identities. Relaying their attitudes towards their work, former employees reflected that "I was a government servant and I'd been given a job to do... I didn't feel any qualms about working for the bomb at all."²³⁹ Others articulated their pride at working towards the nation's defence, expressing "I was exceedingly proud to be a nuclear engineer, when one socialised, one was always justifiably proud."²⁴⁰ This helped embed the nuclear project within an imagined military future, within which Sellafield served as a vital safeguard against foreign aggression in the context of the Cold war arms race and escalating geopolitical tensions.

²³⁷ Brown, *Plutopia*, p. 133.

²³⁸ T. McInerney, 'An Oral History of the Electricity Supply in the UK', interviewed by T. Lean, 7 October 2014; B. Snelson, 'Sellafield Stories: Oral History Project', interviewed by J. Lister, 1 July 2010, p. 4.

²³⁹ G. Gampsey, 'An Oral History of the Electricity Supply in the UK', interviewed by T. Lean, 26 September 2013.

²⁴⁰ G. Brightman, 'Sellafield Stories: Oral History Project', interviewed by G. Wilkinson, 1 July 2010, p. 2; D. Wooley, 'Sellafield Stories: Oral History Project', interviewed by J. Lister, 6 August 2010, pp. 8f.

1.7: Secrecy.

The following section will show how the levels of secrecy that surrounded the Sellafield plant informed local identities and played a vital role in embedding military imaginaries of national defence. Local citizens looked to the layers of military secrecy that permeated plant life as a symbol of Sellafield's immense national importance, and the centrality of the Cumbrian public in the defence of the realm. In this way, the cessation of civil liberties and censorship of the plant paradoxically served to embed imaginaries of a desirable military future sustained through Britain's nuclear arsenal and deterrence policy.

Substantiated by the public's trust in science, the embryonic nuclear industry assumed a corporate ethos and adopted a culture predicated upon the systematic exclusion of the public. Secrecy was a defining characteristic of the early nuclear industry, pervading virtually all aspects of the nuclear lifecycle through a series of "closed and secretive institutions" which exercised stringent power relations through their covert activities.²⁴¹ Anthropologist Joseph Masco has argued that "everything to do with nuclear weapons is born secret, meaning that it is classified without review, and the boundary between what is secret and what is not secret is also secret."²⁴² This mantra was reflected in the institutional culture of Sellafield and the clandestine nature of activities within the site. Factory life was the product of a simple model of compartmentalisation that had its origins in the 'Manhattan Project' at Los Alamos. Workers were not allowed to speak of their work to one another, only to their superiors, who could only converse with their superiors and so on, "until finally the two superiors turn out to be the same

²⁴¹ Blowers, *The Legacy of Nuclear Power*, p. 164; J. Falk, *Global Fission: The Battle Over Nuclear Power* (Oxford: Oxford University Press, 1982); J. Camilleri, *The State and Nuclear Power: Conflict and Control in the Western World* (Seattle: University of Washington Press, 1984); P. Pringle, and J. Spigelman, *Nuclear Barons: The Inside Story of How They Created our Nuclear Nightmare* (London: Michael Joseph Ltd, 1982).

²⁴² Masco, *The Nuclear Borderlands*, p. 225.

person.”²⁴³ This ensured that information ascended up the vertical chain of command, and could not be passed downwards or horizontally, reproducing the culture of the ‘Manhattan Project’, where “you can talk with those just above you or below you, but you must not talk between the lines – that is, technical should not talk with operations except at the top layer.”²⁴⁴ Such intellectual isolation served diverse functions, compartmentalising workers, retaining control over their activities and knowledge, and creating a zone of exclusion whereby the public were omitted from the interior workings of the industry.²⁴⁵ Former workers recalled that they “were not allowed even to discuss what we did with our parents, they just knew we worked at Sellafield and that I worked on graphite.”²⁴⁶ Others recalled that their friends were extremely curious about what went on at Sellafield, recounting that “they wanted to take me about and get drunk to see what they could find out about it!”²⁴⁷ This secrecy served a legitimating social function in the early years of the nuclear industry throughout the 1950s, substantiated by the public’s innate trust in science and experiences of wartime in which military secrecy had become a feature of daily life and a vital component in the successes of the war-effort.

Rather than an object of fear, the secrecy which enshrouded the Sellafield plant simply developed and extended imaginaries of military secrecy cultivated during wartime and bolstered imaginaries of the plant’s contribution to national deterrence strategy. In this context, the plant’s covert operations underscored its importance within the context of the Cold War, as workers and residents internalised their exclusion from knowledge through the lens of national defence and the perceived threat from the USSR. Interviewees recalled that the secrecy of the

²⁴³ Hales, *Atomic Spaces*, p. 118.

²⁴⁴ V. Jones, *Manhattan, the Army and the Atomic Bomb* (Washington DC: Government Printing Office, 1985), pp. 269f; L. Libby, *The Uranium People* (New York: Crane Russak, 1980), p. 179.

²⁴⁵ Masco, *Nuclear Borderlands*, p. 225.

²⁴⁶ D. Cooper, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 1 September 2010, p. 20.

²⁴⁷ B. Anderson, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 5 March 2010, p. 18.

plant was not an issue within the local community, explaining that “there’d been a war and all sorts of things and people were tougher than they are now really. We understood that there was a job to be done and they’re going to do it... Compared with some of the things people had been through during the war, this wasn’t much. There wasn’t any apparent serious risk.”²⁴⁸ In this way, local citizens interpreted plant secrecy through their experiences of the Second World war and entrenched cultural visions of military secrecy as a vital component in Britain’s successful defence and deterrence policies.

Measures of military secrecy were reflected in the very nature of the industry’s organisation and operational culture. Workers recalled that “the attitudes were all very military. Everybody had been in the military... they were all ex-people from the forces. We didn’t go on holiday; we went on leave. It was rank and number.”²⁴⁹ Workers were assigned and known by their numbers, rather than their names. They explained, “it didn’t matter what you had done, or what Sellafield thought of you... you were just a number.”²⁵⁰ This instigated a culture of institutional secrecy that closely resembled wartime scientific and industrial contexts, whereby workers “were managed in new isolated environments; their intellectual products were classified for restricted dissemination; their political activities and labour representations were scrutinised; their collective identity was shaped by pre-existing institutional and industrial affiliations; and their training, job categories and disciplinary labels were assigned largely by their respective governments.”²⁵¹ The cultivation of a military culture normalised the plant’s secrecy as an extension of established military principles, simultaneously entrenching

²⁴⁸ V. Eldred, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 8 February 2010, p. 16.

²⁴⁹ N. Hanlon, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 2 August 2010, pp. 3, 12; E. Davis, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 11 October 2010, p. 14.

²⁵⁰ D. Head, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 25 January 2010, p. 25.

²⁵¹ S. Johnston, ‘Security and the Shaping of Identity for Nuclear Specialists’, *History and Technology*, 27.2 (2011), pp. 124f.

Sellafield as an accepted feature of local life and embedding imaginaries of the plant's role in national defence.

The state's control over the dissemination and flow of nuclear knowledge was a key component in embedding utopian nuclear imaginaries, allowing the state to conceal less desirable elements of the nuclear fuel-cycle in favour of its more utopian credentials. The military culture within the plant suppressed the dissemination of knowledge and allowed the industry to stage-manage public attitudes, cultivating a form of internal 'atomic priesthood' amongst workers, an order of monastic properties which protected against public inquiry, suppressed incidents, and choked potentially harmful information.²⁵² This instigated a culture of operational secrecy which established a barrier of organisational bureaucracy and suppressed information from escaping beyond the social perimeter of factory life. By confining the flow of nuclear information, the industry exercised a great deal of control over public attitudes towards nuclear power, as they could dictate the form of public knowledge regarding nuclear technologies, regulating what was released into the public domain and how it was presented. Locals explained that the industry went largely unchallenged during this period for the simple reason that "we knew so little about what went on there."²⁵³ In this way, the function and purpose of the plant "remained hidden and constrained" from the eyes of the local residents, who had "no alternative but to accept what [they were] told."²⁵⁴ The secrecy which enveloped the plant helped embed utopian nuclear imaginaries by suppressing some of the

²⁵² Masco, *Nuclear Borderlands*, p. 225; Johnston, 'Security', pp. 124f.

²⁵³ National Archives, 'Letters Concerning People Who Live in the Sellafield Area', (EG 4/3191).

²⁵⁴ The suppression of nuclear information operated at a series of spatial domains: at international level between nation states, at domestic level between different sites and ministers, and at institutional level between individual nuclear workers. For further reading, see, Johnston, 'Security' p. 125; Johnston, *The Neutron's Children*, p. 166; J. MacLeod, 'The Case Against THORP: Windscale and West Cumbria', Whitehaven Archive and Local Studies Centre, (Egremont Folder), p. 4.

more controversial aspects of the plant such as Calder Hall's role in the production of plutonium for Britain's nuclear weapons programme.

The Windscale and Calder Hall plants represented the conflicted identities of nuclear secrecy. Windscale was openly vaunted as producing plutonium for nuclear weapons, whilst Calder Hall was marketed as a power station, despite having also been optimised for the production of military plutonium.²⁵⁵ Beneath its façade as an electricity generator, Calder Hall was “primarily intended to produce plutonium for the UK's atomic weapons programme. Producing electricity for the domestic market was a side-line for the plant.”²⁵⁶ Indeed, the electricity it did produce came at a tremendous financial cost, with each Kilowatt hour of electricity costing £232.²⁵⁷ Furthermore, the plant barely produced any electricity. Scientific reporter Chapman Pincher later admitted that “there were times that it was taking energy out off the grid, rather than pumping it in!”²⁵⁸ Despite its scant (and expensive) contribution to national energy production, Calder Hall was disguised as an electricity producer, its true nature obfuscated by the silence imposed on the local workforce via the Official Secrets Act (1911).

Most locals did not even know what the plant did. Interviewees explained that “it was only when I passed my interview and came here and started to work that I realised that we were engaged in producing material for atomic bombs.”²⁵⁹ Multiple participants acknowledged “we didn't really realise what it was then, we thought it was just gonna make electric for

²⁵⁵ Gowing, *Independence and Deterrence*, pp. 14- 18; Johnston, *The Neutron's Children*, p. 166. This phenomenon was also evident in France, for further reading see Welsh, *Mobilising Modernity*, pp. 67- 76; Hecht, *The Radiance of France*.

²⁵⁶ ‘Calder Hall Nuclear Power Station’ <<https://www.ice.org.uk/what-is-civil-engineering/what-do-civil-engineers-do/calder-hall-nuclear-power-station>> [accessed 8 March, 2019].

²⁵⁷ A. Puishes, *Comparison of Calder Hall and PWR Reactor Types* (New Jersey: American Radiator and Standard Sanitary Corporation, Atomic Energy Division, 1957), p. 8.

²⁵⁸ *Windscale: Britain's Biggest Nuclear Disaster*, S. Aspinall. London: BBC, 2007.

²⁵⁹ D. Wooley, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 6 August 2010, p. 3.

everybody”, explaining that “we didn’t know [about plutonium production] until quite a while afterwards... We were all gonna get cheap rates and cheap electric.”²⁶⁰ By concealing the actual purpose and nature of the plant, the industry was able to cultivate a specific public image which eschewed the dystopian realities of the nuclear industry in favour of the more culturally admissible image of power production, offering a utopian image of nuclear technologies which transcended their role in the production of nuclear weapons. Central to this process was the role of language.

Through technical or strategic language, nuclear workers created their own techno-scientific worlds which obscured the dystopian realities of weapons production. This language was similar in essence to military-speak, forming a particular elitist discourse which excluded persons beyond the industry from knowledge about what the plant really did. Exploring this process in the American context, Carol Cohn identifies a patriarchal and overtly sexist technostrategic language amongst US defence intellectuals which suppressed the destructive power of the bomb, functioning as a form of coping strategy designed to mitigate the devastating potential of nuclear war for those involved in planning its implementation.²⁶¹ The technical language spoken at Sellafield had much in common with the ‘Manhattan Project’, as anything to do with the production of plutonium was subsumed within techno-strategic code-names and epithet. In his study of the ‘Manhattan Project’, historian Peter Hales wrote that “everything important at Los Alamos had another name. Atoms were tops. Bombs were boats. And atomic bomb was a topic boat. Plutonium was product... and uranium 235 was tenure.”²⁶² At Sellafield, anything relating to the bomb was a ‘Tommy’, shorthand for ‘atomic’, whilst the

²⁶⁰ E. Dawson, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 13 July 2010, p. 23; C. McCourt, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 17 September 2010, p. 13; K. Mawson, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 6 August 2010, p. 11.

²⁶¹ C. Cohn, ‘Sex and Death in the Rational World of Defense Intellectuals’, *Signs*, 12.4 (1987), pp. 687- 718.

²⁶² Hales, *Atomic Spaces*, p. 246.

site itself was “very secret and known by codenames.”²⁶³ Specific buildings were given colloquial nicknames which hid their role in the fuel-cycle. On account of their shape and purpose, various buildings were known amongst workers as “the dancefloor”, “the cactus”, “the football pitch”, and “the cricket pitch”, the latter two so-named for the recreational past-times favoured amongst workers when their bosses weren’t looking.²⁶⁴ These names subverted the buildings’ intended functions, emotionally detaching the workers from their role in the production of weapons, whilst ensuring that operational secrecy was upheld and employees didn’t know any more about the plant than was absolutely necessary. Workers recalled that they understood very little of the true nature of their jobs, explaining that “you had an idea, but not ... scientifically you didn’t.”²⁶⁵ Through pervasive attempts to safeguard state secrets, these bureaucratic codes hid the true nature of the chemical compounds being used and discursively suppressed their destructive capacity. This simultaneously ratified political discourses of containment, whilst exercising control over the flow of nuclear knowledge and meaning making. These levels of secrecy helped embed utopian nuclear imaginaries by simultaneously diverting public attention away from the destructive aspects of work at Sellafield and impressing the enormous national importance of the work that went on there. Furthermore, the state’s control over the flow of nuclear meaning-making suppressed the potential dystopian effects of radiation exposure upon the local population and workforce and cultivated an imaginary of nuclear safety.

The following section will show how the levels of secrecy which pervaded the plant aligned with a social context of deference towards scientific establishments such as the

²⁶³ K. Smith, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 19 March 2010, p. 7.

²⁶⁴ Author’s interview with Albert Donald, 3 March 2019; Author’s interview with Joe Sutherland, 5 April 2019.

²⁶⁵ J. Farrell, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 20 January 2010, p. 11.

UKAEA and state-run scientific projects, entrenching notions of nuclear utopianism by emphasising the safety of nuclear technologies. Detailing this process, interviewees recalled that they placed a great deal of faith in the authority of state and ‘big science,’ stating that “people thought the government knew best- they trusted them to look after them.”²⁶⁶ Locally, there was also a large amount of respect for senior figures at Sellafield, such as Plant Manager Hugh Davey, Deputy Manager Tom Tuohy, and senior figures at the UKAEA such as Sir William Penney and Sir Christopher Hinton. One local man recalled glowingly, “the senior management at Sellafield then were giants of men.”²⁶⁷ These figures were well respected amongst the local community and people placed a great deal of trust in their integrity. If the scientists told them that the local area was safe, they felt they had little reason to suspect otherwise.²⁶⁸ Through these trust networks, local people imagined nuclear power as “a good clean job working for the government”, resting assumptions upon the aforementioned social dynamic of trust in government and notable scientists, vicariously embedding utopian nuclear imaginaries through their acquiescence to expert assurances from the industry and trusted state actors.²⁶⁹ In this way, local people functioned as active participants in this process through their willing status “as a traditionalistic and cautious onlooker in awe of the arcane mysteries of scientific expertise.”²⁷⁰ By controlling the dissemination of knowledge about radiation, the nuclear industry was able to shape public attitudes towards nuclear hazards, constructing an imagined vision of nuclear safety sustained through the public’s overt trust in state-sponsored science.

²⁶⁶ Author’s interview with Isobel George, 6 March 2019.

²⁶⁷ G. Whitney, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 29 July 2010, p. 7.

²⁶⁸ *Ibid.*

²⁶⁹ N. Ramsden, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 18 December 2009, p. 10.

²⁷⁰ Wynne, Waterton and Grove-White, (eds.), ‘Public Perceptions and the Nuclear Industry in West Cumbria’, p. 16.

State attempts to embed an imaginary of nuclear safety can be traced back as early as 1947. Before the precise nature of the work to be undertaken at Sellafield was known, the government began cultivating a narrative of nuclear technologies as inherently safe and controllable through adequate security procedures. In a planning meeting with members of the local Whitehaven, Ennerdale, and Millom council, the MoS described that “any risks arising from these operations would be controlled with the greatest possible care and they expected no risks to the local population either atmospherically or by effluent into the sea.”²⁷¹ Official industry rhetoric acknowledged the potential hazards of working with nuclear technologies but played down the dangers of radiation by emphasising its predictability and quantifiable nature, arguing that “danger exists but it can be kept under complete control” by adherence to safety procedures and protocols.²⁷² Dangers were seemingly mitigated by systematic safety procedures, such as the wearing of coveralls and “routine creaming of hands, changing of footwear and other protective measures.”²⁷³ Other procedures included the infamous ‘Windscale suit,’ consisting of a primitive form of plastic PVC hazmat suit “blown up with an air-line [placing you] in your own atmosphere.”²⁷⁴ Industry officials detailed the rigorous processes which measured the safety of workers, emphasising the importance of “the films which everyone on the staff, from the works manager downwards, is obliged to wear and which record to what amount, if any, of radiation the wearer has been exposed.”²⁷⁵ These procedures normalised radiation and quantified hazards, subsuming the ‘alien’ nature of radiation within

²⁷¹ Whitehaven Archives and Local Studies Centre, ‘Ministry of Supply: Note of Discussions on 26th August, 1947 at Carlisle, Egremont, and Seascale regarding Housing Accommodation required in the neighbourhood of Windscale Works, Sellafield,’ (SRDE 1/3/1/160).

²⁷² *News Chronicle and Daily Dispatch*, 18 January 1954.

²⁷³ *West Cumberland News and Star*, 12 November 1955.

²⁷⁴ D. Wooley, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 6 August 2010, p. 10.

²⁷⁵ Articles directly compared Sellafield with the cleanliness and sterility of a surgical operating theatre, replete with filtered air and alarm monitors posted at doorways. (*West Cumberland News and Star*, 12 November 1955.)

scientific discourses of measurability and control and regulating public opinion through the stage-management of nuclear knowledge.



Fig 9.0: *News Star Supplement*, 14 April 1960.

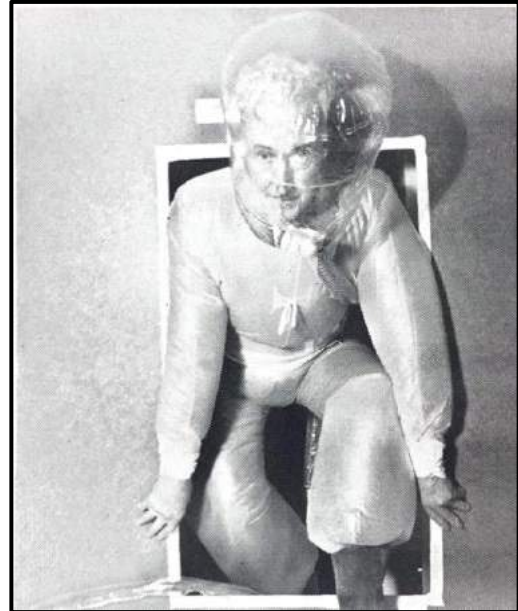


Fig 10.0: Whitehaven Archive and Local Study Centre, (YBNFL 4/24).



Fig 11.0: Whitehaven Archive and Local Study Centre, (YBNFL 4/24).

The industry's ability to monitor radiation levels became a key tool in maintaining public support for the plant by controlling the flow of nuclear knowledge between the industry and the lay public, instigating an uneven power dynamic through which the industry could propagate the vision of nuclear safety. Owing to its invisibility, radiation defies sensory perception. One cannot see, hear, smell, or taste radiation, it exists only through those who can detect it.²⁷⁶ Radiation could therefore only be 'viewed' through the monitoring activities of the nuclear industry. This control over radiation monitoring actively depicted nuclear technologies as safe, as flexible dose limits were created which provided an ostensibly 'safe' level of radiation exposure under which no harm could occur. This asserted that since radiation was a naturally occurring phenomenon, humans could tolerate a certain amount of radioactivity without any health effects, and therefore workers could safely endure radiation exposure up to this level. A 1954 article in *The Economist* argued as much, stating that "men are gradually coming to terms with nuclear technology and its attendant phenomenon of radiation, and are finding that quite heavy doses of radiation can be harmless."²⁷⁷ Former employees recalled internal demonstrations given at the plant where they were taught about ordinary levels of background radiation which posed no threat to human life:

"You had an old luminous alarm clock, pebbles from Cornish beaches, pieces of granite from Aberdeen etc. on the table. Then we'd have a counter and we'd say, "now look, these are all around you. People in Aberdeen have got their houses built from this!" You'd put it [the Geiger counter] there and it'd go 'tchtchtcht!' "And there's no problems with the people in Aberdeen; people are sitting on the beach in Cornwall

²⁷⁶ Macgill, *The Politics of Anxiety*, p. 102.

²⁷⁷ 'Windscale and Beyond', *The Economist*, 8 May 1954 (171.5776), p. 479.

surrounded by these” - ‘tchtchtcht!’ ... You’d put it near, and it would click away quite loudly, [but] you’d move it away and you’d say, “you only have to go this far, and it’s gone.”²⁷⁸

These demonstrations showed that radioactive tolerance levels could be safely established for nuclear workers, whose safety was guaranteed by adherence to strict monitoring procedures and the wearing of dosimeters which would ensure no worker could suffer from over-exposure.



Fig. 12: Whitehaven Archive and Local Study Centre, (YBNFL 4/24).

²⁷⁸ D. Wooley, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 6 August 2010, p. 21.

The process of film-badge monitoring appeared to validate the safety of the nuclear industry, as 1600 badges per week retrospectively analysed the radioactivity workers had been exposed to and measured them against accepted dosage levels.²⁷⁹ Those who worked in more active areas were issued with futuristic “fountain-pen monitors” which served as a realisation of the effectiveness of radiation monitoring, and the justification of the plant’s safety procedures, as the colour or sound given off by the badge empirically ‘proved’ that Sellafield was a clean and safe working environment.²⁸⁰ These measures were central to the belief that the inherent dangers of radiation could be mitigated by scientific testing. They not only instilled a degree of public confidence but internalised foreign elements such as radiation checks and dosimeters as familiar processes and elements of routine.

Measuring equipment and regulatory procedures rendered the alien and unknown element of radiation a more mundane and everyday phenomenon, detectable through regular monitoring and another part of everyday life within the plant.²⁸¹ Former workers articulated this in simple terms, recalling that “you took all the precautions- you measured- you distanced yourself- and you looked after yourself.”²⁸² One former worker recalled that if his radiation alarm went off he simply walked the other way, stating “I had a lot of faith in the old bleep! [radiation monitor]”²⁸³ If a worker did suffer from over-exposure, they were simply redeployed within a ‘clean,’ less radioactive area of the plant and decontaminated. Industry spokesmen explained that “close watch is kept on the amount of radiation to which each worker is exposed, so that the effects of an over-dose can be offset by a temporary change of work to a non-

²⁷⁹ *News Chronicle and Daily Dispatch*, 18 January 1954.

²⁸⁰ *Ibid.*

²⁸¹ Macgill, *The Politics of Anxiety*, p. 102.

²⁸² D. Wooley, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 6 August 2010, p. 9.

²⁸³ D. Head, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 25 January 2010, p. 16.

radioactive part of the plant.”²⁸⁴ A great deal of trust was placed in the decontamination procedures, which involved a severe scrubbing of the skin, trimming and scraping under fingernails, nasal irrigation treatment and the disposal of clothing. Again, this treatment became a feature of everyday life at the plant which served to embed imaginaries of nuclear safety. One interviewee humorously recounted that “I could always tell when my husband had been irradiated because his hair was standing on end when he came home!”²⁸⁵ In this sense, radiation monitoring served as an act of surveillance, designed to detect, notify and control nuclear meaning-making, as the hegemonic control over radiation monitoring gave the nuclear industry total control over knowledge regarding radiation, allowing the industry to peddle a utopian vision of nuclear safety, safeguarded through the apparent meticulous levels of monitoring and care for its workers.²⁸⁶

As the only source of data on radiation levels the MoS (and later UKAEA) subsumed the threat of radiation by reference to its own monitoring statistics, which categorically proved that Sellafield had brought about “no noticeable change” in background radiation levels beyond the factory perimeter.²⁸⁷ At the ‘Atoms for Peace’ conferences held at Geneva, in November 1955 and September 1958, officials gave evidence that “operations at Sellafield had not given rise to any radioactive hazards in the surrounding countryside” as experts proudly proclaimed that “people near Sellafield [are] safe.”²⁸⁸ Emphasising the strength of plant design, they explained that radiation was prevented from escaping the site works by “the thickness of the

²⁸⁴ ‘Windscale and Beyond’, *The Economist*, 8 May 1954, (171.5776), p. 479.

²⁸⁵ V. Eldred, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 8 February 2010, p. 23.

²⁸⁶ It also existed “to keep the records that might protect from later lawsuits.” (Hales, *Atomic Spaces*, p. 317).

²⁸⁷ *West Cumberland News and Star*, 12 November 1955. Interestingly, these findings do not corroborate with the industry’s actual measurements, which were reproduced in the *Journal of Nuclear Energy* in 1955. This is especially interesting as it appears as though the industry were telling the local media and public one thing, whilst producing studies for the more nuclear-conscious scientific public which said another. This will be expanded upon in more detail during the fourth chapter. (*Journal of Nuclear Energy*, 1.3/4 (1955), pp. 173-320.)

²⁸⁸ *West Cumberland News and Star*, 5 September 1958.

concrete and the general construction of the tanks,” whilst the levels of radioactivity given off by the plant were “so negligible that it cannot be measured.”²⁸⁹ This it noted, was in spite of the “extremely sensitive” and “amazing array of detection and measuring equipment” capable of detecting “any change in atmospheric radioactivity.”²⁹⁰ The pages of the local and national press reproduced the findings of the conference, with readers hearing about “mobile laboratories [which were] constantly touring the area testing air, soil, vegetation, and water on the spot”, unequivocally proving that Sellafield offered “no conceivable hazard to human beings, agriculture or fisheries.”²⁹¹ By reproducing industry statements, the local media played an important role in shaping public attitudes towards the Sellafield plant and embedding the imaginary of nuclear safety within the public domain.

Local media assured their readership that “every possible step is taken at Sellafield to ensure that no one in the factory or the district is in any danger from atomic sources.”²⁹² Obtaining their information directly from the UKAEA, newspaper narratives were at pains to stress the care and attention that was paid to public health, explaining that “the safety precautions in a plant of this kind are based on strict discipline” which ensured worker safety, whilst “weekly tests carried out in the immediate neighbourhood” ensured the safety of the public too.²⁹³ Jubilant articles impressed upon their readership that “you’re safer amongst the atoms!” reflecting that “there is very little danger of workers becoming heavily contaminated,” pointing to the strenuous decontamination procedures which ensured that the Sellafield worker

²⁸⁹ *News Chronicle and Daily Dispatch*, 18 January 1954; *West Cumberland News and Star*, 12 November 1955.

²⁹⁰ *West Cumberland News and Star*, 12 November 1955.

²⁹¹ *Ibid.*,

²⁹² *Ibid.*,

²⁹³ ‘Windscale and Beyond’, *The Economist*, 8 May 1954, (171.5776), p. 479; *West Cumberland News and Star*, 12 November 1955.

“will never take any contamination away from the works with him.”²⁹⁴ Where reference was made to the possible effects of radiation, the public were assured that “the symptoms are known, the precautions have been taken, and the remedies are ready,” as the threat of radiation was subsumed within the scientists’ innate mastery of radiobiology.²⁹⁵ These narratives emphasised that there was “no harm to marine or human life from the discharge of the station’s liquid effluent into the sea,” expounding that “the threat to the health of West Cumberland is entirely negligible.”²⁹⁶ The product of industry’s ability to control public access to knowledge about radiation, these media narratives helped embed imaginaries of nuclear safety at the local level as the selective information released by the UKAEA appeared to confirm that nuclear technologies represented no hazard to their daily lives. This aligned with official attempts to trivialise the threat of radiation by comparing the levels within nuclear industry with those found in everyday items such as luminous wristwatches, or X-Rays conducted in footwear shops.²⁹⁷

Local articles reproduced expert assurances that foot X-rays “subject a person to a much heavier dosage of radioactivity than would be permitted in any atomic energy establishment.”²⁹⁸ Designed for the lay reader, these reports compared radiation to sound waves and other invisible technologies. A copy of the local *West Cumberland News* stated that “West Cumberland is in no way likely to be affected anymore by radioactivity from Sellafield than it is by BBC or other sound waves, light waves, or any other waves.”²⁹⁹ These reports misrepresented the nature of radiobiology to downplay its potential effects by domesticating it

²⁹⁴ *West Cumberland News and Star*, 12 November 1955; *News Chronicle and Daily Dispatch*, 18 January 1954.

²⁹⁵ *West Cumberland News*, 12 September 1953, p. 5.

²⁹⁶ *The Times*, 26 September 1956, p. 6; *West Cumberland News and Star*, 12 November 1955.

²⁹⁷ *News Chronicle and Daily Dispatch*, 18 January 1954.

²⁹⁸ *West Cumberland News and Star*, 12 November 1955.

²⁹⁹ *West Cumberland News*, 12 September 1953, p. 5.

within controlled and knowable realms. By comparing radiation to recent scientific advances such as television and radio, the threat of radiation could be publicly internalised within pre-existing emotional and scientific understandings, which simultaneously downplayed its magnitude and helped embed imaginaries of nuclear science as a philanthropic force in the transformation of modern society.

Radioactivity's banality was further depicted through its potential uses within the medical industry. Assertions that nuclear waste products would pose a threat to human health were subverted by newspaper reports which claimed that radioactive "waste may save Britain, and virtually the world, many thousands of pounds now spent in the reprocessing of radium."³⁰⁰ The waste, it was said, would be put to good use "in British hospitals for the treatment of deep-seated cancers."³⁰¹ This represented a genuine research aim for the UKAEA, with former workers recalling working on a project to separate caesium 137 from waste liquors for cancer treatments at hospitals in Southampton and London.³⁰² The medical potential of radioactivity was repeatedly admonished by the local newspaper, which proclaimed that "Britain is taking the lead in turning waste from atomic piles into a new weapon against cancer."³⁰³ Advocating the utility of its waste products within the medical industry, nuclear technologies became seen in a more positive light, as a benign benefactor to the medical profession and a useful extension of the natural realm.³⁰⁴ This reframed dystopian imaginaries of radiation dominated by the

³⁰⁰ Whitehaven Archives and Local Studies Centre, (Social History Folder), *West Cumberland News*, date not given.

³⁰¹ *Ibid.*,

³⁰² K. Smith, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 19 March 2010, p. 9; See J. Cockcroft, 'The Future Role of Atomic Energy in Industry, Science and Medicine', *British Institute of Radiology*, 29.341 (1956).

³⁰³ *West Cumberland News and Star*, 5 September 1958.

³⁰⁴ Similarly, the value of nuclear isotopes within the automotive industry was stressed, with tracer isotopes used to impregnate engine metals in research into performance. Somewhat anecdotal in nature, the expression of diverse uses for nuclear science had a legitimating function, augmenting notions of nuclear technologies as an important strand of medical science, with an array of potential uses. (*News and Morning Star*, 23 September 1958.)

harrowing images of irradiated survivors of Hiroshima and Nagasaki, instead emphasising the utopian role of radiation in an imagined medical and social future. These official attempts to cultivate imaginaries of nuclear safety dovetailed with a series of local social contexts, such as economic hardship and the hazardous working conditions of local industries. These local processes interacted with and helped embed imaginaries of nuclear safety, as Sellafield appeared a more desirable form of employment in the context of the region's traditional dangerous heavy industries and its long-term socio-economic decline.

The industry's careful dissemination of nuclear information helped embed imaginaries of nuclear safety at the local level, and many people considered that Sellafield was a safer alternative to the traditional forestry, mining, chemical plants, or railway work that characterised the regional economy. This linked the nuclear plant with social imaginaries of a desirable regional future free from the inherent dangers of heavy industry, which were "seen as comparatively riskier than the nuclear power station."³⁰⁵ Working conditions in the local railway and coal industries were notoriously bad, as both industries "had been reluctant to engage with health and safety regulation" prior to their nationalisation in 1947, and conditions failed to improve substantially until the 1963 Offices, Shops, and Railway Premises Act established "basic standards for general welfare and working conditions (such as temperature, ventilation, cleanliness, overcrowding, and sanitation)."³⁰⁶ Interviewees such as David Head stressed the appalling conditions in the mine-shafts, conveying childhood memories of hearing his father struggling to breathe at night, admitting that he had heard him "dying for years in the next room."³⁰⁷ David explained that before Sellafield opened, all the major regional industries

³⁰⁵ Parkhill, Venables, Simmonds, 'From the Familiar', p. 48.

³⁰⁶ P. Almond, and M. Esbester, *Health and Safety in Contemporary Britain: Society, Legitimacy, and Change since 1960* (London: Palgrave MacMillan, 2019), pp. 47, 50; V. Long, *The Rise and Fall of the Healthy Factory: The Politics of Industrial Health in Britain, 1914-1960* (London: Palgrave MacMillan, 2010).

³⁰⁷ D. Head, 'Sellafield Stories: Oral History Project', interviewed by J. Lister, 25 January 2010, p. 16f.

were dangerous. He recalled that “the farmers finished up with farmer’s lung, the Forestry [Commission] were using chemicals they knew nothing about, and the railways started spraying the lines, so a lot of them fellas got things as bad as what they got at the pits.”³⁰⁸ In this context, the dearth of safe employment opportunities and locals’ experiential familiarity with industrial risk interacted with imaginaries of nuclear safety to embed visions of Sellafield as a desirable form of employment.

Imaginaries of nuclear safety interacted strongly with local contexts to normalise and subsume unfamiliar aspects of the nuclear industry such as radiation. Within the context of the region’s existing chemical and munitions factories, many locals considered Sellafield an extension of the region’s traditional heavy industry, with “the new danger of radiation... merely a variant of the century old hazards of chemical works.”³⁰⁹ Dangerous industrial work was a feature of local cultures, particularly given the wartime operation of local TNT factories at Drigg and Sellafield.³¹⁰ For many, the “environment of high temperatures, unfamiliar materials, and biological dangers” at Sellafield had distinct parallels with wartime experience at local factories, as former workers likened their work producing plutonium to wartime munitions workers, merely producing a different, more powerful type of explosive.³¹¹ Others conceived of the nuclear industry through their experiential familiarity with industrial risks within the mines. They noted that “it’s no different to working in Haig Pit with coal. You’ve got more chance of being killed in Haig Pit than you have at Sellafield... like a coal miner, you learn to recognise the creaking timbers- it’s just different hazards.”³¹² In this way, locals

³⁰⁸ *Ibid.*

³⁰⁹ Johnston, ‘Security’, p. 131.

³¹⁰ At their peak, these factories employed 11,000 people who produced around 800 tonnes of high explosive TNT per week for the war effort.

³¹¹ Johnston, ‘Security’, p. 131.

³¹² D. Banks, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt and J. Lister, 29 December 2010, p. 10.

internalised nuclear risk through their experiences in other dangerous local industries, with nuclear often seen as the preferred option. Workers iterated that “risk is a part and has been a part of their everyday lives” for successive generations, with attitudes “informed by longstanding memories from a previous industrial age based on the heavy industries of chemicals [at Marchon], coal [in the pits], and shipbuilding” [at Vickers in Barrow, and in Whitehaven docks].³¹³ These experiences helped embed the imaginary of nuclear safety, as Sellafield appeared as a safe form of employment and in particular, a much safer means of energy production, functioning in stark contrast to the traditional iron-ore and coal mining industries which had dominated the local economy since the industrial revolution.³¹⁴

Within the context of the region’s historical mining industry, Sellafield represented a marked departure from traditional methods of generating electricity, which necessitated sending men deep underground to mine iron-ore and coal from the Cumbrian earth. In this context, nuclear fission represented a desirable and safer alternative to coal-mining, rooted in notions of scientific modernity, public trust in the state, and the utopian “transformation of society by rational scientific means.”³¹⁵ Former workers explained how they perceived that Sellafield “would be a nice, safe job, working for the government, and with clean hands.”³¹⁶ To the local public, Sellafield embodied a much cleaner form of energy production, as one local put it, “without all the muck that coal produces.”³¹⁷ Local man, Dr V. Eldred explained that “the idea that someone might be able to generate power without mining coal was very

³¹³ Parkhill, Venables, Simmonds, ‘From the Familiar’, p. 48; Bickerstaff and Simmonds, ‘Absencing/Presencing Risk’, p. 868.

³¹⁴ For further reading on West Cumbria’s relationship to the mining industry, see R. Wheeler, ‘Mining Memories in a Rural Community: Landscape, Temporality and Place Identity’, *Journal of Rural Studies*, 36.0 (2014), pp. 22- 32; O. Wood, *West Cumberland Coal: 1600- 1982/3* (Kendal: Cumberland and Westmorland Antiquarian and Archaeological Society, 1988).

³¹⁵ Welsh, *Mobilising Modernity*, p. 17.

³¹⁶ N. Ramsden, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 18 December 2009, p. 13.

³¹⁷ M. Kipling, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 7 January 2010, p. 10.

attractive.”³¹⁸ Local newspapers helped embed the imaginary of nuclear safety by comparing the safety standards endured in the pits and local chemical factories with those at Sellafield. Articles explained that “atomic energy offers one of the safest of industrial employments [whereby] the worker has no chance of coming to harm in thirty or forty years of work- the highest standard ever set in industry.”³¹⁹ In particular, local newspaper narratives explicitly juxtaposed the levels of safety offered by the nuclear industry with the harsh realities of the mining industry. Articles frequently conceived of nuclear technologies through the lens of previous industrial accidents and illnesses, concluding that “if the same thought had been given to safety in other industries as has apparently been the case in the realms of atomic energy, we would not today have so many instances of silicosis, ‘miners’ eyes’, and so many other industrial diseases so well known to West Cumberland.”³²⁰ In this context Sellafield represented the most desirable means of local employment. Workers explained “I thought I’d be far better in there [Sellafield] than riving bloody silage out of a pit with a gripe and wrecking myself.”³²¹ In many cases, men left stable jobs in other industries to join the nuclear project on the basis of its apparent safety. One worker explained that he left his role producing sulfuric acid at the local chemical works specifically to join Sellafield. He recalled “I thought Sellafield was cleaner than the Marchon... I kept having nose bleeds and I thought, this isn’t for me. Whilst nuclear was a bit unknown... I decided to throw my hand in and go to Sellafield. I

³¹⁸ V. Eldred, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 8 February 2010, p. 3.

³¹⁹ *News Chronicle and Daily Dispatch*, 18 January 1954.

³²⁰ This portrayal of the mining industry was well-founded. A study of mortality amongst Cumbrian mine workers showed that miners suffered from “a significantly increased mortality from lung cancer” and other respiratory illnesses. See, L. Kinlen, and A. Willows, ‘Decline in the Lung Cancer Hazard: A Prospective Study of the Mortality of Iron Ore Miners in Cumbria’, *British Journal of Industrial Medicine*, 45.4 (1988), pp. 219-224; *West Cumberland News*, 12 September 1953, p. 5.

³²¹ J. Naylor, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 1 July 2010, p. 27.

reckon if I'd stayed at the Marchon I wouldn't be alive today."³²² This was typical of local attitudes. Whilst the nuclear industry was new and "unknown", in the eyes of many men it could not be any worse than the conditions endured within the chemical plants and particularly the mine shafts, which had claimed the lives of dozens of local men only a few years previously.

Imaginations of nuclear safety registered acutely amongst local mining communities, who had witnessed 335 deaths over the previous thirty-five years. The same year the nuclear project at Sellafield was announced, the local community had been devastated by the William Pit Disaster on August 15, 1947. This killed 104 miners when an underground explosion released carbon monoxide within the mineshaft, killing all but fourteen of the men on duty. Older interviewees, such as George Heslop recalled this incident in harrowing detail, remembering locals lining the streets and "waiting for news of their loved ones."³²³ This tragedy reconceptualised the way the local population saw the nuclear industry, which offered an alternative future to a life of hardship down the mines. Indeed, many local men chose to leave the mining industry and work at Sellafield as a direct result of this disaster. One interviewee explained that "the miners were a fine lot and it was fine working with them – but there was high mortality in those days in the mines and working conditions weren't very good..."³²⁴ A former miner explained that after one period of sickness caused by the damp conditions down the mine he decided to interview for Sellafield, "just so's you got paid if you

³²² At this time, the Marchon plant manufactured sulphuric acid, phosphate, fatty alcohol, and naphthalene for use in firelighter blocks. See, J. Kennedy, and G. Atkinson, 'A History of Marchon Works at Whitehaven', *Industrial History of Cumbria*. <<https://www.cumbria-industries.org.uk/a-z-of-industries/chemicals/a-history-of-marchon-works-at-whitehaven/>> [accessed 3 June 2018]; G. Heslop, and I. Heslop, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 2 September 2010, p. 5.

³²³ George emphasised the devastation of mining disasters, remembering one new father who "had some come back from the Far East with the war over and they found his first pay packet on his body when he was recovered." (G. Heslop, and I. Heslop, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 2 September 2010, p. 4.)

³²⁴ V. Eldred, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 8 February 2010, p. 3.

were off sick like.”³²⁵ Another interviewee recalled that his father had forbidden him from following in his footsteps and working down the mines. He explained that “he turned round and said ‘you’re not going anywhere near that place. You’re not working down the pit.’”³²⁶ In contrast, Sellafield represented a desirable and safe means of employment for locals, both a chance at a better life for themselves and for their loved ones. Another interviewee explained that “I vowed never to go down the pit.” He described how Sellafield not only offered a desirable future for him, but also a chance to get his father a safer job. He explained that “I took the opportunity to get my dad out of the coal mines to save my mother worrying and into Sellafield.”³²⁷ These narratives show how notions of nuclear safety interacted strongly with the local context, as West Cumbria’s history of mining disasters helped embed imaginaries of nuclear utopianism and Sellafield became embroiled within desirable local futures. In this context, the William Pit Disaster and the historically poor working conditions within the Cumbrian mines emotionally shaped the form of cultural expressions towards nuclear power. This provided a contextual backdrop which helped embed the imaginary that nuclear power represented a clean, safe and unlimited source of energy. Offering a long-term, well-paid, and ostensibly ‘safe’ job within an industry ran by and regulated by the state, the nuclear industry appealed to a number of socio-economic registers at the local level, embedding locally specific visions of desirable futures. This process was further augmented by the financial provisions offered by the nuclear industry, which entrenched imaginaries of the plant as synonymous with the economic recovery and prosperity of West Cumbria.

³²⁵ D. Head, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 25 January 2010, p. 4.

³²⁶ P. McLean, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 11 February 2010, p. 28. In a study of the British working classes, Joanna Bourke similarly found that “although parents in mining industries could use their influence to place their sons in mining employment, few were willing to do so. Sons were equally unwilling... If boys continued to go into mining, it was only due to the shortage of alternative employment.” See, J. Bourke, *Working Class Cultures in Britain, 1890-1960: Gender, Class, and Ethnicity* (Hove: Psychology Press, 1994), p. 93.

³²⁷ G. Heslop, and I. Heslop, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 2 September 2010, p. 4.

Together, the physical and financial security offered by the nuclear project represented a prosperous future for the people of West Cumbria. This assimilated with the financial depression of the inter-war years to embed an imagined future of socio-economic prosperity at the local level. West Cumbria had endured a period of profound socio-economic decline as the mining and manufacturing industries which underpinned the regional economy were hit by the financial blight of the inter-war years, prompting mass unemployment and migration out of the county. Slumps within the steel, coal, and iron industries reaped “economic disaster” upon West Cumbria, which suffered from a period of “catastrophic industrial decline.”³²⁸ Describing the chastening experience of growing up during this period, older respondents remembered “there was no work at all really, it was the bad old days... up to the war started there was no work.”³²⁹ By 1934, the county had been officially branded “a distressed area” and received assistance from the Industrial Development Council who encouraged new industries to take residence in Cumbria to combat the mass exodus of men out of the county in search for work and 13,000 unemployed.³³⁰ This provided a fertile breeding ground for any incumbent industry able to offer long-term jobs and a measure of economic security to the local population

In the context of financial depression, Sellafield intertwined with ideas about the region’s post-war revival to embed imaginaries of a desirable socio-economic future sustained through the nuclear industry. This imaginary was institutionally stabilised by the state, as a

³²⁸ Furthermore, the region was unable to attract alternative industries due to inadequate infrastructure for transportation by either road or rail, and harbours too shallow to cater for steamships. (Author Unknown, *Cumbrian Life* (March 2016), p. 13; *News Star Supplement*, 26 April 1960, p. 1; N. Bell, ‘An Oral History of British Science’, interviewed by P. Merchant, 10 January 2013).

³²⁹ J. Farrell, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 20 January 2010, p. 3.

³³⁰ Indeed, it was only the outbreak of war in 1939 that saw the region begin to emerge from its economic paralysis, with the opening of a number of war-time factories seeking to escape German bombing raids, (Ordnance factories at Drigg in 1940, Bootle in 1941, and Sellafield in 1942, alongside High Duty Alloys, Marchon, and clothing manufacturer Kangol.) *News Star Supplement*, 26 April 1960, p. 1.

series of government-sponsored public exhibitions were set up in order to ‘educate’ the public about the benefits of nuclear technology and its central role in the region’s future.³³¹ Public exhibitions of nuclear energy formed part of a flagrant campaign to gather favour for the nuclear plant by latching onto a romantic image of Cumbria’s industrial heritage and juxtaposing the prosperity of the atom with the area’s recent economic slump. In 1948, just after the Windscale plutonium plant was announced, Cumbria hosted the ‘Atom Train exhibition’ (Fig. 13.0). which visited British towns and cities making the public “atomic energy conscious.”³³²

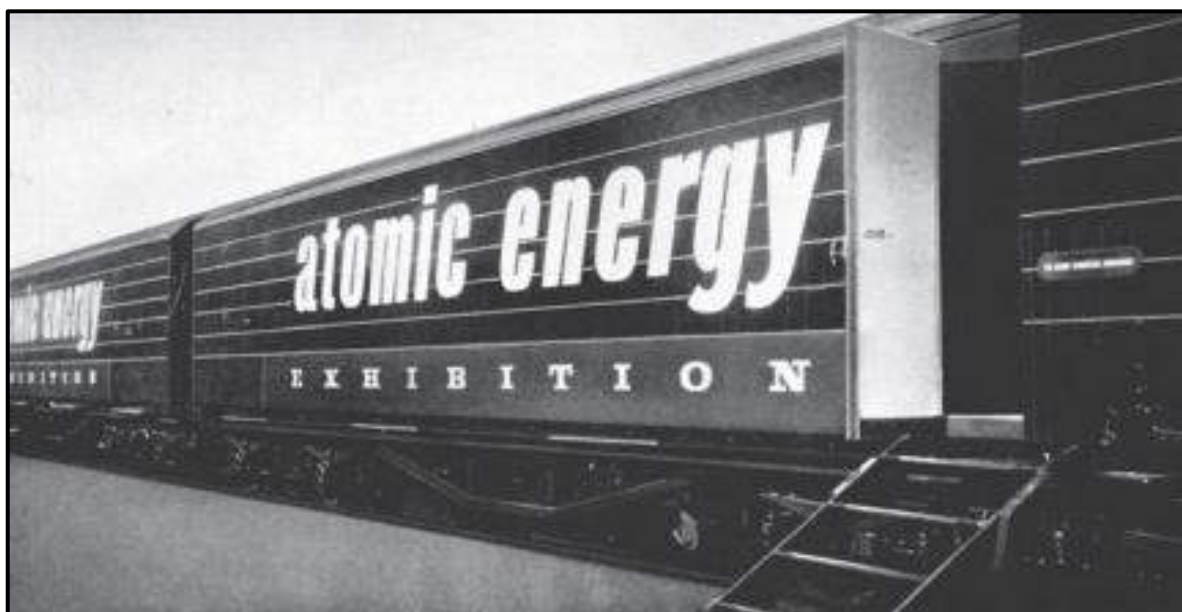


Fig. 13.0: ‘The Atom Train,’ 1948. University of Liverpool’s Department of Physics Archives.

³³¹ Initial public responses to Sellafield were characterised by resistance as the local population resented having lost the initial Courthaulds project. In the Commons, local M.P. Frank Anderson spoke out against the uncertain prospects of employment at the “new-fangled” atomic energy plant, expressing his constituents’ disappointment at having lost the employment prospects offered by the proposed rayon factory and the long-term security of the textiles industry. These concerns were echoed in local newspapers, who engaged in a series of derisive narratives which presented the Sellafield plant as a “Blow for West Cumberland.” This manner of low-level local resistance characterised the early interactions between the nuclear industry and the Cumbrian public, as the imaginary of nuclear utopianism took a short while to manifest. (National Archives, ‘Transcript of Commons Debate on Atomic Energy Plant’, 23 July, 1947, (PREM 8/682), p. 1238; *Whitehaven Daily News*, 24 July 1947, p. 1; Bracey, *Industry and the Countryside*, pp. 102ff).

³³² C. Laucht, ‘Atoms for the People: The Atomic Scientists’ Association, the British State and Nuclear Education in the Atom Train Exhibition, 1947–1948’, *The British Journal for the History of Science*, 45.4 (2012), pp. 591- 608.

This was a public information campaign jointly organised by the Atomic Scientists' Association and the government, designed as a "publicity stunt" aimed to "help you understand the facts about atomic energy", so read the exhibit's official guide.³³³ This presentation "focused on peaceful applications of nuclear energy... framed within the dichotomy of a bright, peaceful atomic future."³³⁴ This imagined utopian future was formalised in the aesthetic design of the exhibition, in which "much light and warm colours are used to create an appropriate atmosphere" and furnish the displays with a positive ambience.³³⁵ This public performance of nuclear prosperity built upon the West Cumbrian Industrial Exhibition of 1948, where President of the Board of Trade and future Prime Minister Harold Wilson delivered a public speech which emphasised the region's industrial heritage, situating the incumbent nuclear industry within the region's "record of great achievement."³³⁶ In a speech to several thousand onlookers, he delivered an address which situated nuclear technologies within a positivist narrative of the region's recent past, with nuclear science the proverbial phoenix that would enable the depressed region to rise from the ashes of industrialism and reverse a generation of economic difficulty. Acknowledging that the region had "suffered more severe unemployment than any of the other distressed areas of Great Britain" he carefully juxtaposed the "industrial prosperity" offered by the nuclear industry with the "grim realities of life back in 1935."³³⁷ Together, these two public displays asserted the employment prospects and the desirability of the incumbent nuclear industry, as state intervention helped embed imaginaries of nuclear prosperity and shaped public opinion in favour of the nuclear project.

³³³ Laucht, 'Atoms for the People', p. 593; 'If Atom War Came', *Liverpool Echo*, 6 November 1947; Atomic Scientists' Association, *Atom Train: Guide to the Travelling Exhibition on Atomic Energy* (London: Atomic Scientists' Association, 1947), unpaginated.

³³⁴ Laucht, 'Atoms for the People', p. 599.

³³⁵ 'Atom Train: A Travelling Exhibition on Atomic Energy Designed by Peter Moro and Robin Day', *Architects' Journal*, 13 November 1947, pp. 434f.

³³⁶ *Times and Star*, 'An exhibition of West Cumbria's Greatest Industrial Achievements', 26 July 2012. <<https://www.timesandstar.co.uk/news/17034042.an-exhibition-of-west-cumbrias-greatest-industrial-achievements/>> [accessed 29 October 2019].

³³⁷ *Ibid.*,

Born into the socio-economic context of financial deprivation and institutionally stabilised at state level, imaginaries of nuclear prosperity registered acutely within the region and became embedded into a locally specific vision of the future. In this context, Sellafield represented a degree of financial surety for local workers looking for a stable income. Workers explained that Sellafield offered a “substantial employment lifeline”, recalling that they “were glad of the work” within an industry whereby “you’re generally safe and you’ve got a job for as long as you want it.”³³⁸ The financial credentials of the nuclear industry were emphasised by the rhetoric of local media narratives, which presented Sellafield “in religious terms” as having stimulated the economic and social regeneration of the local community.³³⁹ Sellafield’s “revolutionary” impact upon the local region, was likened to a form of “salvation” by successive newspaper articles which identified “new life and vigour in the local communities ... where the future is looked forward to with optimism and confidence that the bad old times have passed and that still greater prosperity is around the corner.”³⁴⁰ Local media proudly proclaimed “Cumberland can make it!”, emphasising Sellafield’s “massive contribution” towards “securing the region’s future prosperity.”³⁴¹ These narratives helped embed imaginaries of economic utopianism, as Sellafield was represented as the stimulus for the region’s industrial renaissance. This was augmented by the highly favourable wages offered by the nuclear industry which stimulated the local economy and transformed the standard of living for many in the local area.

³³⁸ J. Farrell, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 20 January 2010, p. 11; A. Barnes, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 4 August 2020, p. 18; Bolter, *Inside Sellafield*, p. 231.

³³⁹ Whitehaven Archive and Local Study Centre, E. Huws-Jones, ‘The Case Against THORP: Windscale and West Cumbria’, (Egremont Folder), p. 5.

³⁴⁰ Jay, *Britain's Atomic Factories*; Bolter, *Inside Sellafield*, p. 231; Bracey, *Industry and the Countryside*, p. 126.

³⁴¹ Sinclair, *Windscale*, p. 7; *West Cumberland News*, 20 December 1947.

Now a well-established tactic of the nuclear industry both in the UK and elsewhere, Sellafield offered wages which grossly outstripped all other industries in the local area.³⁴² This embedded notions of nuclear utopianism as local people attained a higher standard of living through the economic provisions of the nuclear industry. UKAEA historian Lorna Arnold explained that the region became known as “the Gold coast” as the “high wages and the opportunity for almost unlimited overtime” transformed the region.³⁴³ Interviewees explained how the incursion of cash into the local region from the plant had a profound impact on the local economy. One local woman recalled that, whilst it was common that both men and women were required to work, “if the husband worked at Sellafield, the wife didn’t have to go out to work at all.”³⁴⁴ Even those who did not obtain direct employment within the nuclear industry reaped the benefits of the plant as “the combined wage bills put thousands of pounds into local circulation each week.”³⁴⁵ The disposable income of the nuclear workforce “stimulated prosperity and employment in shops, garages, laundries, building, and decorating business” as their generous wages trickled down into the local economy.³⁴⁶ This helped embed the imaginary of nuclear utopianism as local people “welcome[d] the prosperity the atom people had brought.”³⁴⁷ Interviewees recalled that the local area “brightened up during the course of the fifties... all the doors suddenly got painted because people could afford to do that kind of thing!”³⁴⁸ Similarly, the migration of skilled workers and scientists into the area “demanded the professional services of the doctor, dentist, teacher, and chemist”, bringing about residual

³⁴² For comparisons with the French context, see Zonabend, *The Nuclear Peninsula*, p. 22.

³⁴³ Arnold, *Windscale 1957*, p. 11; Sinclair, *Windscale*, p. 10. One former Sellafield welder explained that labourers targeted an incredible 100 hours in a week as staff seized the virtually unlimited overtime quotas. (D. Head, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 25 January 2010, pp. 1-6, 14.)

³⁴⁴ Author’s interview with Isobel George, 6 March 2019.

³⁴⁵ Bracey, *Industry and the Countryside*, p. 125.

³⁴⁶ *Ibid.*,

³⁴⁷ G. Bruce, ‘Atom Village Beats that Quartermass Fear’, *Illustrated Magazine*, 3 March 1956, p. 39.

³⁴⁸ M. Kipling, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 7 January 2010, p. 3.

employment for locals not employed at the plant, engaged in auxiliary services which supported the industry indirectly.³⁴⁹ Residents commented that, “for every job at Sellafield there were probably three more jobs supported round about, from taxi drivers to supermarkets”, adding that “almost everybody worked at Sellafield, and those who didn’t, their livelihoods depended on Sellafield or its employees.”³⁵⁰ This economic prosperity helped embed the imaginary of nuclear utopianism as the financial benefits heralded by the nuclear industry contributed to a higher standard of living amongst the local public. This entrenched the imaginary of nuclear utopianism at the local level, as the region’s economic regeneration assimilated with a series of social, cultural, and subjective processes to help embed visions of regional prosperity attained through the pursuit of nuclear technologies at Sellafield.

1.8: Conclusion.

This chapter has shown how both nuclear technologies and the Sellafield plant became embroiled within imagined visions of desirable social, military, (geo)political, and economic futures, as national ambitions dovetailed with a series of locally specific social, political, and economic contexts to embed utopian nuclear imaginaries at both national and regional level. This reveals how the local and the national intersected in the production of nuclear culture, as social responses to nuclear technologies were characterised by the dynamic interplay between imagined political, socio-economic, cultural, and military futures at both local and national levels. The chapter also demonstrates the utility of thinking about nuclear technologies through the lens of the socio-technical imaginary to understand the cultural work they performed, whilst

³⁴⁹ Bracey, p. *Industry and the Countryside*, 125.

³⁵⁰ N. Bell, ‘An Oral History of British Science’, interviewed by P. Merchant, 10 January 2013; A. Postlethwaite, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 18 March 2010, p. 8.

advocating the reciprocity between the local and the national context in the production and embedding of nuclear imaginaries within British society. Exploring the roles of identity and secrecy within this process, this chapter has shown how national and local identities interacted with and helped embed these imaginaries at multiple scales. Likewise, it has demonstrated how local and personal identities became increasingly shaped by the security apparatus which engulfed the plant, which in turn strengthened imaginaries of nuclear deterrence and local prosperity. These layers of military secrecy allowed the state to cultivate, protect, and embed a series of desirable nuclear futures, at once subsuming undesirable elements of the nuclear industry such as weapons production and radiation effects. This cultivated an imaginary of nuclear safety which interacted with the localised context of mass unemployment, low wages, and poor job security to embed a series of imagined socio-economic, military, and political futures, inextricably aligning notions of regional and national prosperity with the Sellafield plant.

Developing these insights, the following chapter takes inspiration from the fields of cultural geography and landscape studies to explore how the physical design, material layout, and infrastructure of the Sellafield nuclear complex served as an active agent in the production of nuclear culture, particularly during the construction phase between 1947 and 1956. The chapter will demonstrate that Sellafield served as a flagship for the government's pursuit of nuclear technologies, specifically exploring how the plant and its associated material components, such as atomic housing, transport links, and leisure facilities actively embedded nuclear imaginaries at both national and local level by physically embodying and publicly performing a utopian social future predicated upon Britain's pursuit of the atom.

2: Rural Imaginaries.

This chapter explores how the arrival of the nuclear industry in West Cumbria sat within the physical and cultural landscape of the region and helped embed both utopian and dystopian nuclear imaginaries at the local level. Where the previous chapter considered how a series of utopian nuclear imaginaries became embedded at various scales, this chapter takes an overt focus upon the localised context, demonstrating how imaginaries of nuclear utopianism cultivated at the national level interacted with, and were shaped by a series of local processes. Observing how the nuclear industry both integrated and clashed with the local West Cumbrian community, this chapter focuses upon the role of place within this process. Specifically, demonstrating how contests over the meaning and use of nuclear spaces shaped identity and perpetuated social imaginaries by embedding particular visions of the future. This informs our understanding of how the imaginary of nuclear utopianism functioned as both a material and social agent, operating not only as an idea, but a powerful social device capable of shaping the built and non-built environment. As I will demonstrate, this produced physical structures which extended utopian imaginaries, and in some cases, produced dystopian ones, as the local public looked to the physical and cultural changes wrought by Sellafield as representative of a series of desirable and non-desirable local futures.

The first half of the chapter shows how the development of social infrastructure around Sellafield, which included housing and urban planning, embedded utopian nuclear imaginaries by providing a higher standard of living within the local community. Conforming to ideals of modernity, these developments synthesised ostensibly urban ideals such as housing and industry within rural sensibilities and cultural landscapes. This produced new notions of rurality, offering a utopian social imaginary whereby the nuclear industry comfortably co-

existed alongside and perpetuated the desirable characteristics of rural life. It will then examine this social dynamic in greater detail, exploring how the nuclear industry instigated a series of positive social and cultural changes within the local community. Tracing the contours of this process, I show how these changes embedded social and cultural imaginaries throughout West Cumbria by offering a desirable regional future predicated upon the prosperity of the atom. The chapter then demonstrates how these physical and social changes subsequently provoked resistance amongst sections of the local community who lost their employment, land, and traditional way of life through the arrival of the nuclear industry.

The second half of the chapter will explore how these physical and cultural developments embedded resistant nuclear imaginaries amongst the local public as aspects such as plant design, and the compulsory sale of local farmland impinged upon and overwrote existing social customs, identities, and economies. Examining this process, I will show how the existence of Sellafield and its material components embedded an imagined dystopian future amongst sections of the local community, for whom these developments spoke to an undesirable future of social and cultural subjugation at the hands of the nuclear industry. This section will develop the argument that, in the same way as the meanings and values of dominant groups can be read in nuclear sites, so too can they convey and perpetuate resistant ideologies of oppositional groups, as the social and physical architecture of the nuclear industry clashed with localised notions of identity and induced forms of resistance predicated upon dystopian notions of an urban invasion. Ultimately, this reveals that nuclear technologies have always induced forms of social resistance, even during the early halcyon years previously identified as a period of nuclear optimism and ‘trust in technology.’³⁵¹ Recognising the omnipresent nature of nuclear resistance, this understanding steps away from such categorisations as

³⁵¹ Blowers, *The Legacy of Nuclear Power*; Welsh, *Mobilising Modernity*.

somewhat deterministic, failing to account for the myriad and complexity of social attitudes towards nuclear technologies, particularly at the local level.

Shedding light upon the poorly understood nature of social responses to the nuclear industry during this early period, especially within the social and geographic contexts in which many of these installations were located, this chapter places a much greater emphasis on the role of the public as an agent of social change and nuclear meaning-making. By engaging with contests over the meaning and use of rural place, this demonstrates how ordinary citizens resisted the imaginary of nuclear prosperity extended by the state and produced their own forms of nuclear culture by engaging with the social and cultural effects of nuclear technologies at the local level. This evidences the dynamic interplay between ordinary people and the state, disrupting technologically deterministic understandings of British nuclear culture which have failed to account for the complexities of British responses to nuclearisation, and the power of ordinary people to challenge, disrupt, and subvert top-down imaginaries of sociotechnical progress.

2.1: Approach.

The approach taken in this chapter applies thinking from cultural geography and rural studies that explore how places, “far from being static, are processes which change over time.”³⁵² Specifically, this points to nuclear places as active and dynamic processes, which reflect *and* produce societal attitudes, norms, and identities. This aligns with the work of spatial theorists who argue that places “reveal, represent and symbolise the relationships of power and

³⁵² J. Bamford, F. Poppi, and D. Mazzi (eds.), *Space, Place and the Discursive Construction of Identity* (Oxford: Peter Lang, 2012), p. 11; Mitchell, *Landscape and Power*, p. 1.

control out of which they have emerged and the human processes that have transformed and continue to transform them.”³⁵³

Nuclear places are engaged in an on-going process whereby they may embody and produce multiple identities simultaneously or at various times. They are either representative of what individuals perceive themselves to be, or what they are not.³⁵⁴ Furthermore, as agents of cultural power, nuclear places “don’t just show us what power relations exist, [they] actively perpetuate those relations”, often serving as a vehicle of communication for dominant or resistant imaginaries.³⁵⁵ Rosanna Farbøl examines this process, showing how Danish ‘ruin towns’ (training facilities in which villages were deliberately ‘ruined’ in order to create life-like and realistic training grounds for civil defence responses) helped embed particular ways of thinking about civil defence and nuclear attack. Drawing upon previous research on the cultural agency of landscape and the power of fallout bunkers in shaping British culture, Farbøl argues that “the debris and rubble of [the] ruined village gave “mass and solidity” to the imaginary and dystopian war civil defence prepared for.”³⁵⁶ Developing these insights, this chapter shows how nuclear places can shape identity and perpetuate social imaginaries by embedding particular visions of the future. This approach advocates a greater focus on the role of place and identity in shaping and embedding sociotechnical imaginaries. Specifically, I will present the physical structure of Sellafield and the myriad of housing, schools, and infrastructure that accompanied it as *embedding* an imaginary of nuclear utopianism within

³⁵³ Mitchell, *Landscape and Power*; I. Robertson and P. Richards (eds.), *Studying Cultural Landscapes* (London: Hodder, 2003), p. 4.

³⁵⁴ Robertson and Richards, *Studying Cultural Landscapes*, p. 16.

³⁵⁵ C. Brace, ‘Landscape and Identity,’ in I. Robertson, and P. Richards (eds.), *Studying Cultural Landscapes* (London: Hodder, 2003), p. 124.

³⁵⁶ Farbøl, ‘Ruins of Resilience’, in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*, p. 1; Mitchell, *Landscape and Power*; Bennett, ‘The Bunker’, pp. 155– 173; Jasanoff, ‘Imagined and Invented Worlds’, in Jasanoff, and Kim, (eds.), *Dreamscapes of Modernity*, p. 322.

local society, producing new forms of social identity which drew upon the socio-economic opportunities afforded by the nuclear industry as symbolic of a desirable regional future.

2.2: Housing.

Following the announcement of the Windscale nuclear works, government and local councillors quickly established adequate provisions for the influx of workers required to man the factory. As early as August 1947, Ministry of Supply (MoS) officials met with representatives of the Department of Energy (DoE) and Cumbria County Council to plan the housing developments necessary for the incumbent staff at Windscale, erroneously known as ‘Winscales.’ Formally ratified the following month, they agreed to construct two hundred houses within the village of Seascale, a small Victorian seaside village overlooking the Irish Sea, two miles south of Sellafield.³⁵⁷

Historically, Seascale had served as a quaint seaside town, servicing tourists from Lancashire, Yorkshire, as well as Cumbrian holidaymakers. Plans had been drawn up to develop the village as a major tourist destination during the nineteenth century, but were later abandoned in favour of Blackpool. By the mid twentieth century, Seascale functioned as a sleepy agricultural village of around 800 people, sandwiched between the wartime munitions factories at neighbouring Drigg and Sellafield. Residents reflected that very little went on in the village during this time. Characterising local life, residents explained that “there was the pub and the post office and three motor cars for years and years.”³⁵⁸ The region’s status as a

³⁵⁷ Whitehaven Archives and Local Studies Centre, ‘Note of Discussions on 26th August 1947, at Carlisle, Egremont and Seascale regarding Housing Accommodation required in the neighbourhood of Windscale Works, Sellafield’, (SRDE 1/3/1/160).

³⁵⁸ A. Lorton, ‘Ambleside Oral History Group’, interviewed by ‘HB’, 22 March 2005.

cultural backwater posed a challenge to government ministers, who acknowledged the “inadequacy of the existing services” within West Cumbria, which suffered from a lack of infrastructural facilities and was not sufficiently attractive for the calibre of scientific staff required.³⁵⁹ Internal government memorandum accepted that the “success of the Sellafield project was considered to depend on attracting ... a number of technicians who were accustomed to living in very different surroundings,” identifying that the existing housing stock would “not be attractive to immigrants from the south.”³⁶⁰ It was in this context that Seascale was proposed as the ideal setting for a new housing development for scientific workers and senior management, based upon “its proximity to Sellafield, the attractiveness of the village” and its potential “as a centre for UKAEA employees.”³⁶¹ Seascale also offered plentiful opportunity for expansion, as planners identified the open plains and fell-land to the North and South-East of the village as an ideal location for industry housing.

Work soon began to develop the village and a series of new, sleek housing estates designed to house management and administrative staff appeared. In Seascale alone, three hundred houses “erupted” between 1945 and 1957, as town planners fashioned a ‘nuclear community’ out of the existing village, sketching out the contours of a new atomic landscape.³⁶² These developments were designed to reflect and materially embed the aesthetic of the utopian nuclear imaginary. The design and layout of the atomic housing was the product

³⁵⁹ Whitehaven Archives and Local Studies Centre, (SRDE 1/3/1/160.)

³⁶⁰ *Ibid.*; National Archives, ‘UKAEA regional planning committee Egremont/Cleator Moor. Ministry of Housing and Local Government’, 11 January 1954, (AB 8/523).

³⁶¹ Whitehaven Archives and Local Studies Centre, ‘Seascale: Draft Village Plan,’ (Seascale History Folder), p. 13.1.

³⁶² A further 1780 houses were built on the Mirehouse estate in Whitehaven, of which 400 were directly nominated by the authority, and the remaining majority let to Sellafield workers. Five miles south, 350 houses were constructed on the Orgill and Thornhill estates near Egremont, taking the number of authority dwellings to well in excess of 1200, as the nuclear plant sequenced a boom in local housing construction. (Bracey, *Industry and the Countryside*, p. 140); D. Wooley, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 6 August 2010, p. 16; Whitehaven Archives and Local Studies Centre, ‘Correspondence between Borough Librarian, D. Hay to local MP, Jack Cunningham’, (Social Impact Folder).

of post-war attitudes towards the built environment and its key role “in the state-led production of a prosperous, healthy and peaceful post-war society.”³⁶³ This imaginary borrowed from and extended post-war attitudes towards urban planning, as Seascale resembled a model of post-war prosperity enshrined through the pursuit of nuclear science. Ultimately, this produced a whole new civic organisation reflective of and made possible by imaginaries of nuclear science and its role in the transformation of society.

Seascale was designed not only to house workers, but to say something about the affluence of life in the atomic age. With nuclear energy heralded as “one of the key instruments of modernity, it was incumbent upon the UKAEA to provide a setting and style of housing to match.”³⁶⁴ Examining early examples of nuclear architecture, Linda Ross has shown how there was “a need to construct a new type of housing for a new type of community.”³⁶⁵ Seascale was envisaged as a model village for the nuclear industry, designed to house up to 4000 nuclear workers and 2000 visitors in a utopian “holiday resort” setting.³⁶⁶ Planners envisaged Seascale as “the ultimate of atomic housing development,” a blueprint upon which all future nuclear communities would be based.³⁶⁷ Indeed, subsequent nuclear developments, such as Dounreay, were built in its mould, with modern housing and “a style of town planning and architecture” befitting the exciting possibilities of the nuclear age.³⁶⁸ Underpinning this were a series of amenities, carefully curated to reflect the prosperity of atomic life.

³⁶³ R. Hornsey, “‘Everything is Made of Atoms’”: The Reprogramming of Space and Time in Post-war London’, *Journal of Historical Geography*, 34.0 (2008), p. 95.

³⁶⁴ Ross, ‘Nuclear Fission and Social Fusion’, p. 155.

³⁶⁵ *Ibid.*, p. 145.

³⁶⁶ Whitehaven Archives and Local Studies Centre, (YSPC 1/187); Whitehaven Archives and Local Studies Centre, (SRDE 1/3/1/160.)

³⁶⁷ National Archives, ‘Seascale Development, 17 January, 1950’, (MAF 107/75).

³⁶⁸ Ross, ‘Nuclear Fission and Social Fusion’, p. 142; *Glasgow Herald*, 29 March 1957, p. 4.

Plans were made to furnish Seascale with a brand-new shopping centre, a social club, a swimming pool, better schools, a new library, churches, cinemas, and banks.³⁶⁹ This echoed developments in France, where nuclear establishments were legitimised by state attempts to modernise their siting locations, often cultural and socio-economic backwaters that benefitted from state investment in infrastructural developments such as mains electricity and better housing. As historians Chris Pearson and Kate Brown have shown in both French and Soviet contexts, this enveloped the industry in a series of positive cultural assumptions through the provision of modern amenities.³⁷⁰ The built environment thus functioned as a communication tool, designed to convey a set of cultural attitudes towards nuclear technologies, as urban planning became a key realm in which the imaginary of nuclear utopianism was embedded into the physical and cultural fabric of the region.³⁷¹

The physical design of atomic housing helped embed utopian imaginaries, as town-planners produced a series of appealing houses which directly correlated the nuclear industry with visions of a desirable nuclear future. A recent study by Sam Wetherall explores how post-war developments, such as council estates, “reflect[ed] an optimism that new communities could be forged by architecture.”³⁷² Designed to conform to the needs and aspirations of incoming workers and their young families, the design of nuclear housing was based around

³⁶⁹ ‘The Village Where Plutonium Must Mix with Ploughing’, *News Chronicle and Daily Dispatch*, 15 October 1956.

³⁷⁰ C. Pearson, *Mobilising Nature: The Environmental History of War and Militarisation in Modern France* (Manchester: Manchester University Press, 2012), p. 226; Brown, *Plutopia*.

³⁷¹ Little historiography exists on the built environment of nuclear townships in the British context, although this understanding points to the need for future studies in this area, as the built environment functioned as an active participant in the production of nuclear culture, as atomic landscapes co-produced ways of thinking about nuclear science. Notable exceptions to this trend are L. Ross, ‘Nuclear Fission and Social Fusion’; N. Hance, *Harwell: The Enigma Revealed* (Buckland: 2006), pp. 50- 59; S. Harper, *Chapelcross and the Cold War: Scotland's First Nuclear Power Station* (Eastriggs: 2019), pp. 25- 31. In addition to the examples referenced above, a standout example in the US context is Peter Hales’, *Atomic Spaces: Living on the Manhattan Project*.

³⁷² S. Wetherell, *Foundations: How the Built Environment Made Twentieth-Century Britain* (Princeton: Princeton University Press, 2020), p. 7.

these ideals. By projecting an engaging model of middle-class life, these houses produced a new vision of community life which blended the benefits of rural living with the stylistic trappings of modernity. Planners insisted houses were spacious and arranged in a suburban layout, offset with ornate front gardens, “beautiful grass sweeps” and winding paths.³⁷³ One local explained that “these bosses for Sellafield were gonna come out of the towns and cities, so they made it open-plan. They built these massive big lawns out the front, loads of lawns. They got big, massive gardens for all the houses.”³⁷⁴ This built upon a British tradition of model-worker villages such as Port Sunlight on the Wirral, and Bourneville in Birmingham, designed to conform to the ideals of Victorian social reformers as “aesthetic, middle-class garden suburbs.”³⁷⁵ Seascale’s design conformed to this aesthetic, offering a benevolent reinterpretation of this philosophy, re-imagined for the nuclear age.

The design and physical layout of the homes made them very desirable, particularly amongst new workers who were attracted to the region by the model of prosperity they were designed to reflect. Residents recalled their wonder at seeing their new homes, explaining that “those new houses were like a miracle to many of us” ... “they were such beautiful houses... brand new.”³⁷⁶ Figs. 1.0 and 2.0 demonstrate how their design was optimised to appeal to family life, with plentiful storage and built-in spaces for family amenities such as a pram, a larder, refrigerator, serving hatch, and a drying room, offering all the conveniences a modern

³⁷³ National Archives, ‘Seascale Development, 17 January, 1950’, (MAF 107/75).

³⁷⁴ K. Mawson, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 6 August 2010, p. 7.

³⁷⁵ E. Hubbard, and M. Shippobottom, *A Guide to Port Sunlight Village* (Liverpool: Liverpool University Press, 2005), p. 5; G. Noszlopy, *Public Sculpture of Birmingham: Including Sutton Coldfield* (Liverpool: Liverpool University Press, 1998).

³⁷⁶ The physical appearance of the village was a key concern for the nuclear industry. Residents explained that “every four years (usually Olympic year), the painters would come round to the house and paint the house and your front door- the same colour every time. You didn’t get a choice in the matter as they were factory owned. Like the Forth Rail Bridge the painters just moved onto another street and then started all over again.” (Rushworth, *Atom Kids*, pp. 6, 37; M. Davis, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 16 December 2010, p. 14.)

family could want. One new arrival explained that “we thought Seascale was great... we could afford a three bedroomed house with a garden and a garage, for less rent than we were paying for this dump in Newcastle.”³⁷⁷ By offering a higher standard of living than was attainable elsewhere, the village helped embed utopian socio-cultural imaginaries by conforming to idealised visions of family life, projected to the nation through the content of carefully curated public images and press releases.



Fig 1.0: National Archives (MIA/448). Blueprint for Exterior of House. Note the stipulation that the house is to be rendered in fresh cement render, in contrast to the cheaper and more rugged ‘pebble-dash’ style used on most homes in the area.

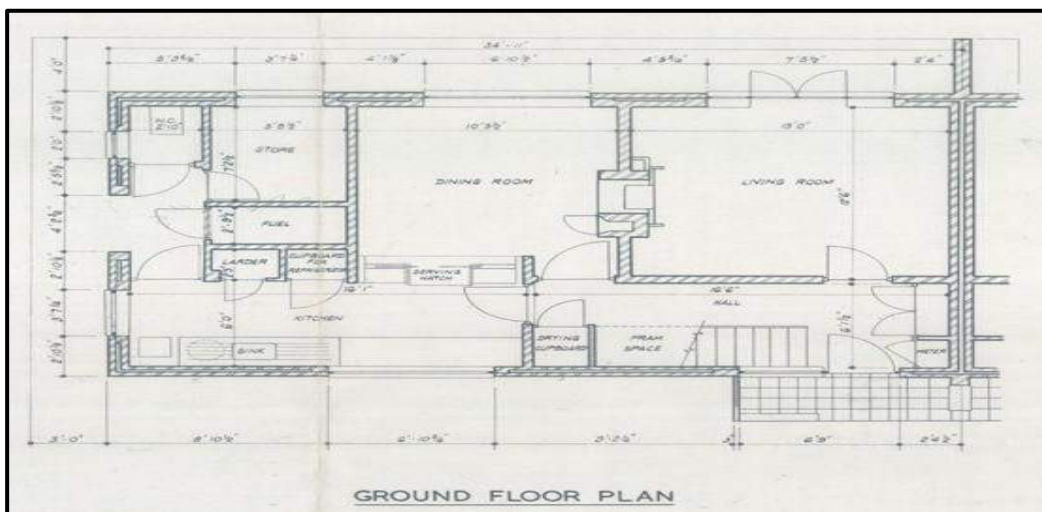


Fig 2.0: National Archives, (MIA/448). Floor-plan of Seascale House.

³⁷⁷ P. Graham, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 27 February 2010, p. 5.

Publicity surrounding the new development replicated the utopian nuclear imaginary, emphasising its suitability for young families. Figs. 3.0 and 4.0 are press releases provided to the national media by the UKAEA in 1955, depicting white, middle-class families enjoying the open spaces of the village.³⁷⁸ Accompanied by smartly dressed young children happily playing in their new surroundings, these images curated a specific image about the model of life offered by nuclear technologies; at once formal and respectable, cheery and homely.



Fig. 3.0: *News Chronicle and Daily Dispatch*, 15 October 1956, p.



Fig. 4.0: *Manchester Guardian*, 16 October 1956, unpaginated.

³⁷⁸ The article explains that the reporter was given a tour of the housing development by a UKAEA spokesman, and the images were therefore either provided by the UKAEA, or staged with their tacit involvement as part of this process.

This also communicated cultural assumptions about the homogeneity and security of the suburban ‘nuclear family.’³⁷⁹ In particular, the images of children playing in open spaces and on neatly kept grass verges operated in marked juxtaposition with the sight of children playing amongst the rubble and debris of bomb-damaged cities. This offered a stark contrast with the contemporary experience of many urban citizens, offering a harmonious vision of the future, characterised by childhood innocence and the freedom of rural life. Another example of this process appeared in a 1956 edition of *Illustrated Magazine*. The image of a housewife hanging her washing in the shadow of the plant (Fig. 5.0) served to depict the plant’s banality, and its harmonious ingratiation into domestic, and family life.



Fig 5.0: G. Bruce, ‘Atom Village Beats that Quatermass Fear’, *Illustrated Magazine*, 3 March 1956, p. 39.

³⁷⁹ For further reading on the nuclear family and its centrality within Cold war society, see Hogg, “The Family that Feared Tomorrow”, pp. 535- 549; E. May, *Homeward Bound: American Families in the Cold War Era* (New York: Basic Books, 2008); L. McEnaney, *Civil Defence Begins at Home: Militarisation Meets Everyday Life in the Fifties* (New Jersey: Princeton University Press, 2000); J. Chappel, ‘Nuclear Families in a Nuclear Age: Theorising the Family in 1950s West Germany’, *Contemporary European History*, 26.1 (2017), pp. 85- 109; C. Hagood, ‘Rethinking the Nuclear Family: Judith Merrill’s Shadow on the Hearth and Domestic Science Fiction’, *Women’s Studies: An Interdisciplinary Journal*, 40.8 (2011), pp. 1006- 1029.

The caption plays a particular role within this process, at once domesticating the threat of radioactivity whilst recognising (and pushing away) public fears towards it by comparing the smokelessness and spaciousness of the nuclear plant with the fumes and toxic atmosphere within the cities.³⁸⁰ These images formed part of a deliberate public image carefully cultivated by the nuclear industry with the tacit involvement of the print media. They helped embed imaginaries of nuclear prosperity, leaning upon and extending existing attitudes towards suburban modernity and the rationalisation of the rural landscape through the provision of ordered housing developments.

The physical layout of the village drew upon contemporary attitudes to post-war urban planning and the rationalisation of rural spaces for the provision of urban housing. David Matless has shown that post-war town planners sought to inscribe urban models of housing upon the rural landscape, attempting to blend the virtues of both environments and produce “the ideal village anatomy in the country.”³⁸¹ This reflected post-war ideals of reconstructionism, whereby the cramped, overcrowded, and unsanitary conditions of urban slums were replaced by satellite towns such as Kirkby (Liverpool), Milton Keynes (Buckinghamshire), and Redditch (Birmingham), as rural spaces were appropriated to deal with urban housing requirements. These new developments sought to replace the bomb-damaged slums of the Victorian era with modern housing optimised for community life in the post-war era. These imperatives were also reflected in the physical layout of Seascale and post-war ‘New Towns’, which were structured as “key sites within an orderly environment for

³⁸⁰ This had a particular cultural salience given the 1956 ‘Great Smog’ of London, in which between 4000 and 12,000 people died as a result of the toxic fumes which engulfed the capital only four years before this image was taken.

³⁸¹ Matless, *Landscape and Englishness*, pp. 318f.

living.”³⁸² The map below (Fig. 6.0) shows how the new housing conformed to this aesthetic, with a series of generously spaced-out housing estates replacing dilapidated Victorian-era terraces, which were pulled down and turned into a carpark for the new class of villager (Fig. 7.0).

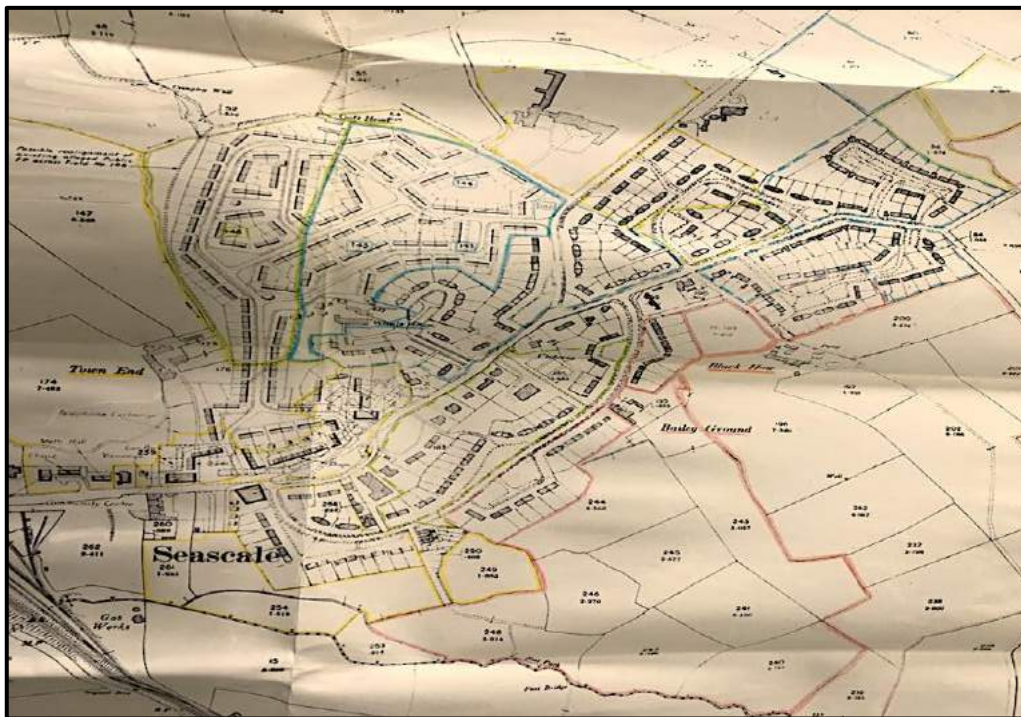


Fig. 6.0: National Archives, (MAF 107/75), ‘Cumberland County Council Planning Department Amended Layout, Seascale.’



Fig. 7.0: National Archives, (ADM 326/315), View of Seascale Car-Park.

³⁸² *Ibid.*; see also P. Larkham, and J. Pendlebury, ‘Reconstruction Planning and the Small Town in Early Post-war Britain’, *Planning Perspectives*, 23.0 (2008), pp. 291- 321.

National media outlets marvelled at these developments, commenting on how the new “slick white housing estates sprouted like magic” in stark contrast with the dour appearance of the older parts of the village.³⁸³ This discursive process aligned these developments with contemporary notions of urban modernity, embedding the imaginary of nuclear utopianism as the ordered village layout conformed to modern attitudes of desirable living. Furthermore, the zoning of housing not only reflected the imperatives of post-war urban rationalism but also exhibited the military principles of hierarchy and compartmentalisation. Here, the physical environment of Seascale reflected military order, reproducing the social and ideological contexts in which it was created.

The ordered layout of Seascale was not only the product of post-war attitudes towards rural and urban environments but also the systematized nature of both nuclear science and the military, as the imaginary of nuclear utopianism borrowed from a more established set of cultural attitudes towards military and research establishments and extended them into the civilian realm. Marianna Dudley's work on the UK Defence Estate has shown that rural defence establishments were frequently reimagined “in favour of a populated, structured, and planned future utopia” where the natural realm was re-appropriated for the purposes of man, and specifically military defence initiatives.³⁸⁴ The physical layout of the village reflected these principles, as the models of atomic housing embodied military attitudes towards standardisation and uniformity, whilst their hierarchical nature also drew comparisons with military rank and status. Houses were divided into a series of developments classified according to the grade of worker to be housed there. Grade A “all-electric” housing was for senior management, and known locally as “millionaire’s row,” grades B and C housed ‘middle

³⁸³ ‘The Village Where Plutonium Must Mix with Ploughing’, *News Chronicle and Daily Dispatch*, 15 October 1956.

³⁸⁴ Dudley, *An Environmental History of the UK Defence Estate*, p. 136.

management’, junior managers resided in Grade D accommodation, whilst Grades E and F were designated for technical staff.³⁸⁵ This also reflected the hierarchical structure of research establishments and universities from which many workers originated, familiar to workers who had served in the forces during the war and younger recruits who hailed from top academic institutions and would have been well-versed in the notion of seniority and rank within their respective research establishments. In this way, the built environment reflected the nature of nuclear science as the spatialisation, zoning, and orderliness of the town’s design embodied the cleanliness and sterility of the nuclear working environment, whilst the logics of “time, space and repetition” repeated the physical structure of the atom.³⁸⁶

Within the limited literature on urban nuclear spaces, Richard Hornsey has argued that the atomic structure served “as an unconscious symbolic device for imagining how social order might be structured at a range of scales” by fashioning new understandings of the urban environment. He argues that post-war housing reflected the make-up of the atomic structure, whereby “the repeated performance of routine, facilitated through the spatialization of social activities and their sequential co-ordination effected a vision of social stability and security.”³⁸⁷ Where Hornsey uses the model of the atomic structure to rationalise post-war attitudes to urban planning, I argue that the standardisation and ordering of the physical environment more accurately reflected the inherent logics of nuclear science, the systematic operation of the plant,

³⁸⁵ In this way, workers could be inspired by a visible career progression structure, encouraging ambitious workers to pursue the tangible rewards of a career in nuclear science. (P. Adamson, O. Adamson, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 20 August 2010, p. 21; Ross, ‘Nuclear Fission and Social Fusion’, p. 134.)

³⁸⁶ Hornsey, ‘Everything is Made of Atoms’, p. 97.

³⁸⁷ Likewise, the model of the atom as divided into a stable nucleus and multiple encircling electrons ratified the relationship between West Cumbria and the rest of the nation, embodying a hierarchy of both centre and periphery “that gave the two particles a formal equality within the maintenance of its equilibrium” and enshrining West Cumbria’s role within the nation. The atom therefore served as a metaphor for the scientific rationalisation of space both at the local level, with compartmentalised housing and ordered town-planning, and at the national level, with West Cumbria at the periphery performing vital work for the security of the nation. (*Ibid.*, pp. 97, 115).

and a military proclivity towards control and co-ordination. Whilst the atom may have acted as a (un)conscious device in this process, the built environment of Seascale reflected the scientific and military imperatives from which it emerged, borrowing from and extending established attitudes towards the rationality and routine of military and scientific establishments. This operated in tandem with post-war attitudes towards urban rationalisation, materially embedding social imaginaries of a desirable future manifested in the built environment.

2.3: Plant Design.

The nuclear imaginary also interacted with the built and non-built environment of the local landscape to produce new understandings of rurality. Through sympathetic and innovative design, the physical structure of the power plant delicately married urban and rural sensibilities. This helped embed nuclear imaginaries by proving that the nuclear industry could be consolidated alongside the rural landscape and therefore did not represent a threat to the inherent character and identity of the region. Local concerns regarding the imposition of urban life and modernity into the Cumbrian countryside had a historical pretext, dating back to the Victorian era where the 'Friends of the Lake District' sought to preserve the innate character of the area in the face of an invasion of tourists and a perceived urban blight.³⁸⁸ Attentive to these concerns, the structure of the plant sought not to dominate the landscape but re-imagine the relationship between the built and non-built environments, producing a design which embedded nuclear imaginaries by forging symbolic links between traditional rural identities and nuclear science.

³⁸⁸ H. Ritvo, *The Dawn of Green: Manchester, Thirlmere, and Modern Environmentalism* (Chicago: University of Chicago Press, 2009).

The ‘greening’ of nuclear science manifested in the design of Calder Hall, which reflected the beauty and rugged terrain of the natural landscape. This drew praise from contemporary commentators, who saw in the plant’s design a new, utopian vision of rural and urban harmony. The back cover of Paul Mauger’s 1959 book *Buildings in the Country* displayed an aerial view of Calder Hall and reflected positively on the architecture of the nuclear industry, acknowledging “we are beginning to see exciting shapes of rationally designed buildings rising from the flat riverside or coastal country in which most of them occur.”³⁸⁹ This curious integration between urban and rural sensibilities embedded nuclear imaginaries into local society as the plant became an accepted feature of local life. This is epitomised by the attitudes of the local public towards the plant. One interviewee commented that “you’ve got this outstandingly beautiful part of the world and then this whacking great nuclear power plant in the middle of it- it’s part of the scenery.”³⁹⁰ Whilst this sentiment superficially conveys the exclusivity of the two realms, a closer reading reveals the clear situation of the plant within the local landscape.

By producing a harmony between urban and rural contexts, the architecture of the industry embodied a delicate blend of urban and rural sensibilities: modernity married to tradition. This bolstered the utopian nuclear imaginary by pointing towards an imagined future where tradition and rurality coalesced with modernity and urbanity. Gabrielle Hecht has noted a similar emphasis on modernity and tradition within nuclear landscapes in France. She explained that French planners understood that “technological achievements did not have to be ugly- modernity could be beautiful” through the “harmonious marriage of the object and its

³⁸⁹ P. Mauger, *Buildings in the Country: A Mid-Century Assessment* (London: Batsford, 1959), p. 31.

³⁹⁰ Author’s interview with Isobel George, 6 March 2019.

natural setting.”³⁹¹ This was a key philosophy of planner-preservationists during the period, who sought to preserve the natural landscape with sympathetic and complimentary designs that embodied man’s dominance of nature, and his appreciation for it.³⁹² These imperatives were reflected in the design of Calder Hall. UK contemporaries such as impressionist landscape artist William Heaton Cooper lauded the plant’s “quiet power, lightness- both of weight and tone [and] spaciousness”, which sympathetically blended the “ancient countryside” with the “positively interesting buildings” of the power plant.³⁹³ Other reports emphasised “the elegant smokeless chimneys of the plutonium works”, which served as an ideal nesting spot for gulls and a variety of sea-birds.³⁹⁴ Planner preservationists lauded how the power station sat within its surroundings, marvelling at how “new shapes are evolving which relate not to human scale, but to cosmic forces, the sea, the clouds, and the mountains.”³⁹⁵ These buildings blended the power of the atom with the inherent power of nature, reflected in the Cumbrian fells and the Atlantic ocean. This helped resolve “any contradictions of the natural and new” as the architecture of the nuclear industry reflected the timelessness of the natural environment around it, at once a symbol of modernity and a product of nature.³⁹⁶ In this process, the design of the plant embedded nuclear imaginaries by harmoniously blending urban with rural: modernity with tradition. By producing a design which reconciled these contexts, this broke

³⁹¹ Similarly, Pearson has shown how, by “respecting the area’s natural beauty” and traditions, French nuclear sites ensured that “tradition and modernity would supposedly blend together in harmony.” (Pearson, *Mobilizing Nature*, p. 224; Hecht, *The Radiance of France*, p. 41.)

³⁹² Crowe’s 1959 study of power landscapes solicited, “how can we explore and enjoy the new experiences which science has opened up for us without losing touch with the organic world of which we remain a part? How can we explore, yet not destroy the wildflowers, travel faster than sound, yet still hear the birds’ song?” See, S. Crowe, *The Landscape of Roads* (London: Architectural Press, 1960), p. 13.

³⁹³ W. Heaton Cooper, ‘The Atomic Landscape’, *Manchester Guardian*, 16 October 1956.

³⁹⁴ This operated in marked juxtaposition with the visual effects of traditional fossil-fuelled industries elsewhere in the county. (G. Bruce, ‘Atom Village Beats that Quatermass Fear’, *Illustrated Magazine*, 3 March 1956, p. 39.)

³⁹⁵ S. Crowe, *The Landscapes of Power: From Detroit to Disney World* (London: Architectural Press, 1958), p. 30.

³⁹⁶ Matless, *Landscape and Englishness*, p. 304.

down the binaries between these categories and reconstructed them within an imagined vision of the region's future.

Materially synthesising urban and rural contexts, Sellafield sat within, and subtly altered, notions of rurality. This reflects the complexity of rurality, and its inherently malleable nature. David Matless has argued that there is a tendency to assume an inherent clash between rurality and modernity, a perception that “the natural and historical are at odds with the modern.”³⁹⁷ He reflects that cultural expressions of ruralism too often refer to “a simple, nostalgic and conservative longing for a ‘rural idyll.’”³⁹⁸ The plant's design, and public representations of it point to such understandings as reductionist, as Sellafield functioned as a transformative symbol of modernity, and yet compatible with traditional attitudes towards the rural landscape and the power of nature. This is epitomised in a local Whitehaven, Ennerdale, and Millom Council report from the period, which assessed the state of local industry. The report reads that:

“There is space enough in Cumberland where man can live and work, yet still have close contact with the countryside. He can glance up from his workbench and see the highest mountains in England; within a few minutes of leaving his work he can be by the side of some lonely lake shore, enjoying the pleasures of a romantic coastline with secluded coves, rocky headlands, and quiet beaches. The Cumbrian is a man of the hills and the sea, a twin heritage from which he draws strength and confidence. It is in the busy, modern factories which dot the coastal plains- in the very area where the Second

³⁹⁷ *Ibid.*; D. Matless, ‘A Geography of Ghosts: The Spectral Landscapes of Mary Butts’, *Cultural Geographies*, 15.0 (2008), pp. 335- 358; J. Lowerson, ‘The Mystical Geography of the English’, in B. Short, (ed.), *The English Rural Community* (Cambridge: Cambridge University Press, 1992), pp. 152- 174.

³⁹⁸ Matless, *Landscape and Englishness*, p. 34.

Industrial Revolution began where the new form of power was first put to peaceful uses- man is forging a bright, purposeful future.”³⁹⁹

This extract demonstrates how the nuclear industry was seen to successfully integrate within localised notions of rurality, embedding socio-economic and cultural imaginaries of a regional future enshrined through the development of nuclear technologies. This was a social script that had distinct parallels in other nuclear communities throughout Europe. Hecht has shown how the Marcoule nuclear site in the South of France “blended harmoniously with traditional lifestyles” by bringing “new people, virtually unlimited employment, and regional modernisation.”⁴⁰⁰ The Sellafield region therefore hosted a new paradox whereby nuclear science moulded with the old, rural way of life of existing citizens, as the successful integration of nuclear workers into the local community saw nuclear technologies become a natural extension of the region’s pre-existing rural identity.⁴⁰¹ This process was augmented by the successful integration of plant workers within the rural community which substantiated socio-cultural imaginaries of urban/rural integration.

2.4: Migration.

Sellafield brought with it an influx of scientific specialists from all over the country, inscribing a new nuclear community over the top of the pre-existing rural population. Despite the social friction this may have entailed, the two communities combined relatively well. The harmony between the two social groups helped embed visions of a desirable local future as the new arrivals assimilated within the existing community structure and shared common interests

³⁹⁹ Whitehaven Archives and Local Studies Centre, ‘Cumberland: For Industrial Expansion and Development’, (Nuclear History Folder).

⁴⁰⁰ Hecht, *The Radiance of France*, pp. 209f.

⁴⁰¹ *Ibid.*, p. 212.

with the locals. Newspapers reported that “the two villages are fusing into one... the atom has become a part of their lives,” referring to “the village where plutonium must mix with ploughing.” They commented on the unique context whereby “mathematics, plutonium and ballet have been asked to fuse, permanently with manure, ploughing and beagles.”⁴⁰² Despite the apparent paradox this entailed, many members of the community found this transition fairly straightforward, finding common ground with amenable and open-minded workers. Reports from the time described how “the men who harness the plough, made friends with the men who harness the atom”, whilst oral interviewees emphasised that locals and newcomers “muddled along surprisingly well” and made “wonderful neighbours.”⁴⁰³ The *Manchester Guardian* remarked that:

“It is hard to find people who are prepared to say unkind things about them... people seem to like the atomic engineers... They do normal things like going to church or playing cricket with the village teams. Their children go to the same schools... Though it may be surprising that a scientific community can be grafted onto another different one in this way, there is, of course, no real evidence that technologists are incompatible with the rest of the community.”⁴⁰⁴

These examples suggest that the incumbent nuclear scientists and engineers assimilated relatively comfortably within the region’s existing identity and rural sensibilities. This successful ingratiation built upon positive local responses to the physical environment of the nuclear plant, embedding imaginaries of the nuclear industry as a welcome, and accepted

⁴⁰² *News Chronicle and Daily Dispatch*, 15 October 1956; G. Bruce, ‘Atom Village Beats that Quatermass Fear’, *Illustrated Magazine*, 3 March 1956, p. 39.

⁴⁰³ G. Bruce, ‘Atom Village Beats that Quatermass Fear’, *Illustrated Magazine*, 3 March 1956, p. 37; D. Wooley, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 6 August 2010, p. 4.

⁴⁰⁴ Author Unknown, *Cumbrian Life* (March 2016), p. 13.

feature of local life. In particular, the cultural outlets favoured by the young, vibrant workforce endeared them to the existing village community by providing a wealth of local entertainment and a series of cultural opportunities which further endorsed the utopian nuclear imaginary.

2.5: Leisure Activities.

A series of sports facilities and social clubs were set up to entertain the new workforce, producing a vast array of social activities within the local community. These cultural opportunities bolstered imaginaries of nuclear utopianism, offering an (ostensibly) higher standard of living as educated elites brought with them a variety of physical and cultural pastimes which broadened the cultural and intellectual horizons of the area. The extreme isolation of the West Cumbrian coastline offered very little in the way of cultural life or sporting opportunities. Owing to the dearth of transport infrastructure and the extreme physical isolation of the plant, workers faced travelling hours afield via infrequent rail services to visit local cities and engage in favoured activities such as dancing, singing, or visiting the theatre. Finding themselves transplanted from familiar surroundings and injected into an apparent cultural wilderness that bore very little relation to the university campuses and urban environments to which they were accustomed, workers formed social groups and sporting clubs designed to combat the boredom of rural life and social isolation of an unfamiliar living environment. A former worker explained that “the villages were quite isolated [so] we all really mixed in... we were all people who were out on our own, well away from relatives and so you relied on friends.”⁴⁰⁵ Often young, single, and affluent, workers created a wide array of social groups, many of which fell under the umbrella of SASRA, the newly formed Sellafield Area

⁴⁰⁵ D. Wooley, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 6 August 2010, p. 17.

Sports and Recreation Association, which was designed by the UKAEA as a social hub within the community.

SASRA was a UKAEA initiative which was designed to encourage both nuclear and native communities to mix. This was a broader imperative seen at other nuclear sites such as Dounreay, where the UKAEA emphasised the “urgent need” for a recreational centre, designed to “encourage and co-ordinate recreational and cultural activities, to create a proper corporate spirit amongst our own staff, and at the same time to enable them to intermingle sufficiently and satisfactorily with the local people.”⁴⁰⁶ This organisation was backed by generous funding from the UKAEA, hosting “gymnastics and keep fit classes on the Seascale playing field [and] nationally renowned opera and theatre companies in the village hall.”⁴⁰⁷ These developments were warmly welcomed by the local community, and contributed to a strong degree of affability between the local residents and the nuclear workforce.

The local community benefitted from the array of cultural opportunities brought about by the nuclear workforce, which helped cultivate an imaginary of the region’s vibrant and dynamic future. The local media celebrated the “amazing variety of social activities” hosted by the nuclear industry, with “classes of one kind or another held every night of the week.”⁴⁰⁸ Residents too, seemed overwhelmingly positive about these changes. They explained that the village became “a terrific place to live in: the school was good, the atmosphere was good... we had gala weeks, with parades running through the village, fancy dress parades from the school or the Windscale Club, we had a whole week of festivities of one sort or another in the

⁴⁰⁶ National Archives, ‘Note: Dounreay Recreational Projects, 1957/8’, (AB 8/637 24).

⁴⁰⁷ SASRA is still in existence and continues to enjoy the financial backing of Sellafield. (Author Unknown, *Cumbrian Life*, March 2016, p. 13.)

⁴⁰⁸ *Cumberland Evening Star and Mail*, 13 November 1958.

village.”⁴⁰⁹ Locals reflected that “the social opportunities were amazing and typical of ex university students,” recalling “ladies evenings once a year, buffet suppers in the hall, good speakers from all over the country, regular lectures, etc.”⁴¹⁰ Citizens explained that life during this period “was magical, absolutely magical, you couldn’t have asked for a more supportive community, there was always something going on all the time.”⁴¹¹ Provided with good living conditions, generous pay, and free time, workers were able to seek leisure activities and happiness in their new community. They were able to spontaneously organise various leisure pursuits which physically enacted, confirmed, and reinforced the imaginary of the nuclear industry as a welcome and natural feature of everyday life. In so doing, the workforce performed the imaginary of nuclear utopianism to the local public, who subscribed to, and re-enacted this imaginary through their willing participation in these activities.⁴¹² This was further augmented by the construction of a brand-new theatre in nearby Rosehill, commissioned by local industrialist Sir Nicholas Sekers to host the arts and attract international performers to the westernmost corner of Cumbria. Suddenly capable of attracting leading lights from the world of theatre, opera, and classical music, Rosehill further contributed to the embedding process by providing a standard of entertainment previously unimaginable for the local community.

The sudden influx of university educated scientists and academics into the area provided sufficient demand for a new theatre, which was built with the support of the

⁴⁰⁹ D. Wooley, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 6 August 2010, p. 15; M. Todd ‘Ambleside Oral History Group’, interviewed by J. Pilgrim, 2013.

⁴¹⁰ D. Wooley, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 6 August 2010, p. 17; Rushworth, *Atom Kids*, p. 5.

⁴¹¹ L. Johnston, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 16 December 2010, p. 22.

⁴¹² In this context, the nuclear industry functioned as a benevolent social entity which drew upon the models of industrial philanthropy modelled by the Quaker Cadbury and Rowntree families, concerned with the quality of life of its workers and the local population.

UKAEA.⁴¹³ The theatre enabled the region to transcend its geographical marginalisation, becoming a venue of national acclaim, lavishly furnished by one of the country’s leading theatre and film designers Oliver Messel, with support from the Royal Opera House London and the Rothschild family, (see Fig. 8.0).⁴¹⁴



Fig. 8.0: ‘Rosehill Theatre, Moresby, Whitehaven’, <cinematreasures.org/theaters/23012> [accessed 23 February 2020].

The theatre hosted a remarkable array of international talent, attracting performers such as Dame Peggy Ashcroft, Benjamin Britten, and Mstislav Rostropovich.⁴¹⁵ These events were hugely popular with the nearby Sellafield workforce, with forty-one of the forty-three performances in the first year being sell-outs. Sekers considered “our keenest and most enthusiastic and critical supporters are the members of the Atomic Station”, who provided “the financial and physical resources to present many types of event that are beyond the capacity of

⁴¹³ The theatre is still supported by Sellafield, who are the foremost capital investor in the theatre. (Whitehaven Archives and Local Studies Centre, ‘Personal Correspondence between Sir Nicholas Sekers and Dr. Derek Ockenden,’ 14 July, 1960, *SASRA Correspondence 1959- 1967*, (YDSO 121/15/8/1).

⁴¹⁴ J. Blackadder, *Rosehill: The Story of a Theatre 1959-2009* (Carlisle: Bookcase, 2009).

⁴¹⁵ *Ibid.*

any other local organisation.”⁴¹⁶ The presence of internationally acclaimed musicians, performers, and orchestras in the remote fells of West Cumbria represented a huge coup for the local area, who hitherto had not been used to visiting performers of any kind. Local residents gushed that “Rosehill has transformed our existence in West Cumberland; it has given us a source of entertainment of a quality and variety previously quite beyond our reach.”⁴¹⁷ This shows how the nuclear project intertwined with cultural imaginaries of regional prosperity, becoming a vehicle for the intellectual and social betterment of the region.

2.6: Education.

Education served a vital function in helping ingratiate the incumbent nuclear workforce and the local Cumbrian public, as these divergent social groups overcame their demographic diversity in the pursuit of better education facilities for their children. The provision of education served as “a centre of common interest for both [nuclear and non-nuclear] communities,” with one local headmaster explaining that “the school has played a part in fusing the two elements of the population together.”⁴¹⁸ For local residents, the pursuit of a higher standard of education constituted “solid proof that much good could come to the village through the newcomers”, cementing an understanding that the nuclear project could function alongside rural life, harmonising together in the pursuit of desirable local futures.⁴¹⁹ This was particularly evident in their vigorous combined efforts to petition the Ministry of Education for better education facilities and funding to meet the growing need amongst the expanding population.⁴²⁰

⁴¹⁶ Whitehaven Archives and Local Studies Centre, ‘SASRA Correspondence 1959- 1967: Personal Correspondence between Sir Nicholas Sekers and Dr. Derek Ockenden,’ 14 July 1960, (YDSO 121/15/8/1).

⁴¹⁷ *Ibid.*

⁴¹⁸ G. Bruce, ‘Atom Village Beats that Quatermass Fear’, *Illustrated Magazine*, 3 March 1956, p. 39.

⁴¹⁹ *Ibid.*

⁴²⁰ *Ibid.*

Working alongside one another, the nuclear workforce and local people were able to obtain significant investment in the county's education facilities, which could not cope with the influx of children brought about by the nuclear project. Between 1947 and 1961, the total population of Seascale grew by over 1,200 with similar growth in neighbouring towns and villages, placing severe strain upon the county's educational facilities.⁴²¹ Between 1951 and 1962, the number of children at Seascale Primary School grew from 181 to 339, with numbers at neighbouring Gosforth also growing from 94 to 160.⁴²² To cope with this growth, the 1950s saw the construction of one comprehensive, four secondary, four junior and five infant schools, "in order to accommodate the large increase in the number of children brought about by the construction of the Atomic Energy factory at Sellafield."⁴²³ A former teacher explained that these new schools enjoyed considerable funding "to accommodate and keep happy the scientists and their children."⁴²⁴ One of these junior schools, (Fig. 9.0) was located in the village of Seascale, whereas elsewhere investments in education saw the construction of secondary and adult education facilities (such as depicted in Fig. 10.0) within the neighbouring town of Whitehaven.

⁴²¹ Whitehaven Archives and Local Studies Centre, 'Seascale: Its Growth and Development by Adele Parker', (Seascale Folder).

⁴²² Bracey, *Industry and the Countryside*, p. 165.

⁴²³ In his 1963 sociological study of industrial communities in rural Britain, Bracey reflected that "the effect on local education of the employment by the Atomic Energy Authority of highly qualified professional staff has speeded up the reorganization of secondary education in the southern part of the county... and it has enabled the building of many Junior and Infant schools to proceed quickly." See, Bracey, *Industry and the Countryside*, p. 166; Whitehaven Archives and Local Studies Centre, 'Seascale: Its Growth and Development by Adele Parker', (Seascale Folder).

⁴²⁴ Author's interview with Isobel George, 6 March 2019.

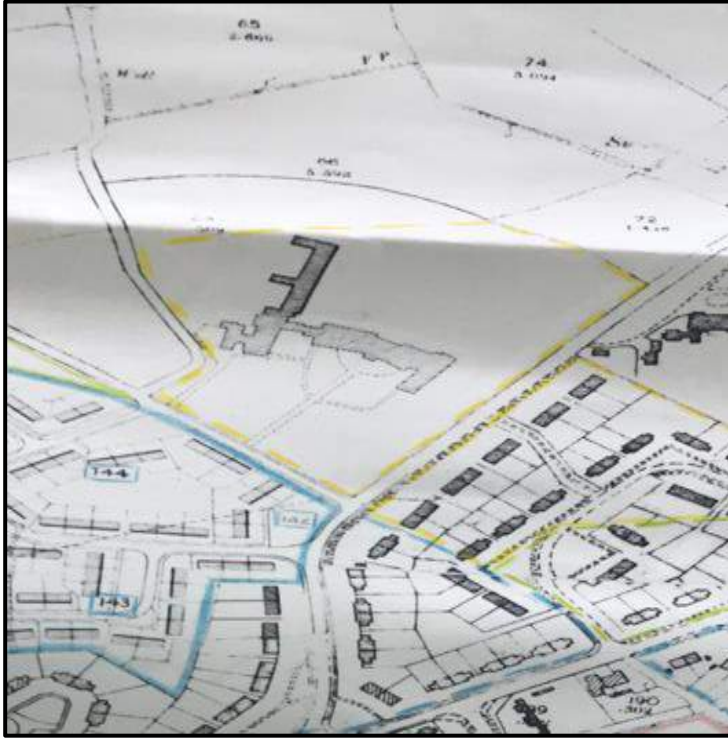


Fig 9.0: National Archives, (MAF 107/75), 'Cumberland County Council Planning Department Amended Layout, Seascale.' Location of new elementary school in Seascale.

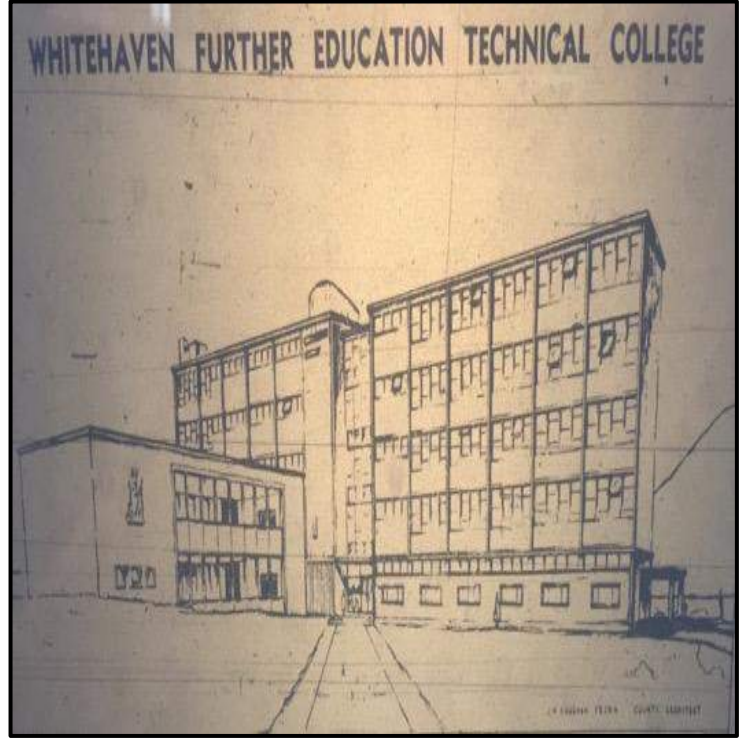


Fig 10.0: *West Cumberland News*, 3 October 1953.

These developments transformed the quality of education enjoyed by local children and placed a much greater emphasis on its role within the local community. This demonstrates how the imaginary of nuclear utopianism functioned as both a material and social agent: embedded as an idea into local culture, then as a practice and material reality in the form of educational facilities, which in turn extended the logic of the imaginary through space, into the future. The development of educational facilities and schools brought about a dramatic change in local attitudes towards education which became tied up in imaginaries of the region's future. In this way, "science and technology [became] enmeshed in performing and producing diverse visions of the collective good", extending (and re-embedding) the logic of nuclear utopianism into an imagined future of regional prosperity through scientific and technical expertise.⁴²⁵ Local

⁴²⁵ Jasanoff, 'Future Imperfect', p. 15.

councillors expressed that the county had a “wonderful opportunity to ride to success on the back of nuclear engineering” by developing schools and colleges to “establish a national reputation in the fields of atomic energy and nuclear engineering.”⁴²⁶ Newspaper reports spoke of the “fast growing need in West Cumberland for the study of industrial science,” with educational reform forming part of a concerted “atomic future plan” for the area.⁴²⁷ To pursue this end, local schools placed an emphasis on scientific and technical subjects such as physics and woodwork, which were designed to foster the technical expertise required for the future running of the plant.⁴²⁸ A former pupil explained that “I wanted to get into engineering. I took the appropriate subjects, technical drawing, engineering, woodwork, that sort of thing- trying to pick up an apprenticeship [at Sellafield].”⁴²⁹ Here, we see how education sat at the heart of plans for regional regeneration, as the pursuit of the technical and scientific excellence required for the plant became a key imperative of local schooling. It seems that this extension phase had a marked impact upon the local community, as the emphasis on teaching and learning contributed to a dramatic shift in local attitudes towards education, which was placed at the heart of the economic and social recovery of the area.

Historically, education had been treated as something of a distraction amongst sections of the local community, for whom it represented a loss of income as children qualified for work at a later age.⁴³⁰ However, the arrival of the nuclear workers placed an increased emphasis on education and saw local children aspire to technical or scientific roles within the plant. Local teachers reflected that their arrival “brought a completely new emphasis in the school really”

⁴²⁶ *Cumberland Evening Star and Mail*, 15 November 1958.

⁴²⁷ *Ibid.*; *West Cumberland News*, 3 October 1953.

⁴²⁸ *West Cumberland News*, 3 October 1953.

⁴²⁹ D. McConnell, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 8 February 2010, p. 3.

⁴³⁰ Previously, villagers had treated schooling with a degree of trepidation, lest their children obtain a place at Grammar school and earn an income at a much later age than their farming contemporaries. (Whitehaven Archives and Local Studies Centre, ‘D. Hay, ‘Annual Report: 1955-56’, p. 7.)

as pupils “are now keen to receive homework and their parents sometimes come and ask the headmaster what books they should read to succeed.”⁴³¹ This formed part of a radical shift in social attitudes as children became more attuned to the social prospects afforded by the nuclear industry. One local headmaster recognised that “the children of the newcomers have had a notable effect on the children of older residents: they are becoming more eager to work, and are showing more interest in people and events” outside the local area.⁴³² Here we see how the emphasis placed on education by the arrival of the nuclear industry extended the nuclear imaginary and produced new visions of social and cultural progression, as the socio-economic horizons of the region gradually expanded outwards.

Newspaper reports explained that the shelves of local grocers and newsagents started selling “journals on engineering, electronics, and the atom as well as national magazines and newspapers” as the local public pursued educational literature.⁴³³ This shift was not purely amongst the scientific community and is reflected in the archival records of local libraries where the librarian made repeated requests for additional copies of scientific literature, vigorously consumed by the local community. In his annual report for 1955-56, he reflected, in previous years, locals “were not interested in the history and technical literature of their craft”, but “the influence of Sellafield... brought about an increasing demand for scientific and technical literature.”⁴³⁴ This reflected the cultural shift brought about by the industry, as the imaginary of nuclear utopianism extended and re-embedded visions of social progress attained through the pursuit of nuclear science.

⁴³¹ Bracey, *Industry and the Countryside*, p. 168; Author’s interview with Isobel George, 6 March 2019.

⁴³² Bracey, *Industry and the Countryside*, p. 168.

⁴³³ G. Bruce, ‘Atom Village Beats that Quatermass Fear’, *Illustrated Magazine*, 3 March 1956, p. 39.

⁴³⁴ Whitehaven Archives and Local Studies Centre, ‘D. Hay, ‘Annual Report: 1955-56’, p. 7.

The local public revelled in the improvement of local education, which contributed to a sense of local pride which re-embedded the utopian nuclear imaginary. Public enthusiasm for the improvement of educational facilities can be traced in the rhetoric of council reports. The local council report for the year 1955-56 identified that the “rapid evolution in our educational provision has ensured that the number of children remaining at school until 16 is increasing faster than anyone prophesised [and] the number of young men and women going on to a period of full-time university and technical education is rocketing.”⁴³⁵ This growth was such that plans were being drawn up for a university in West Cumbria, given government backing as part of the suggestions of the Robbins Report of 1963.⁴³⁶ Similar narratives were also found within regional media reports. Newspaper articles referred to Seascale as “Britain’s Brainiest Village”, whilst the local media reflected this rhetoric, constructing imagined and fanciful narratives of everyday life in “Boffinville.”⁴³⁷ These narratives at once embedded and extended the utopian nuclear imaginary at the local level, pointing to the decisive changes to the region’s prosperity brought about by the nuclear plant, which had provided the local community with a higher degree of social mobility.

The arrival of the nuclear industry “considerably widened” the career options of local children, with the nuclear plant promising almost “unlimited opportunities for careers in science and administration.”⁴³⁸ This was bolstered by an apprenticeship scheme, made available for local students. Co-sponsored by the council and UKAEA, a bursary was

⁴³⁵ *Ibid.*, pp. 10f.

⁴³⁶ *Ibid.*

⁴³⁷ *Manchester Guardian*, 16 October 1956; *News Chronicle and Daily Dispatch*, 1 October 1956; G. Bruce, ‘Atom Village Beats that Quatermass Fear’, *Illustrated Magazine*, 3 March 1956, p. 39; *Cumberland Evening Star and Mail*, 13 November 1958; D. Wooley, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 6 August 2010, p. 12.

⁴³⁸ Whitehaven Archives and Local Studies Centre, ‘Correspondence between Mr Daniel Hay and Mr J Cunningham,’ 17 October 1973, (Social Impact Folder.)

established for 160 “especially keen boys with outstanding ability” who would be “encouraged to study for university degrees... and craft diplomas.”⁴³⁹ Indeed, the first recipients of this stipend were featured in a double-page spread in the local newspaper (Fig. 11.0), openly lauded as “the atomic energy plant engineers of the future” who “will rank second only to the scientists.”⁴⁴⁰ This eulogistic rhetoric conveys not only the social deference afforded by the local public towards the nuclear project, but the plant’s transformative role in local life.

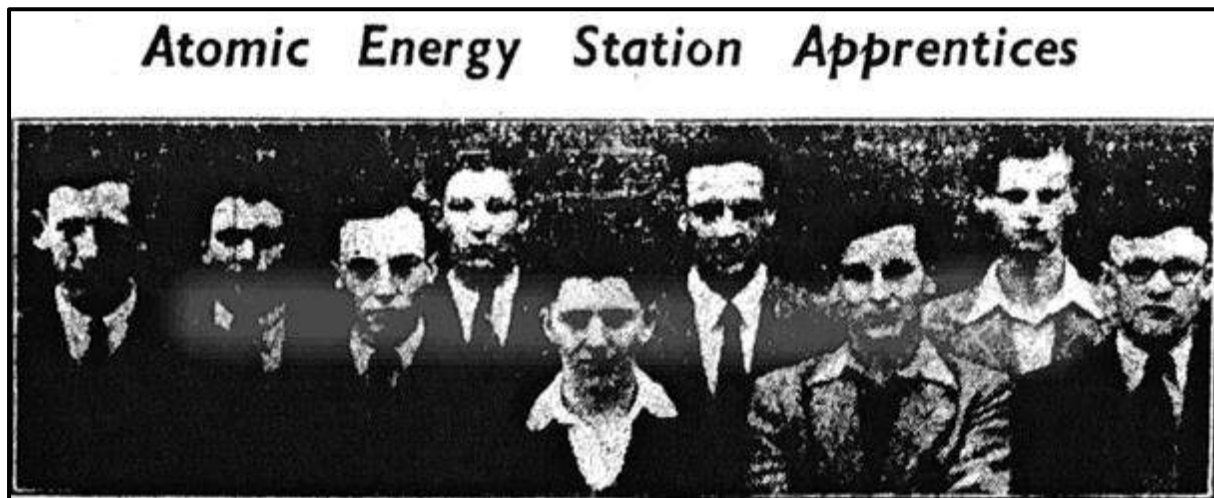


Fig 11.0: *Whitehaven News*, 7 September 1950.

For a community with a tradition of low-paid manual labour, Sellafield offered a greater degree of social mobility as workers employed in the operational side of the plant gained a well-paid, long-term, and skilled trade, whilst academically gifted students had the opportunity to qualify for more highly paid scientific work. This change extended the imaginary of nuclear prosperity by ensuring that young men no longer had “to leave home to search the South for a good job with good prospects.”⁴⁴¹ Local newspaper reports commended the “steadily

⁴³⁹ Despite the gender specific language used in this report, I have found no evidence that these bursaries were unavailable to local girls, a large number of whom also qualified for work at Sellafield. (*Whitehaven News*, 7 September 1950; D. McConnell, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 8 February 2010, p. 3.)

⁴⁴⁰ *Whitehaven News*, 7 September 1950.

⁴⁴¹ *Daily Mirror*, 5 September 1950, p. 2.

increasing stream of local young men and women qualifying for jobs in the higher grades at Sellafield”, referring to “Cumberland’s rapidly developing industrial machine.”⁴⁴² Locals commented that “in the early 1950s it [Sellafield] was viewed very optimistically... it gave a whole generation, including my dad, an opportunity undreamt of for working class families.”⁴⁴³ Local man Dale McConnell summarised this position, explaining that for ambitious young boys, “ultimately the aim was to get into Sellafield.”⁴⁴⁴ By providing working-class families with direct opportunities for well-paid, skilled employment, Sellafield not only became synonymous with a prosperous future, but with previously unattainable goals such as social mobility and class migration. This was again echoed by local newspaper narratives, which stated that “in Whitehaven is being born a new way of life that offers prosperity and sublimation to unborn generations.”⁴⁴⁵ Here we see how the education functioned as part of the utopian nuclear imaginary, simultaneously extending and re-embedding this imaginary by offering a greater degree of social mobility to local children, who were offered not only a prosperous future, but the opportunity to transcend their social status by pursuing a career at Sellafield.

As this section has shown, the built environment of the nuclear industry embedded and extended imaginaries of nuclear utopianism, positioning the nuclear project at the heart of the region’s future prosperity. Thus far, we have explored how the nuclear project assimilated within the physical and cultural landscape of the area, as the socio-cultural changes it wrought

⁴⁴² *Cumberland Evening Star and Mail*, 13 November 1958.

⁴⁴³ Rushworth, *Atom Kids*, p. 5.

⁴⁴⁴ Others emphasised the permanence of these imaginaries, commenting that “it’s where the good wages come from. I met someone who described their new neighbours by saying ‘oh and they’ve both got good jobs at Sellafield you know.’ This is the height of Millom’s ambition. They’ve made it, they’ve both got good jobs at Sellafield [laughter].” Author’s interview with Isobel George, 6 March 2019; D. McConnell, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 8 February 2010, p. 2.

⁴⁴⁵ *Cumberland Evening Star and Mail*, 13 November 1958.

combined with and extended the utopian imaginaries it engendered. The following section of the chapter will trace the subtle patterns of resistant sentiment which emerged at the local level, pointing to a deeper, more problematic relationship between nuclear technologies and the local community. This points towards the emergence of localised resistance amongst sections of the community, particularly disaffected groups such as local landowners forced to sell their land, farming communities who lost arable fields and livelihoods, and sections of the local community for whom the arrival of urban infrastructure and large swathes of migrant workers represented a subversion of local identities and rural sensibilities. This suggests that local resistance towards the nuclear project was more heavily nuanced than the oft-cited ‘NIMBY’ (Not-In-My-Backyard) syndrome, as cultural attitudes towards the nuclear project intersected with notions of local identity and rurality, producing dystopian imaginaries of nuclear science as culturally and physically subjugating the local community.⁴⁴⁶

2.7: Resistance.

Whilst localised resistance can be read within traditions of opposition towards the electricity industry, affiliated with desires to preserve the character and protect against the spoliation of rural Britain, it is clear that many of these anxieties had distinct nuclear characteristics and should be read as concerted efforts to resist, or redefine imaginaries of nuclear technologies.⁴⁴⁷ Although these efforts appeared in the minority, it is nevertheless important that these be taken seriously as localised attempts to subvert the “unanimity of

⁴⁴⁶ For further reading on the NIMBY phenomenon, see I. Welsh, ‘The NIMBY Syndrome: Its Significance in the History of the Nuclear Debate in Britain’, *The British Journal for the History of Science*, 26.1 (1993), pp. 15- 32; M. Foley, ‘No Nukes and Front Porch Politics: Environmental Protest Culture and Practice on the Second Cold War Home Front’, in E. Conze, M. Klimke, and J. Varon, (eds.), *Nuclear Threats, Nuclear Fear and the Cold War of the 1980s* (Cambridge: Cambridge University Press, 2017), pp. 186- 205; Benford, Moore, Allen-Williams, ‘In Whose Backyard?: Concern About Siting a Nuclear Waste Facility’, *Sociological Inquiry*, 63.1 (1993), pp. 30- 48.

⁴⁴⁷ Welsh, *Mobilising Modernity*, p. 22.

dominant symbolic representations” of the nuclear.⁴⁴⁸ In fact, given the deep-seated power held by the nuclear industry and government during this period, I argue that these expressions should be read as particularly significant, given the social context from which they emerged. This alludes to a much more delicate co-production of nuclear meaning-making between society and state, whereby ordinary people exercised agency over the content and dissemination of nuclear culture and local attitudes could challenge the dominant imaginaries cultivated by the state. Whilst these efforts differed greatly from the more direct forms of opposition which the nuclear industry later encountered, the quiet and subtle articulation of resistance at the local level comprises a significant, yet omitted part of the history of British responses to nuclearisation. This resistance suggests that the socially deterministic binaries of ‘trust in technology’, ‘the age of innocent expectation’, and ‘peak modernity’ identified in the previous chapters may cast too simplistic an understanding of the multitude of British cultural responses to the nuclear age, particularly when we dig down to the local level.⁴⁴⁹ This thesis sits within a broader body of work calling for a more comprehensive understanding of local

⁴⁴⁸ These expressions of resistance take on a deep significance as some of the few examples of the nuclear industry being challenged during the early period of the atomic age, and as such, attest to a more complex pattern of local responses, as citizens articulated forms of nuclear resistance and imaginaries of dystopian nuclear futures. (Author’s interview with Isobel George, 6 March 2019; E. Dawson, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 13 July 2010, p. 23; Author unknown, ‘A Walk Down Memory Lane: Phil Hallington and David Moore Share their Calder Hall Memories’, *Sellafield Magazine*, 5.0 (October 2016), <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/625743/sellafield-magazine-issue-5.pdf> [accessed 18 February 2019], pp. 19ff; Welsh, *Mobilising Modernity*, p. 22.

⁴⁴⁹ O’Riordan, ‘The Prodigal Technology: Nuclear Power and Political Controversy’, *The Political Quarterly*, 59.2 (1988), pp. 161- 177; Blowers, *The Legacy of Nuclear Power*; Welsh, *Mobilising Modernity*, p. 17.

attitudes towards nuclear facilities.⁴⁵⁰ This ultimately points to the emergence of localised resistance towards the nuclear industry as sections of the local public contested the imaginary of nuclear prosperity and the desirable futures Sellafield was seen to represent. Here, the sociotechnical imaginary offers a nuanced framework around which to think through the co-production of nuclear culture by the state and broader public at national and localised levels, ultimately pointing to the dynamic interplay between these elements in the production of nuclear culture.

This suggests that STIMs are an active component in the production of nuclear culture. These are social agents, as Jasanoff claims, but they are constructed and illusory, and exclusionary. As this section demonstrates, the ‘embedding’ and ‘extension’ phases Jasanoff outlined can do harm and subvert aspects of the original imaginary, ultimately producing and helping embed resistant imaginaries. By historicising this process, we gain a greater understanding of the production and circulation of nuclear culture, particularly at the localised

⁴⁵⁰ This aligns recent thinking regarding the plurality of nuclear culture(s) with insights from STS studies, as scholars have become more attuned to the social, cultural, and structural bases for social responses to nuclear technologies, identifying issues of trust, power imbalances, notions of identity, and geographical components of risk in shaping localised responses. For further reading on trust, see Wynne, ‘May the Sheep Safely Graze?’ in Lash, Szerynski and Wynne, *Risk, Environment, and Modernity*, pp. 44– 83; For power imbalances, see R. Benford, H. Moore, and J. Allen Williams, ‘In Whose Backyard?: Concern About Siting a Nuclear Waste Facility’, *Sociological Inquiry*, 63.1 (1993), pp. 30- 48; For identity, see K. Bickerstaff, “‘Because We’ve Got History Here’’: Nuclear Waste, Cooperative Siting, and the Relational Geography of a Complex Issue’, *Environment and Planning A*, 44.0 (2012), pp. 2611– 2628; For the geographical components of risk, see K. Parkhill, D. Venables, and P. Simmonds, ‘From the Familiar to the Extraordinary: Local Residents’ Perceptions of Risk When Living With Nuclear Power in the UK’, *Transactions of the Institute of British Geographers*, 35.1 (2010), pp. 39- 58; D. Orsini, ‘Signs of Risk: Materiality, History, and Meaning in Cold War Controversies over Nuclear Contamination,’ *Comparative Studies in Society and History*, 62.3 (2020), pp. 520– 550; X. Fang, ‘Local People’s Understanding of Risk from Civil Nuclear Power in the Chinese Context’, *Public Understanding of Science*, 23.3 (2014), pp. 283– 298; D. Venables, N. Pidgeon, K. Parkhill, et al., ‘Living with Nuclear Power: Sense of Place, Proximity, and Risk Perceptions in Local Host Communities’, *Journal of Environmental Psychology*, 32.0 (2012), pp. 371- 383; I. Welsh, ‘The NIMBY Syndrome: Its Significance in the History of the Nuclear Debate in Britain’, *The British Journal for the History of Science*, 26.1 (1993), pp. 15- 32.

West Cumbrian level where many of the interactions between nuclear technologies and the British public were first played out.

Whilst imaginaries of nuclear utopianism related to the social, economic, and physical regeneration of the area, these attitudes were subject to contest and redefinition within sections of society. Specifically, nuclear resistance was frequently animated by place, and clashes over the use and meaning of land. Whilst the physical nuclear landscape reflected imaginaries of utopianism and prosperity to one section of society, it also embodied one of subjugation and scientific invasion to others, as local residents articulated resistant imaginaries centred around the industry's impact on physical place and historic notions of local identity. Specifically, localised pockets of resistance emerged through the industry's purchase of farmland, which overrode local attachments to place and subverted entrenched agricultural identities. As land which had historically made up family holdings was taken by the MoS, farming communities lost income, workers, and a central tenet of their socio-cultural identity to the nuclear industry.

Issues of land purchase and access combined with broader anxieties over the profitability of local farming to produce a hotbed of resistance towards the nuclear industry amongst local farming communities. Faced with little recourse or opportunity to appeal the decision to strip them of their land, local farming communities performed this resistance in indirect ways that are not always evident to the historical researcher until they press into local attitudes and subjectivities. In the following pages, I will show how sections of the local community resisted the imaginary of nuclear utopianism, forging their own imagined dystopian futures of the nuclear industry as a subversion of traditional attachments and meanings of place, and an urban imposition upon the rural landscape and character of the area.

2.8: Land Purchase.

The construction of the plant and the requisite housing and infrastructural developments required a considerable amount of land, much of which was owned by local citizens. Whilst the MoS owned land to the North-West of the River Calder where the Windscale site was based, the maps below show that the remaining land to the South (where Calder Hall would be situated, Fig. 12.0) and the intended site for worker housing (Fig. 13.0) remained in the ownership of local farmers and residents.

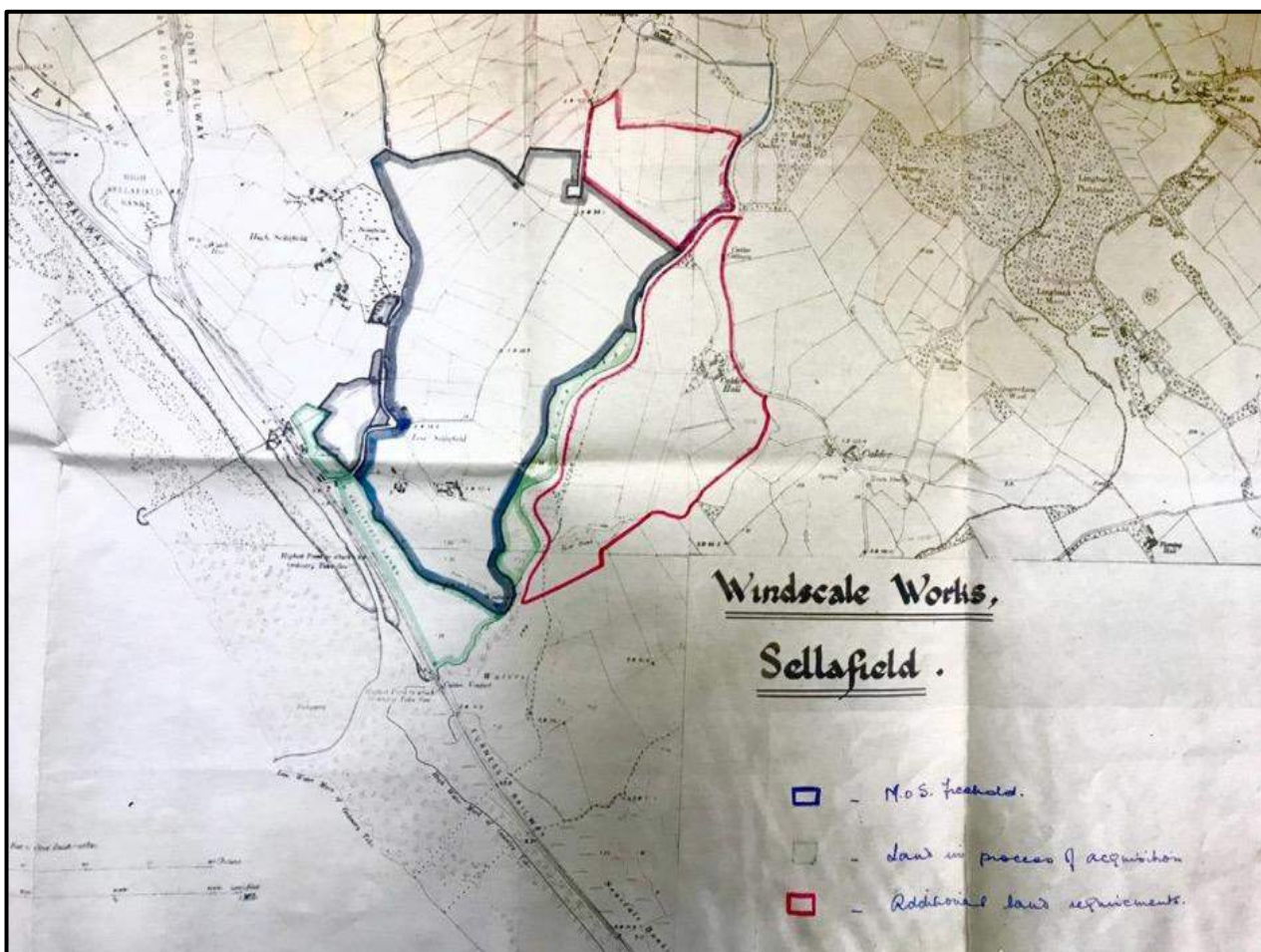


Fig 12.0: National Archives, (MAF 107/75), 'Windscale Works: Sellafield'. Land in blue indicates "Ministry of Supply Freehold" (Windscale site). Green, "Land in procession of acquisition". Red "Additional land requirements" (future Calder Hall site).

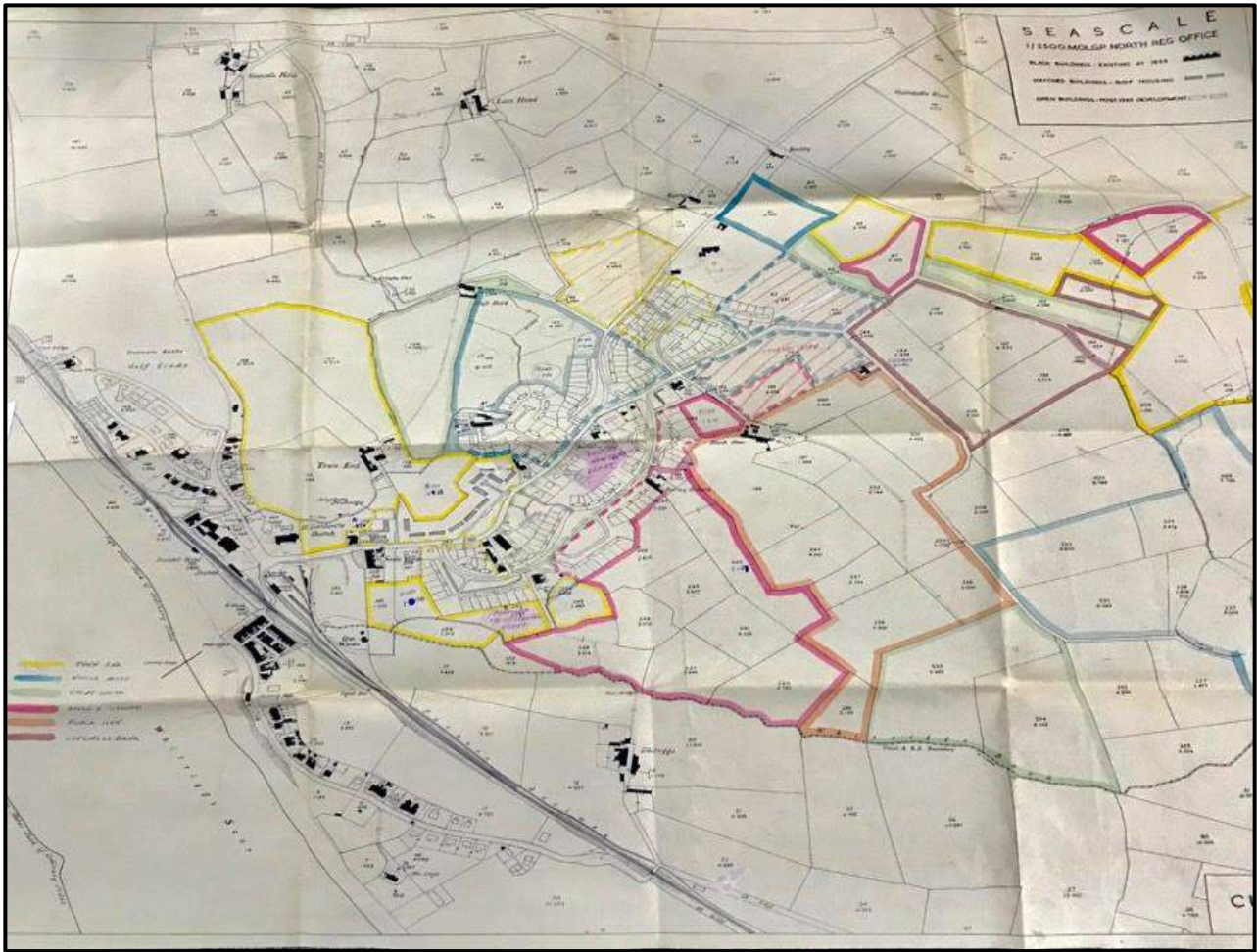


Fig 13.0: National Archives, (MAF 107/75), 'Map of Land Acquisition: Seascale'.
Coloured plots indicate land procured from various local farms, named in key.

In 1947 the MoS began evicting tenants from their homes and placing compulsory purchase orders upon areas of land required for the nuclear project. Government ministers ordered the requisition of local land without delay, extracting pressure upon local councillors by emphasising Sellafield's "supreme national importance."⁴⁵¹ Ministers suggested that local farm-land deemed "not particularly well-farmed or of good inherent character" be "made available... even to their elimination as units."⁴⁵² They impressed the short time scales required, reminding local officials that "I do not need to explain to you how urgent is the job

⁴⁵¹ National Archives, 'Seascale Development, 17 January 1950', (MAF 107/75).

⁴⁵² National Archives, 'Seascale', (MAF 107/75).

of building about fifty houses for employees of the Department of Atomic Energy”, unsubtly suggesting that they give “favourable consideration” to government requests.⁴⁵³ In the face of such ardent sentiment, local councillors consented to do “all in [their] power to assist” the development of the atomic factory through the rapid procurement of the necessary land.⁴⁵⁴ This left local farmers no choice but to sell for a price determined by the MoS. One farmer’s wife bitterly recalled that there was simply “nothing you could do... it was just Sellafield and that was it.”⁴⁵⁵ Another farmer explained that “you had absolutely no appeal or nothing, they just came and took it... you couldn’t argue with it.”⁴⁵⁶ By the mid 1950s, a sizeable quantity of farm land had been re-appropriated for military and civil use as part of the nuclear industry and associated housing developments.⁴⁵⁷ This process naturally brought about much ill feeling within local farming communities, who interpreted the utopian STIM as a threat to their land, traditions, customs, and socio-cultural identity.

The loss of local farmland broke down the imaginary of a rural/urban symbiosis between the nuclear industry and local community. Instead, this produced its inverse by overwriting local attachments to place and the historic identities inherently bound up within them. In the act of building roads, houses, and developing farmland, the arrival of the nuclear project “brought radically different concepts of nature, ecology, and power into being, but also threatened... indigenous connections to specific spiritually animated places.”⁴⁵⁸ Indigenous farming communities culturally resisted this process by emphasising their historic ties to the

⁴⁵³ Whitehaven Archives and Local Studies Centre, ‘Correspondence between Clerk to the Millom RDC and J.E. Davies,’ 22 December, 1948, (SRDM 1/3/5); National Archives, ‘Correspondence between W. M. Ogdon and J. Willoughby: Seascale Development’, 3 June, 1954, (MAF 107/75).

⁴⁵⁴ Whitehaven Archives and Local Studies Centre, (SRDM 1/3/53).

⁴⁵⁵ E. Dawson, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 13 July 2010, pp. 30, 37.

⁴⁵⁶ K. Mawson, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 6 August 2010, p. 7.

⁴⁵⁷ As Marianna Dudley has shown, this had commonalities elsewhere in the UK as the post-war period saw the gradual expansion of the defence estate and the purchase of rural land for this purpose. See, Dudley, *An Environmental History of the UK Defence Estate*.

⁴⁵⁸ J. Masco, *The Nuclear Borderlands*, p. 110.

area and the land they had previously owned, in so doing, producing a resistant imaginary of the nuclear industry as antithetical to the historic identity of the region. Many families could trace their farming heritage back hundreds of years and local media narratives regularly accentuated these lands as their historical birth-right, referring to local farmers who “had yeoman roots here going down for five centuries.”⁴⁵⁹ One report relayed the story of a local farmer who was forced to give up his land, lamenting that “his ancestors have tilled the soil of Seascale for the past four centuries. Until officials from the Ministry of Supply arrived one day, quoted their price for it and told him when he had to go.”⁴⁶⁰ This confirmed a deep sense of localised identity predicated upon attachments to place and induced a resentment towards those responsible for taking what they considered as *their* land. One particular farmer could trace his Cumbrian ancestry back to 1598, he explained that “my family have only moved one mile in more than four hundred years.”⁴⁶¹ For Ella Dawson, whose family had owned and farmed at Calder Hall for generations, the situation was very simple, “Hall Senna had been in our family for six hundred years... we were there before they were.”⁴⁶² Faced with the loss of a central component of their identity, contest over the control and meaning of place and the natural environment fed into growing pockets of resistance towards nuclear technologies, which transmuted the utopian imaginary of nuclear power into an altogether more sinister vision of an oppressive industry, as farming communities increasingly resisted the cultural and socio-economic imposition of the nuclear industry upon their livelihoods.

⁴⁵⁹ *News Chronicle and Daily Dispatch*, 15 October 1956.

⁴⁶⁰ G. Bruce, ‘Atom Village Beats that Quatermass Fear’, *Illustrated Magazine*, 3 March 1956, p. 38.

⁴⁶¹ Author Unknown, ‘A Walk Down Memory Lane: Phil Hallington and David Moore Share their Calder Hall Memories’, *Sellafield Magazine*, 5.0 (October 2016), pp. 19ff.

⁴⁶² E. Dawson, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 13 July 2010, pp. 30, 37.

2.9: Economic Impact.

Whilst the industry brought a major economic boost for many citizens, local farmers faced economic ruin as the MoS cherry-picked the land they required and left fragmentary remains. Several local farms were left “uneconomic” as the partial land acquisition of the MoS carved up steadings and affected profits.⁴⁶³ This subverted the imaginary of regional economic prosperity as many farms were left financially insolvent and destitute. Despite the ministry’s promise that “adjustments would be made wherever possible to keep to a minimum the amount of land taken from agricultural use,” the purchase of land resulted in three local farms being abandoned and one halved in size, rendering it economically unviable.⁴⁶⁴ Ultimately, this drove down the price and led to its eventual purchase by the UKAEA for the paltry sum of £250, well below the market value. Many locals believed this was a deliberate ploy to minimise the cost of purchasing land, a suggestion which is itself indicative of the increasing schism that land purchase opened up between the local community and the nuclear industry.⁴⁶⁵ This scattergun approach to the acquisition of land was, by the government’s own admission, “far from satisfactory”, with ministers conceding that a number of farms had been “seriously affected” by the “failure” of these developments.⁴⁶⁶ Left facing economic ruin, these financial components fed into the dystopian nuclear imaginary, as local farming communities fashioned undesirable futures of the nuclear industry as economically, socially, and culturally subjugating them.

⁴⁶³ National Archives, (MAF 107/75).

⁴⁶⁴ Whitehaven Archives and Local Studies Centre, (SRDE 1/3/1/160); K. Mawson, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 6 August 2010, p. 17.

⁴⁶⁵ National Archives, ‘Whole House Farm’, 14 February, 1951, (MAF 107/75).

⁴⁶⁶ Ministers remarked that “it would have been very much more satisfactory if they had acquired the whole of the farm units so that some re-distribution of land and buildings could have been affected in agricultural interests.” (National Archives, ‘31 October, 1950’, (MAF 107/75); National Archives, ‘10 May, 1951,’ (MAF 107/75).

Farmers emphasised both their powerlessness in the face of the nuclear industry, and the lack of care shown for their interests by planners culturally and physically dislocated from the local area. Tellingly, even government ministers were forced to concede that “there is much local feeling about the taking of good farmland and it would be fair to say that the local population are in opposition.”⁴⁶⁷ This was augmented by the failure of the MoS to pay farmers for the land within the contractually agreed timeframes. Local farmer Ernest Moore (Fig. 14.0) explained that “I had to give up cattle breeding [because] they kept me waiting months for the money they owed me for my own land.”⁴⁶⁸ Mr. Moore was ultimately forced to take alternative employment in order to support his family. Fig. 14.0 visually depicts the obvious resentment and anguish this caused him, as he was left with no alternative but to sell milk to the scientists who lived on his former land.



Fig 14.0: G. Bruce, 'Atom Village Beats that Quatermass Fear', *Illustrated Magazine*, 3 March 1956, p. 38.

⁴⁶⁷ National Archives, 'Correspondence between W.S. Waters and J. V. B. Willoughby, 11 May, 1954', (MAF 107/75).

⁴⁶⁸ G. Bruce, 'Atom Village Beats that Quatermass Fear', *Illustrated Magazine*, 3 March 1956, p. 38.

Mr. Moore's sense of injustice was compounded when he later discovered that the Ministry didn't want the land he had sold to them and, instead of returning it to him for the same price, tried to profit from it by selling it to a developer and requesting more of his land. He explained "they were trying to sell some of the land to someone else, they didn't want it, they wanted some more of mine instead."⁴⁶⁹ Farmers explained that the Ministry would identify a piece of land they wanted, name their price and take it. One farmer explained that one particular field had been full of crops when they requisitioned it, adding that "they came with a bulldozer one day and bulldozed my potatoes under."⁴⁷⁰ Episodes such as this speak to the low-level forms of indirect resistance performed by local farmers who resented their powerlessness in the face of the nuclear industry, which could render their livelihoods insolvent with the stroke of a pen, as historically profitable family steadings were divided and cut up to make way for nuclear housing and infrastructural developments.

The negative socio-economic effects of the nuclear industry embedded resistant imaginaries amongst farming communities, who identified the nuclear industry as a scourge upon their lives. Farmers explained that their livelihoods became much harder after the plant was built, conceding that "everything they did was really against us."⁴⁷¹ They explained that "we had to go up through the estate to get to the rest of our land... we can't get at our land now, they cut it off... if you were taking cattle or anything up there they were always on lawns and folk were complaining. It used to be very unpleasant. If there's tractors going up and down

⁴⁶⁹ *Ibid.*

⁴⁷⁰ *Ibid.* (During an interview with the local newspaper Mr Dawson, whose land was being examined at Calder Hall complained, "I wish they would make up their minds and give me something to go on. Ministry men have been sinking boreholes and generally jobbing about for a long time. How do they expect a chap to plan his farming when he doesn't know what land might be taken away from him at the busiest time of year?" *Whitehaven News and Star*, 19 March 1953.)

⁴⁷¹ K. Mawson, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 6 August 2010, p. 21.

the road, if they leave any muck off the wheels on the road, you get complaints.”⁴⁷² Interviewees recalled that even the weather changed with the arrival of the nuclear plant as it became harder to grow crops. Land near the plant was frequently rendered infertile by the atmospheric effects of the nuclear plant which affected local weather patterns through the condensing vapour emitted from the cooling towers. Farmers recalled that “when you were hay timing, it used to rain all over it. When you got it all ready for bringing bale in and that, it would just rain on it and wet it all again. Lovely day like this and you know, ‘oh how nice’ and then you would go out and it was raining again.”⁴⁷³ These localised effects of the plant on day-to-day activities fed into localised patterns of resistance amongst farming communities, for whom the nuclear industry represented a dystopian imposition upon their livelihoods and way of life.

The dystopian nuclear imaginary was embedded by the financial effects of the plant upon local economies and wage structures. Unable to compete with the high wages offered at Sellafield, many farmers lost their workforce to the nuclear plant.”⁴⁷⁴ Many of the remaining farms that had not been bought out or rendered insolvent by land purchase were forced to close and several farmers, like Ernest Moore were left with no choice but to take up roles at Sellafield or in auxiliary services that supported the plant. Newspapers reported that farmers made to “give up the land are now working alongside yesterday’s farm-labourers, as industrial hands at the atom plant.”⁴⁷⁵ This further augmented the discrepancy “between existing ways of life and

⁴⁷² The closure of several farms meant that some farmers were able to purchase additional land, although this resulted in undesirable pockets of disparate farmland, isolated from one another and difficult to reach. (K. Mawson, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 6 August 2010, p. 16.)

⁴⁷³ This represented a cruel blow to an already unprofitable livelihood. (E. Dawson, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 13 July 2010, p. 29.)

⁴⁷⁴ D. McConnell, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 8 February 2010, p. 13.

⁴⁷⁵ ‘The Village Where Plutonium Must Mix with Ploughing’, *News Chronicle and Daily Dispatch*, 15 October 1956.

the ultra-modernity of which nuclear power was a symbol”, as the nuclear industry increasingly clashed with proud traditions of local farming livelihoods and, in the words of one local, “really upset the apple cart.”⁴⁷⁶ As a threat to these traditions, a cultural resistance towards the nuclear industry emerged as citizens identified Sellafield as a threat to the region’s agricultural culture and identity. Whilst the loss of areas of farmland had threatened the identity of the farming communities which owned and worked them, the closure of these farms altogether represented a more ardent threat to the agricultural identity and traditions of the area. This assimilated with broader discussions about the impact of the nuclear industry upon the countryside, as local citizens produced resistant imaginaries of nuclear science as an alien and overtly urban imposition upon rural sensibilities.

2.95: Rurality.

Farmers’ prejudices assimilated with broader concerns regarding the imposition of the urban upon the countryside, as the built environment of the nuclear industry appeared as a dystopian imposition upon rural culture. Luke Bennett has shown that “where necessary to the interests of modernism and the metropolitan realm – the non-urban becomes infected with urbanist ways and priorities.”⁴⁷⁷ This was a clear concern within the local community, who resisted the imposition of a symbiotic relationship between uses of rural land for the sustenance of the urban through the provision of electricity. Local woman Jill Perry explained that there was a clear discrepancy between the nuclear industry and a rural way of life. She recalled that “the feeling in my family was this it was just another... industrial process, a man-made

⁴⁷⁶ Tompkins, *Better Active than Radioactive!*, p. 36; P. Gordon-Duff-Pennington, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 21 January 2011, p. 21.

⁴⁷⁷ L. Bennett, ‘Cold War Ruralism: Civil Defence Planning, Country Ways and the Founding of the UK’s Royal Observer Corps’ Fallout Monitoring Posts Network’, *Journal of Planning History*, 17.3 (2018), p. 13.

process that interfered with nature.”⁴⁷⁸ The National Farmers’ Union (N.F.U.) expressed the deep suspicion of the farming community, remarking pointedly that, “farmers are not enthusiastic in their demands for industrial development in a rural area, since industry takes away employees” whilst bringing “into the area alien urban elements.”⁴⁷⁹ This purported threat manifested in the built nuclear environment, as the physical architecture of the plant embedded resistant imaginaries of an urban invasion of the countryside.

In spite of the overwhelmingly positive praise for the plant’s architecture which emanated from national commentators and designers, it appears as though the local public received the nuclear environment with more scepticism. This again calls for a more localised focus on the production of nuclear culture, as considerable variation emerges between national and local scales. Regional and local media reports show that the built environment of Seascale was considered “garish” by many locals, who lamented the new housing estates “swamping the neighbourhood”, expressing fears that “the new inhabitants may be the vanguard of an army that will change the character of the withdrawn village.”⁴⁸⁰ Elsewhere, the physical structure of the plant animated fears regarding the onrush of modernity into the countryside, with locals viewing “the erection of massive concrete structures on the fringe of the Lake District an act of spoliation.”⁴⁸¹ These narratives were a feature of local media articles, with reports bemoaning the “gaunt buildings that had mushroomed from the earth to change the life of the village,” lamenting their soulless nature: “secretive and uninhabited [with] their chimneys

⁴⁷⁸ J. Perry, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 3 January 2011, p. 8.

⁴⁷⁹ Bracey, *Industry and the Countryside*, p. 123.

⁴⁸⁰ *Manchester Guardian*, 16 October 1956; Bracey, *Industry and the Countryside*, p. 146.

⁴⁸¹ S. Sinclair, *Windscale: Problems of Civil Construction and Maintenance*, (London: George Newnes Ltd, 1960), p. 5.

pointing like aimless fingers into the sky.”⁴⁸² Reflecting on these developments, an article in the *Manchester Guardian* cautioned that:

“in our efforts to make our cities smokeless and to bring other benefits to our nation we might very well destroy a great deal of our magnificent countryside, a heritage which it is only too easy for great concerns to underrate. For this and other reasons connected with destructive power there are still many people today who can only think of atomic power with feelings of dread or resentment and who wish that it had never been discovered.”⁴⁸³

This passage suggests that local citizens were becoming concerned with the growing use of the rural landscape for the provision of the nation, as areas of natural beauty were becoming increasingly ‘infected’ with urban concerns. This undermined hegemonic visions of nuclear utopianism in favour of dystopian realities of urban blight and rural spoliation. This aspect of the dystopian nuclear imaginary not only revolved around the physical effects of the nuclear industry, but also upon the socio-cultural effects of migration into the county, as Sellafield’s construction sequenced the arrival of thousands of scientific staff and labourers from outside the local area.

The arrival of labourers required to build the nuclear plant helped embed a series of undesirable social futures as locals resented the imposition of alien elements considered antithetical to notions of rurality. This imaginary also built upon an undercurrent of anti-Irish sentiment during this period, as the behaviour of migrant contract workers brought a series of

⁴⁸² G. Bruce, ‘Atom Village Beats that Quatermass Fear’, *Illustrated Magazine*, 3 March 1956, p. 37.

⁴⁸³ *Manchester Guardian*, 16 October 1956.

social ills into the countryside, subverting the inherent character and relative lawfulness of the region.⁴⁸⁴ Plant construction required thousands of migrant workers from areas of the UK and particularly Ireland, who were lodged in specially constructed camps ran by the Ministry of Works. These camps consisted of temporary accommodation arranged into barracks, designed to house workers in a tight, military style layout, with basic amenities and a sombre functionality. Migrant workers were a source of considerable unease amongst the local population, who expressed fears that “if large numbers of single men, or men living away from their wives come into an area with little to do during their free time, unpleasant social effects often follow.”⁴⁸⁵ Similarly, local media narratives stressed the “prospect of invasion by a battalion of ‘rough labourers’”, whose attitude and way of life contrasted sharply with ordinary country residents.⁴⁸⁶ These concerns also borrowed from wider cultural assumptions about the lawlessness of Irish workers. In this way, the nuclear industry was seen to be responsible for bringing in ‘alien’ elements into the area, as anti-Irish prejudices aligned with the moral conservatism of the region, embedding an undesirable future of weakening rural values.

An undercurrent of anti-Irish sentiment emerged throughout the interviews, as respondents recalled the unruly behaviour of “the Paddies” who “were always singing and dancing- cause they liked their drink.”⁴⁸⁷ Indeed, the heavy drinking and social activities of the construction workers brought about a large increase in the number of police cases for disorderliness and drunkenness. Local media outlets often featured reports of skirmishes between the migrant workforce and local police.⁴⁸⁸ Similar issues emerged in Scotland, where

⁴⁸⁴ For further reading on anti-Irish sentiment in Britain throughout the twentieth century, see P. Garrett, “‘No Irish Need Apply’: Social Work in Britain and the History and Politics of Exclusionary Paradigms and Practices’, *The British Journal of Social Work*, 32.4 (2002), pp. 477- 494.

⁴⁸⁵ Bracey, *Industry and the Countryside*, p. 127.

⁴⁸⁶ *Ibid.*

⁴⁸⁷ J. Richardson, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 10 June 2010, p. 16.

⁴⁸⁸ *West Cumberland News*, 25 December 1954, p. 7; *West Cumberland News*, 25 November 1954.

workers at Dounreay were viewed as “drunk and incapable, proverbially urinating” and fighting in the street, as citizens recalled that the region became a nuclearised equivalent of the ‘Wild West.’⁴⁸⁹ In Cumbria, their behaviour was such that even Sellafield management acknowledged the negative social effects they had brought to the area. Plant manager H.G. Davey admitted that “there was a considerable amount of heavy drinking in Nethertown”, whilst another resident recalled that “the public houses in Whitehaven and Egremont took a hammering on Saturday nights.”⁴⁹⁰ Workers’ behaviour was such that locals would avoid particular pubs and areas of their home town, explaining that many people were “concerned with whether the Irish labourers would get pissed and molest your daughters and that sort of thing.”⁴⁹¹ The unruly conduct of the workers was apparently only regulated by the camp’s Roman Catholic padre, who appeared to be “the only man who had any real influence amongst the Catholics,” and was regularly required to “keep the peace” between workers and local residents.⁴⁹² This reflects the considerable unease with which the two communities integrated during the early years of Sellafield’s construction, as the nuclear plant became embroiled within broader concerns regarding the declining moral character of the region.

Fears regarding the subversion of rural values existed at other nuclear sites throughout the UK too. Linda Ross has observed that the community local to Dounreay were fearful of the impact of an “alien population to whom the culture, traditions, and religious outlook of the Highlands are entirely foreign.”⁴⁹³ At both Dounreay and Sellafield, the influx of migrant workers animated fears of moral degradation, provoking resistance amongst locals resentful of the perceived decline of rural values. Residents recalled that, prior to the nuclear industry

⁴⁸⁹ Ross, ‘Nuclear Fission and Social Fusion’, p. 298.

⁴⁹⁰ Bracey, *Industry and the Countryside*, pp. 127f.

⁴⁹¹ N. Bell, ‘An Oral History of British Science’, interviewed by P. Merchant, 10 January 2013.

⁴⁹² *Ibid.*, p. 128.

⁴⁹³ *John O’Groat Journal*, 28 May 1954, p. 3; Ross, ‘Nuclear Fission and Social Fusion’, p. 88.

“people never used to lock their house, doors, or anything! One day the police came and said ‘get your doors locked, we’ve a load of Irishmen working here now’ - we had to go to Egremont to buy locks... because we didn’t have any!”⁴⁹⁴ In this way, the conduct of the workers spoke to an undesirable future of the region’s physical, social, and moral degradation. Here, nuclear specific concerns assimilated with broader prejudices regarding Irish immorality and the spoilation of the rural area, embedding resistant imaginaries of Sellafield as a subversion of the region’s inherent character and values.

Fears about the decline of traditional rural values and customs were augmented by the influx of scientists responsible for running the plant. This brought similar concerns regarding the imposition of urban, university educated elites upon the region’s rural way of life, helping embed resistant imaginaries of cultural subversion. West Cumbria held (and still has) a distinct cultural particularness. In his 1956 study of the nearby village of Gosforth, William Morgan Williams wrote that the geographical isolation of the area led to the retention of distinct cultural features and a long tradition of autonomy. He pointed to the “unsuccessful introduction of the manorial system” within West Cumbria, the “absence of the tied cottage” and “consequent retention of a large group of free farmers” as historical precedents which had established a unique form of cultural autonomy.⁴⁹⁵ This is a view shared by Brian Wynne, who identified “the upland hill farming region in the Lake District is one of the few locations of relative solidarity and distinctive cultural identity left in industrial Britain... these communities share an unusually demanding livelihood as a way of life; they occupy a distinct and sought-after geographical locality and have common historical traditions, linguistic dialects, and

⁴⁹⁴ E. Dawson, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 13 July 2010, p. 31.

⁴⁹⁵ W. Williams, *The Sociology of an English Village: Gosforth* (London: Routledge, 1956).

recreational pursuits.”⁴⁹⁶ Against this cultural backdrop, the influx of scientific academics appeared incongruous to the social mores and specific worldview of farming communities, for whom the social changes wrought by the nuclear project represented a dystopian future of cultural marginalisation.

Based upon a predilection towards standardisation, method, and procedure, the scientists held an intellectual framework which clashed with farmers’ way of life and values. Agricultural communities, particularly fell sheep farmers hold an experiential form of knowledge relied upon oral-storytelling, folklore, and a historic form of craft tradition embedded through generational apprenticeship, a unique mastery of the local environment and “specialist hill-farming expertise.”⁴⁹⁷ These cultures are predicated upon an intrinsic lack of control over nature and a strong proclivity towards adaptation and survival. This formed a diametric opposite to the practices of the scientific community and the nuclear industry, which emphasised an ethos of prediction, control, and “engendered an exaggerated sense of certainty” regarding issues such as radiation and dosage limits.⁴⁹⁸ Emphasising the social disparity between the two communities, interviewees recalled that the scientists “had a different sort of view on life to what the ordinary West Cumbrian would have had,” laughing that local people were “more bothered about vegetables than atoms.”⁴⁹⁹ One respondent remarked that “father didn’t like Seascale after they all arrived. They were involved with the local churches and things changed with a lot of young, lively, intelligent people coming in.”⁵⁰⁰ One interviewee recalled that “they came up here and turned the place upside down. What did we care about

⁴⁹⁶ B. Wynne, ‘May the Sheep Safely Graze?’ in: Lash, Szerszynski, and Wynne *Risk, Environment and Modernity*, p. 283.

⁴⁹⁷ *Ibid.*, p. 295.

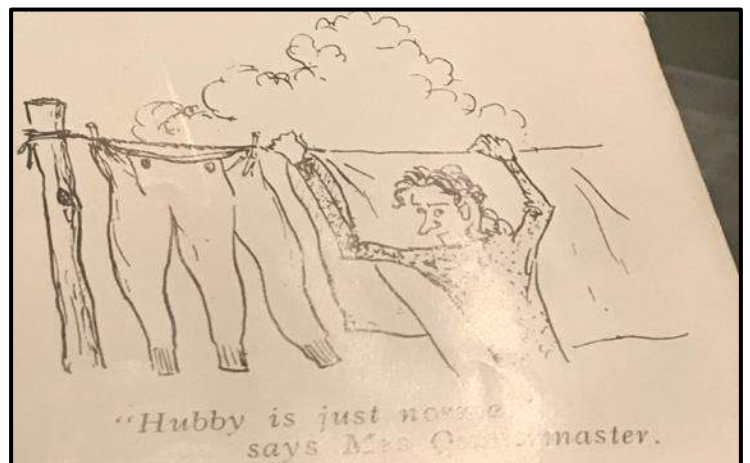
⁴⁹⁸ *Ibid.*, p. 286.

⁴⁹⁹ M. Steele, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 20 August 2010, p. 31; G. Bruce, ‘Atom Village Beats that Quatermass Fear’, *Illustrated Magazine*, 3 March 1956, p. 37.

⁵⁰⁰ Author’s interview with Isobel George, 6 March 2019.

nuclear fission? Closest thing we knew was bloody fishing... Mind you, you need rods for that and all!”⁵⁰¹ Into this context, nuclear science appeared as a subversion of the region’s rural characteristics and a foreign element incongruous with the concerns and world-view of the local population.

The sense of disparity between urban and rural contexts was epitomised by a satirical magazine article (Fig. 15.0) which mocked the union between farming and scientific groups. Published by the national *Pixillated* [sic] magazine in 1955, this parody was written by ‘Ritchie Pincher’ (a play on the scientific correspondent for the *Daily Express*, the well-known journalist Chapman Pincher) and focused on the fictitious Cumbrian village of ‘Boilerscale.’ Poking fun at official attempts to develop nuclear technologies within a backward, inward-looking community, the article described Boilerscale as “the sleepy old Cumbrian village [which] woke up one day to find that the atom-smashers had arrived- and then it went back to sleep again.”⁵⁰²



Figs. 15.0 and 16.0, Left to right: ‘Farmers’ discussion’ and ““Hubby is just normal” says Mrs Quartermaster’. The Beacon Museum Whitehaven, ‘Atom Village versus Quatermass Fear’, *Pixillated Magazine*, ‘Sellafield Stories Collection’.

⁵⁰¹ Author’s interview with Albert Donald, 3 March 2019.

⁵⁰² The Beacon Museum Whitehaven, ‘Atom Village versus Quatermass Fear’, ‘Sellafield Stories Collection’.

This satirised the mutual imbrication of scientific and farming communities through the archetypal stereotypes of local farmer ‘Isiah Dangleberry’ and “atom-smasher Crispin Quatermasster”, (a play on the hit 1953 BBC drama ‘the Quatermass Experiment’ where scientists oversee the creation of a British space programme and the first manned flight into space).⁵⁰³ The article takes a playful swipe at both communities, parodying scientists who want to supercharge the growth of rhubarb with nuclear isotopes, and farmers who begin “beating their ploughshares into plutonium”, teaching scientists how to get “slewed as neutrs [a dialect word for neutrons]” and complaining about the sudden onset of ‘piles.’⁵⁰⁴ Likewise, Fig. 16.0 shows a housewife hanging her a three-legged pair of her husband’s trousers on the line, whilst stressing the normality of local life. This image operates in marked juxtaposition with Fig. 5.0 displayed earlier, conveying a set of assumptions about the bizarre cultural make-up of the local area. Whilst a satirical parody of the social balance within the area, this article alludes to a clear divergence between social groups, indicative of, if not an overt animosity, but a degree of social friction between long-standing residents and the scientific community.

Whilst local residents and the incumbent nuclear workers muddled along together relatively well during the early years of the nuclear industry, there remained clear social and cultural divergences between the groups. This is indicative of an ongoing cultural resistance towards the nuclear industry. In many cases, whether through design or choice, the two communities failed to integrate, and local residents in particular looked upon the new arrivals as spoiling the social life of the village. This embedded resistant imaginaries amongst local residents who viewed the nuclear enterprise as a subversion of local social norms and community life. Locals recalled that society remained highly stratified in the early years of the

⁵⁰³ *Ibid.*

⁵⁰⁴ *Ibid.*

nuclear industry, remembering a distinct sense of “them and us in the community,” and a “mutual resentment” between “the old and the new.”⁵⁰⁵ Characterising this relationship, one respondent shared, “my grandfather was very sceptical. He said that he would work with the scientists, but he would never trust them.”⁵⁰⁶ Likewise, former employees recalled that “if you were a southerner, nobody wanted to know you- there was a lot of animosity from people.”⁵⁰⁷ This speaks to the deep-rooted social discord between the two groups, as both communities exercised a degree of insularity in their social interactions.

Designed as a blueprint for a utopian social order and a homogenous, classless society, the nuclear industry ultimately stratified local life and divided the community, as the secrecy of the scientific community presented a severe “obstacle in terms of normal day-to-day conversations.”⁵⁰⁸ Characterising this divergence, one respondent explained that:

“The problem was, locals were used to sitting down and having a good chat about what had happened in their day; whether that was rounding up sheep or issues with cattle. They were going out to the local pubs and the Windscale club at the time, and suddenly they were faced with people who could not talk about the job they did because they had all signed the Official Secrets Act. The scientists and engineers could talk to each other about work and the things that they were doing, but locals were excluded from that. It created a divided village for a long time because locals could not understand why these

⁵⁰⁵ J. Jones, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 20 August 2010, p. 4; G. Bruce, ‘Atom Village Beats that Quatermass Fear’, *Illustrated Magazine*, 3 March 1956, pp. 37f; Author Unknown, ‘A Walk Down Memory Lane: Phil Hallington and David Moore Share their Calder Hall Memories’, *Sellafield Magazine*, 5.0 (October 2016), pp. 19ff.

⁵⁰⁶ Author Unknown, ‘A Walk Down Memory Lane: Phil Hallington and David Moore Share their Calder Hall Memories’, *Sellafield Magazine*, 5.0 (October 2016), pp. 19ff.

⁵⁰⁷ R. Hardiman, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, and C. McCourt, date not provided, 2010, p. 4.

⁵⁰⁸ Author Unknown, ‘A Walk Down Memory Lane: Phil Hallington and David Moore Share their Calder Hall Memories’, *Sellafield Magazine*, 5.0 (October 2016), pp. 19ff.

people who were moving into their community couldn't talk to them. They didn't have any common ground."⁵⁰⁹

The secrecy of plant life contributed to a degree of social distance between the two groups in the formative years of Sellafield's operation as, in many cases, the local population sought to keep the nuclear industry at arm's length. They were simultaneously grateful for the plant's economic provisions, and yet fearful of a dystopian future "dominated by scientists, controlling a strange, forbidding experiment."⁵¹⁰ This demonstrates how the technology, classified as secret, created social cleavages, undoing aspects of the embedding process of the imaginary. The fragmentary integration between the two groups unravelled the social aspects of the utopian STIM, and embedded resistant imaginaries amongst locals, for whom the nuclear enterprise represented a challenge to existing social hierarchies and local village life, illuminating dystopian futures of their social and cultural subjugation.

The disconnected social dynamic between locals and nuclear workers reflected the failure of urban planners to fully integrate the two communities. Government plans for a built nuclear utopia were hampered by post-war financial pressures and Seascale's physical layout failed to conform to the original visions of 1940s town-planners. Whilst initial plans accommodated a village of up to four thousand people, by January 1950 this figure had been revised down to two thousand inhabitants, after the local council refused government requests

⁵⁰⁹ *Ibid.*

⁵¹⁰ G. Bruce, 'Atom Village Beats that Quatermass Fear', *Illustrated Magazine*, 3 March 1956, p. 37.

to fund the entire development.⁵¹¹ This had a drastic impact on the physical make-up of the village, resulting in two disparate plots divided by both physicality and culture.

By 1950 construction had already started on the atomic housing located outside the old village. It had been intended to develop this land first, and then knit the two communities together by building upon the land between ‘old Seascale’ and ‘new Seascale’, thus unifying the two developments.⁵¹² Financial pressures and government cutbacks negated this plan and cast the village into a physical and social binary which aggravated the social disparity between the two communities.⁵¹³ This embedded dystopian imaginaries of cultural subversion, as locals explained how the stratified nature of local housing “changed the community beyond all recognition”, dividing the village into “old Seascale” and “new Seascale.”⁵¹⁴

Residents described that the village had been a small and close-knit community, but “that all went to pieces when all the off-comers came in. Some wouldn’t mix, some were never happy here, they didn’t stop long.”⁵¹⁵ The hierarchical model of government housing also meant that workers frequently moved around between authority houses within Seascale and other UKAEA sites. Residents described how Seascale became “a transit camp” for UKAEA personnel, commenting that most of the inhabitants did not consider it ‘home.’⁵¹⁶ They

⁵¹¹ A deal was eventually struck between the local housing authority and the Ministry of Supply which saw the council construct 441 properties and the UKAEA 512 by the end of 1959. (National Archives, ‘Outturn 1957/58: The Authority’s Housing Policy,’ (AB16/1427 115); National Archives, ‘Seascale Development, 17 January, 1950’, (MAF 107/75); National Archives, ‘D. A. Shorlaw to C.J. Highton, 1 July, 1954’, (AB 8/523).

⁵¹² National Archives, ‘Seascale Development, 17 January, 1950’, (MAF 107/75).

⁵¹³ Town planners were deeply unhappy about these developments, expressing that “the whole question of the development of Seascale is far from satisfactory and because of the failure of the MoS to proceed further with their plans we now have a sprawled ribbon development.” (National Archives, ‘Seascale: CPB. 2447’, (MAF 107/75.)

⁵¹⁴ M. Steele, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 20 August 2010, p. 31; T. Knowles, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 9 July 2010, p. 7.

⁵¹⁵ K. Mawson, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 6 August 2010, p. 9.

⁵¹⁶ J. Hall, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 27 May 2010, p. 22.

complained at how their village became “a sort of war department settlement, where if you lived on a certain street you were on a certain status within the works, then if you moved up the ladder you moved house- it was just bonkers.”⁵¹⁷ Whilst planners had deliberately tried to avoid creating an ‘atom town’, fearful of fostering the illusion of “a strange and secretive caste of ‘atomics’, withdrawn from the ways of mortal men,” the fragmented village layout materially manifested the cultural differences between the two groups, embedding the social aspects of the dystopian STIM.⁵¹⁸ This created a social division between the new arrivals and the local people, as the material layout of the village meant that difference became “manifested in the built environment long before the first atomic arrived.”⁵¹⁹

Through the controversial provision of social housing, locals expressed and articulated their resistance to the domineering power structures of the industry, juxtaposed against a subjugated local population seemingly swept aside and overlooked in the interests of the nuclear enterprise. Whilst the local area suffered from a chronic shortage of social housing, of the 442 new homes built between 1947 and 1963 only ten were made available for the local public.⁵²⁰ The housing situation provoked “expressions of deep dissatisfaction” amongst local residents, whilst town councillors decried the situation as “a scandal.”⁵²¹ This narrative was greatly compounded by the local media, who argued that it was “morally wrong that houses should be allocated to Ministry people when there was a greater need among the people of Whitehaven.”⁵²² This was a view shared amongst the public who viewed the housing situation as an injustice upon the local population, bemoaning “that newlyweds have to fulfil a three-

⁵¹⁷ Author’s interview with Albert Donald, 3 March 2019.

⁵¹⁸ Bracey, *Industry and the Countryside*, p. 136.

⁵¹⁹ Ross, ‘Nuclear Fission and Social Fusion’, p. 175.

⁵²⁰ Whitehaven Archives and Local Studies Centre, ‘Seascale: Draft Village Plan,’ (Seascale History Folder), p. 4.1.

⁵²¹ *West Cumberland Evening Star and Mail*, 8 December 1950; *Whitehaven News*, 19 October 1950.

⁵²² *Whitehaven News*, 19 October 1950.

year waiting qualification when an electrician from Cardiff could come up and get a house immediately.”⁵²³ This sentiment also permeated the oral interviews, as residents explained that “the most criminal thing of all that happened was with the Sellafield houses- they were reserved for off-comers. Anybody that was brought up in the village that wanted a house, they weren’t allowed one. The locals were just absolutely totally victimised. That should never have been allowed.”⁵²⁴ One couple recounted their anger that, despite having grown up in the village they had been refused housing in Seascale as they did not work at Sellafield.⁵²⁵ The material structure of the village and patterns of housing allocation therefore undid the social aspects of the utopian STIM as local residents were excluded from benefitting in the socio-economic provisions afforded by the atom in favour of the newly arrived plant workers. This spoke to a dystopian future of socio-economic marginalisation, aligning issues such as housing allocation with broader concerns regarding the hegemonic power of the nuclear industry, and the disproportionate share of influence it had within local politics.

Centred around issues of power and representation, residents resisted the political power wielded by the nuclear industry, forging a resistant imaginary of nuclear technology as a subversion of local interests and autonomy. The new arrivals dominated local politics, stripping power away from the local residents and placing it firmly within the hands of people affiliated to the industry. Following their arrival, plant workers rapidly obtained council positions and seats of power. Newspaper reports from 1956 show that within two years, ten out

⁵²³ *Ibid.*

⁵²⁴ Former residents recounted that the UKAEA housing officer virtually “ran Seascale from a little office,” and would show overt favouritism “for his friends.” (K. Mawson, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 6 August 2010, pp. 9f; J. Jones, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 20 August 2010, p. 5; D. Wooley, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 6 August 2010, p. 13.)

⁵²⁵ J. Hall, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 27 May 2010, p. 9.

of the twelve available seats on the local council were occupied by “off-comers.”⁵²⁶ This uprooted existing power relations and embedded dystopian imaginaries amongst locals who emphasised their increasing marginalisation. Tellingly, interviewees referenced feelings of manipulation, complaining that “the scientists want to run the whole village their way in next to no time and they have the expertise, the ability to manipulate and they do just that.”⁵²⁷ Residents explained how the industry's power extended beyond the factory gates and into the local community, describing that it behaved “a bit like a cuckoo in the nest.”⁵²⁸ Others explained that local people had very little political autonomy, as the village “became like a company town in the US... basically the plant owned the town.”⁵²⁹ Similarly, newspaper reports decried that “control of their own village, passed from their hands overnight”, whilst disaffected locals referred to the town as “the Seascale Soviet” observing commonalities between local life and the lack of self-determination afforded subjects of the Soviet Union.⁵³⁰ This was a common occurrence in nuclear communities, where incumbent workers assumed control of, or drastically re-organised local political groups. Dounreay farmer Morris Pottinger recalled that “you ended up with a certain domination of the council” by the nuclear cohort who were “quite vocal” in their views. He explained that “you found people coming on to the town council and you found the Caithness people backing off” as control of local political organisations was gradually absorbed by staff from the nuclear plant.⁵³¹ With similar processes evident in West Cumbria, the loss of political autonomy embedded forms of resistance amongst local people, who looked to the socio-cultural effects of the nuclear industry as symptomatic

⁵²⁶ ‘Off-comers’ is a local term used to describe anyone not born in West Cumbria- regardless of how long they have lived in the area. (*News Chronicle and Daily Dispatch*, 15 October 1956.)

⁵²⁷ The switch from the past to the present tense in this section of the interview also suggests that this sentiment still exists, and to some extent, that these power relations are still being perpetuated. (M. Steele, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 20 August 2010, p. 31.)

⁵²⁸ M. Todd, ‘Ambleside Oral History Group’, interviewed by J. Pilgrim, 2013.

⁵²⁹ Author’s interview with Martyn Day, 17 September 2019.

⁵³⁰ G. Bruce, ‘Atom Village Beats that Quartermass Fear’, *Illustrated Magazine*, 3 March 1956, p. 39; *Cumbrian Life*, March 2016, p. 13.

⁵³¹ Ross, ‘Nuclear Fission and Social Fusion’, p. 273.

of a dystopian future of the economic, social, and cultural marginalisation of the local community.

Conclusion.

Focusing on the contested meanings of nuclear places and their wider role in embedding both utopian and dystopian nuclear imaginaries, this chapter has shown that the Cumbrian public responded to the arrival of the nuclear industry in more complex ways than have been recognised by historians. Instead, local people challenged, resisted, and supplanted the imaginary of nuclear utopianism propagated at the national level. Drawing upon the material, cultural, and social changes wrought by the nuclear industry, local citizens constructed and articulated a series of dynamic, intertwined, and locally-specific undesirable futures heralded by the nuclear industry. These dystopian imaginaries were then embedded into local culture, entering into productive tension with the utopian nuclear imaginary. This understanding provides a more nuanced insight into the historiography of British social responses to nuclearisation, demonstrating the power of ordinary people to act as agents of nuclear meaning-making. Responding to scientific and political developments and the sociotechnical processes that engulf them, we can see how ordinary people, even when seemingly politically powerless and socially peripheral, exercise significant agency over sociotechnical trajectories and produce their own forms of nuclear culture. This history takes on a deep significance for our understanding of the complexity of British responses to nuclearisation, demonstrating that social attitudes towards nuclear technologies were not technologically deterministic or as simplistic as has been previously ascertained, but rather were the product of the public's engagement with, and redefinition of sociotechnical imaginaries of desirable (utopian), and undesirable (dystopian) nuclear futures.

This chapter also points to the plurality of nuclear cultures throughout Britain, particularly calling for greater engagement with the localised geographic contexts in which nuclear technologies were created, designed, and embedded. It also corroborates recent suggestions that “the social impact and persistence of nationwide nuclear sociotechnical imaginaries cannot be fully understood without reference to the localized social, geographical and discursive contexts in which [they were] located and enacted.”⁵³² However, whilst Hogg argues that nuclear imaginaries were “strengthened and made durable once [they] became intertwined with localised contexts [...] and individuals working within them,” this chapter has demonstrated that local contexts and individuals also possess the power to disrupt and challenge these imaginaries, embedding their own resistant imaginaries which simultaneously espouse an alternative imagined future to the one propagated by the state, and disrupt the flow of power from the core to the periphery.⁵³³ The sociotechnical imaginary therefore emerges as a heuristically useful tool for thinking through the co-production of nuclear culture between state and populace at a range of scales. Ultimately, this alludes to a deeper, more problematic relationship between nuclear technologies and local society, which was to have deep ramifications for the future, paving the way for the hostility and more aggrandized resistance witnessed following the Windscale fire in 1957, to which the following chapter will now turn.

⁵³² Hogg, ‘Normalising Nuclear War’, in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*, p. 3.

⁵³³ *Ibid.*, p. 9.

3: Utopian Dreams/ Plutonium Nightmares.

Taking the events of the Windscale fire in 1957 as its point of departure, this chapter points to increasing patterns of localised resistance towards the nuclear project between 1957 and 1963, as a series of incidents combined to unravel the utopian nuclear imaginary at the local level. Drawing upon a range of sources from oral testimony, newspaper narratives, and internal government documents, I show that this occurred in two ways. Firstly, the fire delegitimised the imaginary of nuclear safety, demonstrating that nuclear technologies were inherently dangerous and could not be completely controlled. Secondly, it exposed official attempts to cover-up and suppress the cause of the fire and the threat to public health. These two factors exposed the misleading nature of the utopian STIM by showing that not only were nuclear technologies dangerous but that the government could not be trusted to keep the public safe from their hazardous effects. Identifying the reciprocal relationship between public trust and imaginaries of nuclear safety, this chapter demonstrates how the fire weakened the trust relations between the nuclear industry and the local public, who expressed increasing concerns about the effects of radiation. Sociologist Brian Wynne has shown that people's attitudes towards nuclear risk are mediated by the levels of trust they have in nuclear authorities.⁵³⁴ This chapter develops this argument, revealing that the industry's attempts to cover up the fire heightened public concerns about radiation, embedding a dystopian imaginary of nuclear technologies as a threat to the public health of the local community.

These findings divert from previous studies of the local context, which found that citizens responded to the Windscale fire with little or no concern. Whilst these conclusions

⁵³⁴ Wynne, 'Misunderstood Misunderstanding', pp. 281- 304.

speak to general patterns of response in the initial aftermath of the fire, “relatively little information is available on the social and psychological consequences of the Windscale accident.”⁵³⁵ Pointing to the long-term effects of the local milk ban, the contamination of farm produce, and ongoing debates about the effects of radiation exposure, I demonstrate that the fire had a number of more enduring psychosocial and biological consequences. Tracing the impact of the incident firstly upon the local community, then looking to specific social groups, such as children, nuclear workers, and farmers, I will tease out and identify patterns of local resistance as citizens imagined the deleterious effects of radiation upon public health.

Used in conjunction with the oral histories the STIM framework demonstrates that citizens resisted the nuclear project in subtle ways. As Claire Waterton, Brian Wynne, and Robin Grove-White have demonstrated, it is “radically misleading” to assume that just because “there is no observable public protest about a hazardous activity... this means the public accepts the hazard and trusts in the authorities who are meant to be in control.”⁵³⁶ Rather, this chapter demonstrates that the local public responded to the fire by actively resisting elements of the nuclear project, imagining a dystopian future characterised by the physical and radiobiological consequences of radioactive contamination. These patterns of response have been missing or given only fleeting attention within the existing historical record. This chapter sheds light upon the localised impact of the fire and contributes to the broader historiography by admonishing the significance of the local and rural context in shaping our understanding of Britain’s nuclear history. Very few studies have examined nuclear resistance during the 1950s, with scholarly attention largely devoted to the 1960s as the anti-nuclear movement,

⁵³⁵ J. Smith, ‘Nuclear Accidents’, in J. Walls, C. Sharrard, F. Livens (et al.), (eds.), *Nuclear Power and the Environment* (London: Royal Society of Chemistry, 2011), p. 63.

⁵³⁶ Wynne, Waterton and Grove-White, (eds.), *Public Perceptions and the Nuclear Industry in West Cumbria*, p. 24.

spearheaded by the Campaign for Nuclear Disarmament (CND), espoused direct resistance towards nuclear technologies through mass demonstrations and protest.⁵³⁷ This chapter diverts from this understanding by highlighting the emergence (and permanence) of anti-nuclear sentiment in West Cumbria from as early as 1957.

The previous chapters have shown that up to this point, nuclear resistance had been largely predicated upon the misgivings of disgruntled individuals who had been disaffected by the construction, siting policies, and socio-economic impact of Sellafield. This chapter shows that localised responses to the Windscale fire built upon these attitudes, prompting this resistance to morph into a deeper, more coherent and collective localised opposition towards nuclear technologies. This aligned with an emerging undercurrent of resistance towards nuclear technologies, witnessed in the formation of the CND in November 1957, increasingly ardent public support for an international nuclear test-ban agreement, and public inquiries into the siting of nuclear power plants at Hunterston in Scotland, and Bradwell in Essex.⁵³⁸ The fire therefore emerges as an important historical juncture in the trajectory of public responses to nuclear technologies. It was the first act of a second phase which saw the imaginary of nuclear utopianism begin to give way to expressions of more sinister, dystopian realities and a broader resistance to nuclear technologies and the state that wielded them.

⁵³⁷ For examples of literature on anti-nuclearism in 1950s Britain, see Hogg, "'The Family That Feared Tomorrow": Nuclear Fear and Individual Experience in Late 1950s Britain,' *British Journal for the History of Science*, 45.4 (2012), pp. 535- 549; Wall, 'Nuclear Prospects', pp. 246- 273; A. Bingham, 'The Monster'? The British Popular Press and Nuclear Culture, 1945-early 1960s', *British Journal for the History of Science*, 45.4 (2012), pp. 609- 624; G. McKay, "'Just a Closer Walk with Thee": New Orleans-Style Jazz and the Campaign for Nuclear Disarmament in 1950s Britain', *Popular Music*, 22.3 (2003), pp. 261– 281. For studies which focus on the 1960s, see J. Burkett, 'Re-Defining British Morality: 'Britishness' and the Campaign for Nuclear Disarmament, 1958–68,' *Twentieth Century British History*, 21.2 (2010), pp. 184– 205; H. Nehring, 'The British and West German Protests against Nuclear Weapons and the Cultures of the Cold War, 1957– 64', *Contemporary British History*, 19.2 (2005), pp. 223– 241; M. Phythian, 'CND's Cold War', *Contemporary British History*, 15.3 (2001), p. 133– 156.

⁵³⁸ See Welsh, *Mobilising Modernity*, p. 90; *Manchester Guardian*, 30 January 1957.

3.1: The Windscale Fire.

The Windscale fire was the result of an uncontrolled release of energy in pile number one of the two plutonium producing Windscale reactors between 8th and 11th October 1957. The fire was caused by an unsuccessful attempt to release energy trapped within the reactor core through a technique known as a ‘Wigner release’, which was designed to disperse accumulated energy in a safe and controlled manner. These releases were relatively common and had occurred eight times previously without incident. Despite this, at some time between 8th and 9th of October, one of the fuel cartridges inside the reactor core burst open and ignited, spreading fire throughout the core. To combat the rising temperatures, staff switched on the fans designed to regulate the core’s temperature, inadvertently fuelling the flames of the fire further. At this point, the full severity of the situation was realised. Increasingly concerned, reactor managers removed an inspection plug and saw four fuel channels glowing a deep, cherry red, concluding that the pile was now ablaze, and had been burning for some 48 hours.

Several unsuccessful attempts were made to cool the pile, first by pushing the stuck cartridges out of the back of the pile and into the cooling ponds below. The incredible heat and intense radioactivity rendered this impossible, as the scaffolding poles workers used to try to remove the cartridges melted in the heat of the blaze. Workers watched in horror as scaffolding poles dripped with molten metal and radioactivity levels kept on increasing. Desperate to cool the smouldering reactor, liquid carbon dioxide was poured onto the charge face of the pile, but to no effect. Eventually, Deputy Works Manager Tom Touhy ordered the fans be shut off and the pile doused with water. Despite the risk that this would trigger an explosion, the fire was finally brought under control on October 11th, three days after it had been discovered. Largely due to the heroism of the operating staff who remained on site tackling the fire, the bravery of

Tuohy, and more than a healthy slice of luck, a nuclear explosion had been averted, but at considerable radiobiological cost to the surrounding countryside and its inhabitants.

3.2: Nuclear Safety.

The fire delegitimised the carefully crafted imaginary of nuclear safety, espousing an alternative future where nuclear technologies represented a tangible threat to public health. Less than twelve months after the royal opening of Calder Hall, the fire flew in the face of the overwhelming positivity which enveloped the civil nuclear project up until this point. Official UKAEA historian Lorna Arnold reflected that during this period “nuclear power seemed brilliantly promising and full of hope... [as] the perennial fountain of world prosperity.”⁵³⁹ Contemporary commentators too, noted that “the discovery of nuclear energy has come like an answer to prayer.”⁵⁴⁰ In the context of ardent public positivity, the incident at Windscale shook public confidence in the nuclear project, particularly at the local level where the fire unravelled the utopian STIM by exposing the vulnerability of the local public and subverting “the depiction of nuclear power as a harbinger of modernist progress.”⁵⁴¹

The fire provided irrefutable evidence that nuclear technologies were inherently fallible and subject to the same (or worse) stresses and potential hazards as any other industry. The utopian STIM had propagated the view that nuclear science was intrinsically safe, controllable through adherence to operational and scientific principles which regulated and contained the

⁵³⁹ Arnold, *Windscale 1957*, p. xxi.

⁵⁴⁰ G. Thomson, ‘Britain’s Drive for Atomic Power’, *Foreign Affairs*, 10.0 (1956), p. 96.

⁵⁴¹ Historian Ian Welsh has argued that the fire induced “a major loss of public confidence” in nuclear technologies by exposing the inherent vulnerability of the general public if something went wrong. See, Welsh, *Mobilising Modernity*, pp. 96f.

immense power of the atom. This imaginary had been embedded at both scientific and political levels by senior figures who assured that radiation could not affect public health. Only two years earlier in 1955, the Minister of Works, Nigel Birch, stated that “there is no danger at all associated with radioactivity from the use of atomic power for civil purposes. Such radioactive materials as are emitted are very weak and their effect is not cumulative. Their radioactivity ceases almost at once. I want to dispose of any suggestion that the use of atomic energy for civil purposes raises any danger.”⁵⁴² As the previous chapter demonstrated, public statements such as this ensured that imaginaries of nuclear safety had become deeply entrenched within local culture, as the harmful effects of radiation were seemingly mitigated through scientific advances and strict operational protocols.

Imaginaries of nuclear safety were similarly embedded amongst scientists working at the plant, who were increasingly over-confident in their abilities to harness the immense power of the atom. At this time, confidence at Sellafield was at an all-time high. Buoyed by the royal endorsement of nuclear energy barely twelve months previously, the nuclear scientific establishment was “a socio-intellectual community... operating in a pervading atmosphere of scientific self-confidence.”⁵⁴³ Historian Ian Welsh has argued that the success (or lack of major incident) throughout the previous decade had instilled a spirit of autonomy at Sellafield, identifying “a positive disposition towards risk-taking” within the “early, ‘heroic’ phase” of the nuclear industry.⁵⁴⁴ In this context, the fire exposed the fallacy of imaginaries of nuclear safety and the self-confidence within the atomic science community. Looking back, former

⁵⁴² Hansard, ‘Nuclear Explosions (Genetic Effects)’, 22 March 1955
<hansard.millbanksystems.com/commons/1955/mar/22/nuclear-explosions-genetic-effects> [accessed 22 July 2019].

⁵⁴³ Wall, ‘Nuclear Prospects: The Siting and Construction of Sizewell A Power Station, 1957-1966’, p. 250; Wynne, *Rationality and Ritual*, pp. 12- 19.

⁵⁴⁴ Welsh, *Mobilising Modernity*, p. 48.

scientists acknowledged that during this period, the reactor was pushed “much too near the precipice,” in response to demands for ever-increasing yields of fissile material.⁵⁴⁵ They explained that the fire “was a useful reminder we didn’t know everything! There was a general feeling [that] we had to be a bit more careful, we had to think about things rather a lot more than we had done before.”⁵⁴⁶ This provided a bleak reality check to the nuclear scientific establishment, shattering imaginaries of nuclear safety by evidencing the potentially catastrophic consequences of scientific indulgence and nuclear chauvinism. Furthermore, the fire not only had repercussions within the scientific community but also undermined the local public’s confidence in the nuclear project by pointing to the possibility of another, more serious incident in the future.

By exposing the potential effects of an incident at Sellafield, the fire contributed to a greater sense of vulnerability amongst the local public. This supplanted the utopian STIM as local citizens imagined the possibility and injurious consequences of another future incident. This process can be seen in oral history interviews, where local citizens conveyed the anxieties they felt after the fire. Interviewees recalled that “a lot of people, including myself were very frightened that it would happen again”, whilst some parents were so scared of a future incident that they “got nervous and took their children away” from the area altogether.⁵⁴⁷ Characterising public responses during this time, writer Stuart Sinclair contended that:

⁵⁴⁵ The upcoming moratorium on nuclear testing (1963) and the failure of Britain’s first thermonuclear weapon to achieve the ‘magic megaton’ yield resulted in the development of a second weapon, which required five times the tritium of the first. These increasing demands for fissile material placed the reactor under increasing strain by forcing operators to reduce safety thresholds in order to increase efficiency. Specifically, the aluminium ‘fin’ casing which surrounded the fuel cartridges was reduced by 25mm, whilst the cartridges themselves were increased in size. This yielded an increase in productivity but pushed the reactor beyond its operational capacity. The temperature of the reactor was also raised to achieve similar results. Ultimately, these two elements combined with a series of operational and design flaws to cause the fire in pile number one. (*Windscale: Britain’s Biggest Nuclear Disaster*, S. Aspinall. London: BBC, 2007.)

⁵⁴⁶ F. Graham Brightman, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 1 July 2010, p. 2

⁵⁴⁷ M. Davis, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 16 December 2010, p. 28.

“Nothing like this had happened during the seven years in which the factory had been at work, and during which time the early prejudices against the industrial invasion of the countryside had been broken down. If one mishap could occur, would others follow with more serious consequences?”⁵⁴⁸

In the aftermath of the fire the imaginary of nuclear safety began to break down, as citizens renegotiated the relative risk posed by the nuclear industry and imagined an alternative reality whereby the plant represented an ongoing threat to public health. In his seminal 1992 study of risk, Ulrich Beck explained that social attitudes towards hazards such as nuclear power are constructed through a reflexive process. At first, citizens trust the technology and the institutions which control it; after hazardous issues arise “people become reflexive and aware of the catastrophic consequences of technological development.”⁵⁴⁹ Examining public responses to nuclear accidents, sociologists J. Richard Eiser, Joop van der Plight, and Russell Spears have identified similar trends, demonstrating that nuclear incidents (however severe) induce anxieties amongst affected communities by exposing the threat of future incidents. They argue that “evidence that incidents occur with mild consequences is taken to show that they could also, with a little less luck, occur with severe consequences.”⁵⁵⁰ This also echoes the work of Dan Cordle, who identifies that nuclear incidents, whether imagined or real induce a “sense of increasing and heightened insecurity” amongst the public by introducing the possibility of nuclear disaster.⁵⁵¹ As the following section will demonstrate, by proving that something could go wrong, the fire heightened public concerns about issues of nuclear safety.

⁵⁴⁸ Sinclair, *Windscale: Problems of Civil Construction*, p. 6.

⁵⁴⁹ Beck, *Risk Society*; X. Fang, ‘Local People’s Understanding of Risk from Civil Nuclear Power in the Chinese Context’, *Public Understanding of Science*, 23.3 (2014), p. 284.

⁵⁵⁰ Eiser, van der Plight, Spears, *Nuclear Neighbourhoods*, p. 169.

⁵⁵¹ D. Cordle, *Late Cold War Literature and Culture: The Nuclear 1980s* (London: MacMillan, 2017), p. 48.

However, this was not a straight-forward or linear process, as the UKAEA's attempts to suppress the incident's severity ensured that the local public reacted with little apprehension in the initial aftermath of the fire, as its true consequences were hidden from the local community.

The reaction of the public was at first one of indifference and calm. Existing studies by Christine Wall, Lorna Arnold, and Ian Welsh have all asserted that initial public reactions “appear to have been limited.”⁵⁵² Indeed, the content of national media reports in the days following the fire paint a picture of public inertia, with an article in the *Daily Express* on the day of the fire carrying very little mention of it at all, instead emphasising the increased social opportunities afforded by the nuclear industry.⁵⁵³ Likewise, a headline in *The Times* declared “no apprehension in West Cumbria!”⁵⁵⁴ These responses have historically been taken as evidence of the apathy of the local population towards the fire, and their ongoing trust in the safety and operation of the Sellafield plant. Despite the seeming lack of public outcry or anxiety within the local area, these conclusions fail to account for the censorship of information in the initial aftermath of the fire, as local citizens were given fragmentary and politically censored information. Furthermore, they overlook that attention was limited only in the initial days as authorities successfully concealed the severity of the incident from the public. Residents recalled that, “what one read about was there had been a small fire in a shed, a charcoal store or something like that, they played it down.”⁵⁵⁵ In the days that followed, the accident was thrust in local consciousness through the extensive coverage of local newspapers. Only two weeks later, a local newspaper commented that “whatever the record might be for headline holding by a single incident, the Windscale accident must have come very close to breaking it.

⁵⁵² Wall, ‘Nuclear Prospects’, p. 247; Arnold, *Windscale*, p. 71; Welsh, *Mobilising Modernity*, pp. 98f.

⁵⁵³ *Daily Express*, 12 October 1957.

⁵⁵⁴ *The Times*, 12 October 1957.

⁵⁵⁵ Author's interview with Albert Donald, 3 March 2019.

It has held the headlines for a fortnight, and it isn't finished yet- not by a long chalk."⁵⁵⁶ As information gradually permeated the veil of secrecy erected by the authority, the apparent indifference of local society gradually gave way to a more overt form of intransigence as it became clear that they were being given incomplete, misleading information by UKAEA officials.

3.3: Local Contamination.

The UKAEA's reticence to communicate with the local public was interpreted with suspicion by the local population, who expressed significant concern about the length of time it took the UKAEA to inform them about the fire. During the three days whilst the fire raged, residents were not told of the incident or given instructions to protect themselves from the airborne radiation. In fact, "fire-fighting efforts had been underway for 24 hours before even the local Chief Constable was formally notified."⁵⁵⁷ This was itself an official policy which sought to exclude the public from goings on at the plant. Former Health and Safety Manager Huw Howells recalled that, "at that time it was thought that the peace of mind of the people concerned was more important than to pass on any information because undoubtedly it would be misinterpreted."⁵⁵⁸ Designed to stage-manage public opinion, this aspect of the utopian STIM paradoxically embedded dystopian imaginaries of nuclear safety by heightening public fears about radiation.

Whilst the official line of the UKAEA was that at no point had radiation limits been breached, and that it was prepared to warn the public should they have done, their failure to

⁵⁵⁶ *West Cumberland News and Star*, 26 October 1957.

⁵⁵⁷ W. Patterson, *The Fissile Society Energy, Electricity and the Nuclear Option* (London: Earth Resources Research Ltd, 1977), p. 20.

⁵⁵⁸ *Inside Story: Our Reactor Is on Fire*, D. Blakeway. London: BBC, 1990.

disclose information was interpreted as a deliberate policy of suppression, designed to hide the threat to public health. The limited release of information had a profound effect on local attitudes towards the plant, contributing “to [a] growing public alienation and scepticism” amongst the local community.⁵⁵⁹ The local *West Cumberland News and Star* referred to the fire’s “sobering” effect on local opinion.⁵⁶⁰ This acknowledged that there had been a dramatic shift in public attitudes in the days following the incident, as public opinion changed from a “state of initial acceptance to one of considerable concern and despair.”⁵⁶¹ This was also confirmed by a local councillor, who told the national press that “this business is far more serious than we imagined at first. I don’t think the [UK]AEA has been completely honest with us. People who were quite calm to begin with are getting worried.”⁵⁶² This unravelled aspects of the utopian STIM by simultaneously weakening public trust in the nuclear authorities and exacerbating public concerns about the harmful effects of radiation.

Evidencing the local public’s growing concern about their safety, citizens petitioned their M.P., Frank Anderson to call upon the government to tell the truth regarding the severity of the fire and the relative threat it posed to the public. In the House of Commons, Anderson subjected Prime Minister Harold MacMillan to a barrage of questions, referring to the “very strong condemnation” amongst his constituents at the lack of public information given to them.⁵⁶³ Residents bemoaned the “lack of full information available to the public,” and complained that “absolutely nothing was done” to protect them.⁵⁶⁴ One resident, whose

⁵⁵⁹ Welsh, *Mobilising Modernity*, p. 116.

⁵⁶⁰ *West Cumberland News and Star*, 22 October 1957.

⁵⁶¹ *West Cumberland News and Star*, 19 October 1957, p. 6

⁵⁶² *Daily Express*, 16 October 1957, p. 5.

⁵⁶³ He described the public relations procedures as “sadly lacking” and committed to visiting the Prime Minister on a second occasion to impress upon him the concerns of local residents. *Hansard*, ‘Atomic Energy Establishment: Windscale (Accident)’, 28 November 1957, <[https://hansard.parliament.uk/Commons/1957-11-28/debates/5d7735ad-0ea9-48f4-a49a-eeaadfba35cc/AtomicEnergyEstablishmentWindscale\(Accident\)](https://hansard.parliament.uk/Commons/1957-11-28/debates/5d7735ad-0ea9-48f4-a49a-eeaadfba35cc/AtomicEnergyEstablishmentWindscale(Accident))> [accessed 27 January 2018].

⁵⁶⁴ National Archives, (EG 4/3191); *Inside Story: Our Reactor Is on Fire*, D. Blakeway. London: BBC, 1990.

property backed onto the plant explained that, “I was quite annoyed because we had gone almost three days before they had informed us that there was anything seriously wrong with the works.”⁵⁶⁵ The letters page of the *Manchester Guardian* was awash with embittered residents, angered that “at the very least, we might have wanted to stay indoors” and “shut [our] windows to avoid escaping radioactivity.”⁵⁶⁶ Over the following days, coverage in the national newspapers took a similarly disapproving tone, reflecting the growing hostility amongst the local public. These animosities were the feature of reports by the *Daily Mail* and *Daily Express*, who asserted “the right of individuals to know how to protect themselves.”⁵⁶⁷ The *Daily Express* ran a feature with the headline: “Distrust- That is the mood which is growing among the ordinary people who work at Calder Hall, or live in the surrounding Cumbrian villages.”⁵⁶⁸ Prominent magazine, the *New Scientist* reported that the public had been “severely shaken” by attempts to “minimise the gravity” of the accident and by the “extremely late hour” at which their health had been considered.⁵⁶⁹ Efforts to protect the imaginary of nuclear safety by disclosing limited amounts of information to the public therefore contributed to a wave of local resistance. This fed into and embedded dystopian imaginaries of nuclear technologies as a threat to public health by challenging the safety of nuclear technologies and the integrity of the authorities responsible for managing them, exposing their deliberate attempts to hide and suppress the threat to local people.

⁵⁶⁵ McSorley, *Living in the Shadow*, p. 12.

⁵⁶⁶ *Manchester Guardian*, 15 October 1957; see also, H. Bolter, *Inside Sellafield: Taking the Lid off the World's Nuclear Dustbin* (London: Quartet Books, 1996), p. 40; Whitehaven Archives and Local Studies Centre, ‘Minutes of the First Meeting of the Windscale Emergency Liaison Committee,’ 2 December 1957, (SRDE 1/3/2/6).

⁵⁶⁷ *Daily Express*, 16 October 1957; *Daily Mail*, 16 October 1957.

⁵⁶⁸ *Daily Express*, 17 October 1957, p. 9.

⁵⁶⁹ *New Scientist*, 17 October 1957; Welsh, *Mobilising Modernity*, p. 99.

Nuclear secrecy was thus reinterpreted, not as a benign component of a future utopia but as a political instrument that disguised the plant's risk to public health. Disengaging with the imaginary of nuclear safety, local people saw the UKAEA's silence as an indication of the threat to public health. Sociologist Ulrich Beck argued that because radiation is an invisible hazard, people are "dependent on scientific and administrative knowledge about the hazards."⁵⁷⁰ He found that when these vehicles of communication are found to be unreliable, public trust in the institutions breaks down and people lean upon their own "experience-based expertise."⁵⁷¹ We can see this happening in the aftermath of the fire as citizens, increasingly aggrieved by the slow and incoherent information emanating from the UKAEA, refuted the industry line that they were not at risk from the fire. Instead, residents relied upon their own knowledge of local weather patterns to demonstrate that radioactive fallout had contaminated the local area, disputing the industry's claim that they had not been exposed to airborne radionuclides and that the vast majority had been blown out to sea.⁵⁷²

The few official statements that had been released sought to play down the severity of the incident and its threat to public health, concluding that "no-one in this area is in danger" by explaining that radiation had passed harmlessly over the Irish Sea.⁵⁷³ These statements contradicted the experience-based knowledge of local people, who resisted attempts to mislead

⁵⁷⁰ Beck, *Risk Society*; O. Kuchinskaya, 'Articulating the Signs of Danger: Lay Experiences of Post-Chernobyl Radiation Risks and Effects', *Public Understanding of Science*, 20.3 (2011), p. 407.

⁵⁷¹ H. Collins, and R. Evans, 'The Third Wave of Science Studies: Studies of Expertise and Experience', *Social Studies of Science*, 32.2 (2002), pp. 235- 296.

⁵⁷² In her official history, Arnold explained that during the fire "the weather pattern was complex and changeable." She noted that whilst initial wind patterns "appeared to be blowing offshore and out to sea", above these light, variable, easterly winds there was an inversion layer at 400ft, and above that south-west winds prevailed. Then, in the early hours of 11 October, a cold front caused the wind to freshen and veer northerly, blowing from the north-west for some twelve hours. Thus, there were two distinct plumes: the earlier carrying material north-east, the latter moving to the south-east over England and eventually over Western Europe. See, Arnold, *Windscale*, p. 53; National Archives, 'Plowden/PM', 11 and 12 October 1957', (AB 16/2441); *Manchester Guardian*, 12 October 1957.

⁵⁷³ *West Cumberland Times*, 19 October 1957, p. 6.

them. One interviewee recalled the lack of credibility in these statements. He explained that “it was obvious that it [the radiation] hadn’t blown out to sea and quite a lot of it was in the coastal strip.”⁵⁷⁴ This claim was particularly patronising, given the intimate knowledge of wind and weather patterns held by the agricultural communities dotted along the coast. One resident joked that, “one thing a countryman does know is which way the wind is blowing! He looks at the cows and their tails!”⁵⁷⁵ In light of the contradiction between their own understanding and industry assurances, residents became increasingly suspicious of the seemingly misleading information given to them by the UKAEA and began constructing their own interpretations of nuclear risk. This was a process acknowledged by contemporary newspaper reports. The *Daily Express* noted that local people had become distinctly “sceptical about the assurances that have been proffered by experts,” whilst the local *Barrow News* protested that “these scientists leave us baffled”, with reassurances which are “no more than wishful thinking.”⁵⁷⁶ These narratives suggest that the local population, whilst ostensibly apathetic in their initial responses to the Windscale fire, became increasingly disturbed by official attempts to mislead them and minimise the threat to public health.

Using their experiential knowledge, local citizens challenged the credibility of the utopian STIM and imaginaries of nuclear safety, formalising the threat to public health through the harmful effects of radiation exposure and official efforts to hide this evidence. Attempts to conceal the extent of radiation exposure were debunked by local scientists, who empirically

⁵⁷⁴ E. Davis, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 11 October 2010, p. 20. This belief was later vindicated by the evidence that radioactive fallout had been blown inland, spreading radiation throughout the West of the UK, the North East of England, and registering as far away as Norway and the Netherlands. See, J. Blok, R. Dekker and C. Lock, ‘Increased Atmospheric Radioactivity in the Netherlands after the Windscale Accident’ *Applied Science Research*, 7.0 (1985), pp. 150ff; N. Stewart and R Crooks, ‘Long-range Travel of the Radioactive Cloud from the Accident at Windscale’, *Nature*, 182.0 (1985), pp. 627f; T. Bergan, M. Dowdall, and O. Selnaes, ‘On the Occurrence of Radioactive Fallout over Norway as a Result of the Windscale Accident, October 1957’, *Journal of Environmental Radioactivity*, 99.0 (2008), pp. 50- 61.

⁵⁷⁵ Author’s interview with Albert Donald, 3 March 2019.

⁵⁷⁶ *Daily Express*, 23 October 1957, p. 2; *Barrow News*, 18 October 1957.

proved the fire's threat to public health. Whilst the UKAEA were using radiation levels recorded at the Sellafield site, scientists knew that these figures hid the extent of airborne radiation downwind of the plant. Ministry officials explained that "the greater part has been retained by the Windscale chimneys [and] only a small amount has been distributed over the works site."⁵⁷⁷ Despite this, tests conducted by local scientists had proved that in the event of an accident, radiation levels would be higher a couple of miles away from the plant, rather than at the site itself. They explained that "on a chimney, the maximum fallout tends to be somewhere downwind, not somewhere immediately adjacent to the chimney."⁵⁷⁸ Concerned about the extent of local contamination, a number of Sellafield scientists decided to take their own independent measurements at their homes within Seascale. These findings were completely incongruous with the UKAEA's publicised measurements. One scientist, Dr Frank Leslie explained that "I took a tissue and rubbed it over my son's shoes, and I was amazed to find the count rate was 3,500 counts a minute. In the lab, if you had more than 600 counts per minute you were regarded as being contaminated, and there we were, six times the normal level in Seascale."⁵⁷⁹ Similar findings were recorded by Piya Guneratne, who took his daughter's shoes into the laboratory to check the radiation readings they registered, finding levels much higher than those published by the UKAEA.⁵⁸⁰ Marjorie Higham, a scientist at the plant who would go on to campaign against Sellafield as a County Councillor in the 1970s, recalled measuring colleagues on the day of the fire. She recalled that, "some of my friends had cycled from Seascale, along the edge of the sea and we discovered, to our horror, that their hair went off the scale of the instrument completely. At that time, we had not come across that amount of activity. The instruments had never been stretched to that limit..."⁵⁸¹ Building upon the

⁵⁷⁷ *West Cumberland News and Star*, 12 October 1957, p. 12.

⁵⁷⁸ *Inside Story: Our Reactor Is on Fire*, D. Blakeway. London: BBC, 1990.

⁵⁷⁹ *Ibid.*

⁵⁸⁰ McSorley, *Living in the Shadow*, pp. 17f.

⁵⁸¹ *Inside Story: Our Reactor Is on Fire*, D. Blakeway. London: BBC, 1990.

misgivings of the non-scientific public, these findings categorically and empirically proved that local people had been exposed to dangerously high levels of radiation and that this had been covered-up by the nuclear authorities.

Part of a growing cohort of local scientists concerned about the threat to the public, Dr Leslie published his findings in the *Manchester Guardian* on 15 October 1957, confirming that residents had been exposed to levels of radioactivity far in excess of those publicly released.⁵⁸² This subverted the utopian nuclear imaginary by debunking imaginaries of nuclear safety and exposing the deception of the UKAEA. Leslie's revelations provoked a sharp backlash amongst the local community, as residents reacted with hostility towards attempts to "bamboozle" the local population.⁵⁸³ Residents explained that they were "quite horrified" by the incongruity between official and independent measurements and became convinced "something was radically wrong" with the information they were being given, rejecting the authority's attempts to "pull wool over their eyes," through the telling of a series of "lies" and "half-truths" designed to keep the incident "as quiet as possible."⁵⁸⁴ Echoing public sentiment, the *West Cumberland Times* and the *Daily Express* spoke of a simmering undercurrent of "distrust" towards "the clam-mouthed" authorities operating under "a veil of secrecy."⁵⁸⁵ Likewise, local journalists pointed to the broader implications these revelations had upon public safety, declaring that Leslie's figures had brought about a "complete lack of confidence

⁵⁸² *Manchester Guardian*, 15 October 1957. Leslie's whistle-blowing incensed Prime Minister Harold MacMillan, who held very little respect for the pronouncements of what he considered 'rogue scientists' such as Leslie, who he later referred to in his private memoirs as "an opinionated ass." (National Archives, (PREM 11/2156); see also Arnold, *Windscale*, p. 62.

⁵⁸³ F. Madge, 'Ambleside Oral Archive', interviewed by SF, 21 August 1990; Leslie remarked that it was "highly unsatisfactory that the authorities should be able to hush these things up." (*Inside Story: Our Reactor Is on Fire*, D. Blakeway. London: BBC, 1990.)

⁵⁸⁴ E. Davis, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 11 October 2010, p. 20; F. Madge, 'Ambleside Oral Archive', interviewed by SF, 21 August 1990; Whitehaven Archive and Local Study Centre 'The Case Against THORP: Windscale and West Cumbria', Friends of the Earth, p. 13, (Egremont Folder); *Inside Story: Our Reactor Is on Fire*, D. Blakeway. London: BBC, 1990.

⁵⁸⁵ *Daily Express*, 17 October 1957, p. 9; *West Cumberland News*, 9 November 1957, p. 5.

amongst the public in the operation of this business.”⁵⁸⁶ By eroding public trust in the UKAEA, his revelations bolstered public fears about the unknown quantities of radiation they had been exposed to, helping embed dystopian imaginaries of nuclear technologies as a threat to public health.

The local community’s lack of trust in the nuclear authorities heightened public anxieties about the long-term and hidden effects of radiation upon their bodies. Here, the invisibility of radiation, the UKAEA’s control over the production and dissemination of radiation knowledge, and the public’s lack of faith in their ability to tell the truth generated “a proliferating physic anxiety as potentially exposed individuals realised their inability to evaluate [nuclear] risk.”⁵⁸⁷ Impassioned locals wrote to the local newspaper demanding “we know something happened at Windscale, but what? Let us tear away the veil of secrecy and admit there is danger from these reactors!”⁵⁸⁸ Restricted from knowing if and to what extent they had been irradiated, and the potential long-term implications this may or may not have, local citizens lost the ability to measure and quantify their exposure or exercise any kind of control over their bodies, as the after-effects of radiation hung “in the abyss of scientific uncertainty.”⁵⁸⁹ In his research on nuclear sites, anthropologist Joseph Masco has argued that radiation exposure has a series of profound psychosocial effects and greatly increases anxieties amongst those exposed. He explains that radiation executes its “own uncanny form of manifest destiny, traveling an unpredictable course through ecosystems and bodies, creating “new social beings [and] new tactile experiences of everyday life” as citizens engage with and fashion possible futures for themselves on the back of their exposure.⁵⁹⁰ In short, radiation exposure

⁵⁸⁶ *West Cumberland Times*, 2 November 1957, p. 7.

⁵⁸⁷ Masco, *Nuclear Borderlands*, p. 12.

⁵⁸⁸ *West Cumberland Times*, 19 October 1957, p. 6; *West Cumberland News and Star*, 14 October 1957.

⁵⁸⁹ Brown, *Plutopia*, p. 308.

⁵⁹⁰ *Ibid.*

(whether real or imagined) encouraged citizens to imagine their future health and engage with the possibility that they could suffer from radiation-induced illnesses at any point in the future. This echoes the findings of environmental studies examining the long-term effects of chemical contamination, which have found that exposure to chemical or radioactive toxins causes individuals to evaluate the likelihood of health effects further down the line.

In their study of chemical contamination in the New York district of Love Canal, Martha Fowlkes and Patricia Miller found that people were “required to articulate coherent perspectives about the actual or potential implications of the chemicals on their well-being.”⁵⁹¹ Similar processes were at play in the West Cumbrian context, where citizens were forced to evaluate the relative likelihood of experiencing health defects as a result of the incident. In this way, the breakdown of trust relations between the nuclear industry and the local community meant that local people were left to speculate about the amount of radiation they had received and imagine the future effects this may have. Citizens became dislocated in an imagined temporal ellipsis, wherein the effects of radiation could manifest at any given moment. This helped embed imaginaries of nuclear technologies as a threat to public health by forcing citizens to imagine and reconcile themselves within a potential future characterised by the deleterious effects of radiation upon their bodies. Furthermore, it also forced local people to imagine the impact of radiation exposure upon their families and young children. This proved a major source of consternation amongst parents who had unwittingly exposed their children to radiation, as the exceptionally fair weather on the day of the fire meant that many children were outdoors in the open air whilst the fire raged.

⁵⁹¹ M. Fowlkes, and P. Miller, *Love Canal: The Social Construction of Disaster* (Washington DC: Federal Emergency Management Agency, 1983), pp. 55f.

Attempts to embed and protect the utopian STIM by not warning the local public about the fire thus had the opposite effect, engendering public fears about the possible health effects radiation exposure may have had on their children. A frequent feature of oral interviews was respondents' reference to where their children were at the time of the fire. This was never a question put to interviewees but something that respondents volunteered as they arranged their memories and encoded them in a narrative structure. Oral historians have shown that the structure given to an individual's memories can reveal a lot about that person's relationship with the histories they are retelling.⁵⁹² Specifically, Lynn Abrams has argued that oral historians should observe "how people shape their narratives in order to make a point", analysing the way they structure their memories in order to "suit the story they are telling and the meaning they wish to impart."⁵⁹³ By framing their memories of the fire around their children, interviewees demonstrated anxieties about the long-term impact of radiation upon the human body, particularly those of young children.

One example came from a local farmer, who explained that "we had two sisters who both had babies at the time. During the Friday they were parked outside, right next to the factory fence. One was just four months old and one was 18 months. The wind was coming from the west and it was drifting our way... We were quite annoyed when we found out because it was enough for the workers the other side of the fence to go home and we had these young babies..."⁵⁹⁴ Here, we see how he structured his life-story around the potential impact the fire may have had upon his sisters' children. His inability, or conscious choice not to conclude this

⁵⁹² In her study into the role of emotion within the oral history interview, historian Katie Holmes suggests that memories are "at once something bigger and something more interior than the life-history, related to consciousness, self, and the way that self is told or performed." (K. Holmes, 'Does it Matter If She Cried? Recording Emotion and the Australian Generations Oral History Project', *The Oral History Review*, 44.1 (2017), p. 68.

⁵⁹³ Abrams, *Oral History Theory*, pp. 108, 128f.

⁵⁹⁴ McSorley, *Living in the Shadow*, pp. 12, 17, 24; For further examples, see interview with M. Davis, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 16 December 2010.

passage of speech also indicates his uneasy relationship with this history, as the possible consequences of the fire extended into the present and he contended with the possible dormant or future health problems that may result. Framing his narrative around the most vulnerable members of society, we can see how the fire supplanted the utopian imaginary of nuclear safety as citizens conceived of and imagined a future characterised by the negative health effects of radiation.

3.4: Milk Ban.

The threat posed by radiation was made clear by the UKAEA's October 12th decision to prevent the consumption of local milk supplies, which had become contaminated with excessive quantities of radiation during the fire. Scientists were troubled by high radioactive iodine levels in local milk, which was known to concentrate in the thyroid glands of infants.⁵⁹⁵ No scientific literature existed which offered any guidance for this particular kind of nuclear accident, since most studies at this point focused on the impact of nuclear weapons, and specifically related to lifetime doses rather than accidental exposures. Studies had "not yet addressed the question of radiological protection in once-in-a-lifetime emergency for the general population; and it had developed a model for a standard man, but not for a standard child or baby."⁵⁹⁶ The limited data available suggested that levels of Iodine 131 in milk should not exceed 0.3 micro-curies per litre; since it had been established that damage could occur

⁵⁹⁵ Arnold, *Windscale*, pp. 55f. At this time, (and as a consequence of the government's vigorous pursuit of nuclear technologies), adequate radiation protection standards had not yet been established. Limited knowledge of radiation had been hurriedly translated into a series of thresholds levels which covered an array of industrial plants and research laboratories handling multiple types of radioactive material; many of which were calculated from what limited data and theory was available. The fire revealed the deficiency of these models, as scientists scrambled to establish 'safe' threshold levels for the quantities of radioactivity entering the local atmosphere and foodstuffs.

⁵⁹⁶ *Ibid.*

above this point. Tests of local milk showed levels between 0.4 and 0.8 micro-curies per litre from October 11 (the day after the fire was discovered) onwards.⁵⁹⁷ The decision was then made to prevent the consumption of local milk by instigating a milk ban within an 80 square mile radius. This was later extended to 190 square miles and lasted up to a month.⁵⁹⁸

The disposal of milk collected from local farms publicly showcased the threat of consuming irradiated foodstuffs and played a major role in embedding dystopian imaginaries of the harmful consequences of nuclear technologies. Owing to the invisible nature of the radiation released and the fire's location deep within the boundaries of the Windscale plant, the threat to the public was not immediately discernible. In her study of Belarusian communities exposed to fallout from the Chernobyl nuclear plant, Olga Kuchinskaya argues that "radiation risks and health effects are not always obvious or immediately observable for those experiencing them."⁵⁹⁹ In this way, the milk ban provided a tangible measure of the fire's threat to public health, and a visual representation of the extent of contamination beyond the factory perimeter.

Despite official attempts to present the ban as an exercise in conservatism, this decision had a symbolic role in undermining the institutionally pedalled vision of nuclear technologies as offering a clean, safe, and abundant source of energy.⁶⁰⁰ The destruction of locally sourced milk appeared to contradict official assurances that there was no danger posed to the public

⁵⁹⁷ *Ibid.*

⁵⁹⁸ *Ibid.*, pp. 34- 37.

⁵⁹⁹ O. Kuchinskaya, 'Articulating the Signs of Danger', p. 405.

⁶⁰⁰ It has been argued that "the news of the milk ban created more anxiety within the general public than the fire itself" and became the factor that "really scared the public both nationally and locally." (R. Batten, 'A Significant Moment in the Development of Nuclear Liability and Compensation: Dealing With the Consequences of the Windscale Fire 1957', *Ex Historia*, 3.0 (2011), p. 95; T. Hall, *Nuclear Politics: The History of Nuclear Power in Britain* (Harmondsworth: Penguin Books, 1986), p. 62; Welsh, *Mobilising Modernity*, pp. 98f.

and became one of the ways in which the fire's impact could be actualised by the public. Oral respondents frequently referenced the sight of a UKAEA Land Rover patrolling the country lanes in the surrounding area taking milk samples for testing, recalling news bulletins which showed thousands of litres of milk being poured down the drain.⁶⁰¹ The interviews demonstrated that the destruction of local milk functioned as a form of collective memory which helped actualise the threat posed to locals' well-being. This overwhelmingly superseded the imaginary of nuclear safety that had largely characterised the period up until this point, forcing locals to reconcile with the potential harmful effects of radiation upon their bodies. Furthermore, it actively embedded dystopian imaginaries amongst local citizens who became concerned about the health effects of consuming local produce in the three days between the fire and the implementation of the milk ban.

The milk ban embedded imaginaries of radiation hazard by disclosing the threat to public health from the consumption of local foodstuffs. Residents had received no warning to stop consuming other types of local produce whilst the fire had spewed contamination onto the surrounding countryside over the previous days. Interviewees recalled that they had been consuming local vegetables, fruit, and milk for days before they were informed of its potential hazards.⁶⁰² Dorothy Bateman explained that "they never once came to monitor the garden, we grew and ate our own vegetables and fruit. But we've never been checked, and nobody has ever come to ask us anything." This omission fed into a narrative of victimhood and

⁶⁰¹ J. Johnson, 'Sellafield Stories: Oral History Project', interviewed by G. Wilkinson, 24 June 2010, p. 6; K. Smith, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 19 March 2010, p. 10; Author's interview with Isobel George, 6 March 2019.

⁶⁰² E. Dawson, 'Sellafield Stories: Oral History Project', interviewed by G. Wilkinson, 13 July 2010, p. 26; A. Barnes, 'Sellafield Stories: Oral History Project', interviewed by G. Wilkinson, 4 August 2020, p. 11; Interview with M. Davis, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 16 December 2010, p. 24. It was also later established that milk up to three times the permissible level had been sold in Grasmere, a fact which was omitted from the Medical Research Council's report into the fire, published in November 1957. (*Observer*, 3 January 1988.).

exploitation, as local people like Dorothy engaged with the dominant power relations of the nuclear industry, remarking that “we were very naive and trusting. But we weren’t being protected by anybody, not the NRPB [National Radiological Protection Board], the government, not Copeland environmental health – nobody.”⁶⁰³ The image of milk being destroyed therefore provided tangible evidence of an otherwise invisible disaster, formalising the danger posed to the local public through their consumption of local food contaminated with harmful levels of radioactivity. In this way, the milk ban espoused the fire’s direct threat to public health and helped embed dystopian imaginaries of radiation hazard by pointing to the possible health effects of consuming local produce. Furthermore, the milk ban had a series of negative effects on local farmers, who suffered financially from the after-effects of the fire on local markets.

3.5: Farming Communities.

Tracing the contours of public sentiment during this period, it is possible to identify an increasing current of anxiety within farming communities in the aftermath of the fire, as farmers repeatedly identified radiation as a threat to their income and livelihoods. Whilst this sentiment failed to manifest into any form of direct protest towards the UKAEA or Sellafield itself, we can see a growing pattern of concern towards radiation as farmers embedded a series of undesirable futures characterised by the negative effects of radioactive contamination. This was centred around overlapping concerns regarding the economic impact of radiation upon farming economies and anxieties about the radiobiological threat to cattle, arable land, and farm produce. In the first instance, farmers were particularly aggrieved, as having been

⁶⁰³ McSorley, *Living in the Shadow*, p. 24.

identified as farms affected by radiation, many lost income as the price of their produce and land fell in the months following the fire.

The Milk Marketing Board initially reimbursed farmers for the milk that had been poured away. However, compensation only continued for a month and many farmers suffered from long-term financial losses as people refused to buy their produce and land prices plummeted.⁶⁰⁴ Whilst restrictions only lasted for a few days in some areas, interviewees remarked that “it wasn’t a seven day wonder, cos the aftermath took a lot of dealing with, you know,” referencing the long-term effects of the ban on local markets.⁶⁰⁵ Wynne, Waterton, and Grove-White have noted that “farmers’ dependency on annual lambing or full quotas of milk means that their economic viability rests heavily upon environmental factors”, identifying that “any public perception of radioactive blight on farm products” places farming families in an economically vulnerable position.⁶⁰⁶ This was especially true for the sheep farming fell communities, who relied upon the Autumn sale of sheep for much of their annual income. For these communities, the timing of the fire could not have been worse, falling in the middle of the most important time of the year.⁶⁰⁷

⁶⁰⁴ In fact, many farmers saw this as a financial opportunity and profiteered from this scheme in the short-term by watering down the milk and registering larger yields than normal. Multiple respondents stressed that milk production increased during the weeks following the fire, as canny Cumbrian farmers sought to capitalise on the chaos by adding water to the milk levels. One interviewee recalled that “because nobody was bothering any longer measuring cream content or volumes of milk, it was all being poured down a drain and the farmers were being compensated... all sorts of allegations went around like the milk yield shooting up!” (I. Rule, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 19 November 2010, p. 6; K. Smith, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 19 March 2010, p. 11; *West Cumberland News*, 26 October 1957, p. 11; See also National Archives, ‘Farm Forum – A Momentous Meeting’, 31 October 1957, (MAF 298/54).

⁶⁰⁵ D. Crellin, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 4 March 2010, p. 12.

⁶⁰⁶ Wynne, Waterton and Grove-White, *Public Perceptions*, p. 8.

⁶⁰⁷ “Sheep farms, particularly fell-farms, earn most of their annual income in the few autumn weeks from September to November.” See, J. Rebanks, *The Shepherd’s Life* (Penguin: London, 2015), p. 108.

Local newspaper reports emphasised the incident's "disastrous aftermath for the farming community", estimating losses of £50,000 as the public stopped purchasing local products.⁶⁰⁸ Reports from the period referenced the substantial financial losses "incurred by farmers through falls in livestock price and the refusal of housewives to buy meat, eggs and vegetables produced in the banned areas."⁶⁰⁹ These narratives emerged in the national press, with the *Daily Mirror* acknowledging farmers' desperate attempts to "convince the people outside the area that the farms, the livestock and the vegetables in Cumberland were worth buying."⁶¹⁰ Animals from restricted areas were marked with yellow paint, creating what one market dealer called "a buyer resistance [to their livestock]," as a number of disgruntled farmers complained to the National Farmers' Union (NFU) that their cattle were "doomed and their farms valueless."⁶¹¹ A report in the local *West Cumberland News and Star* also explained that police at an Exeter market had forbidden a farmer to sell a group of cows originating from nearby Ulverston, due to fears that they would be too radioactive for consumption.⁶¹² These incidents not only emphasised the deleterious effects of the nuclear industry upon farming economies but aligned with farmers' existing prejudices against the nuclear industry as an

⁶⁰⁸ Farmers received £50,000 as compensation for 3,050,000 litres of milk which were destroyed. (National Archives, 'Copy letter sent to Mr. Drake from Donald Perrott', 25 October 1957, p. 2, (AB 8/763); *West Cumberland News*, 26 October 1957, p. 1.)

⁶⁰⁹ *West Cumberland News*, 26 October 1957, p. 1. Furthermore, the price of land plummeted as local farms became tainted by the negative publicity that surrounded the area. In particular, Lorna Arnold's study of the fire references one farmer who, beholden by public anxieties regarding the contamination of his crops and livestock sought to sell his farm and move further away from Sellafield. Unable to find a willing buyer, he was ultimately forced to accept a price considerably below market value for his land. See, Arnold, *Windscale*, p. 70.

⁶¹⁰ *Daily Mirror*, 18 October 1957, p. 17. Press reports noted the "concern amongst the agricultural population about the effects, if not of radioactivity on their stock, at least of the reputation that same stock will have if it is put on the market." Whitehaven Archives and Local Studies Centre, (Nuclear Energy Folder); see also National Archives, 'Notes of a Meeting Held in Mr. Crooks' Office 2.30 p.m, 25 October 1957', p. 2, (MAF 250/210).

⁶¹¹ Hall, *Nuclear Politics*, p. 59; National Archives, (MAF 298/54), National Archives, 'Farm Forum – A Momentous Meeting', 31 October 1957, p. 1, (MAF 298/54).

⁶¹² Newspaper reports explain that contaminated cattle were marked with yellow paint, and their irradiated thyroid glands were removed and buried "no less than two feet below ground... as a precaution." (*West Cumberland News and Star*, 17 October 1957; *West Cumberland News and Star*, 23 October 1957.)

incursion upon rural life. This helped embed an imaginary of the nuclear industry (and more specifically radiation) as a dystopian imposition upon farmers' livelihoods and way of life.

Intertwined with fears about declining revenues and ongoing debates about public health, farmers were also deeply concerned about the long-term effects of radiation upon their produce, cattle, and arable land. The fire thus helped embed dystopian imaginaries of nuclear technologies as a threat to farming interests, the wellbeing of their animals and crops, and public health more broadly. Internal correspondence within the Ministry of Agriculture, Fisheries and Foods made just after the fire recognised that “there is a great deal of uneasiness in this country both among the general public and the farming community about radioactivity. This has been made worse by the Windscale accident.”⁶¹³ Referencing contemporary attitudes, local residents recalled that “there was certainly a lot of panic in the area” as farmers “were frightened that contaminated dust or something’d settle on their fields.”⁶¹⁴ Fears about radiation were not altogether new, as farming communities had expressed concerns about radiation on several occasions throughout the previous decade. As early as 1947, Labour M.P. for Whitehaven, Frank Anderson, voiced the concerns of local farmers that atomic science could induce some form of “industrial disease” within the area, expressing unease about the effects of radiation, which were “not well known.”⁶¹⁵ Likewise, in 1955 only two years before the fire, the *West Cumberland News and Star* noted the “widespread alarm throughout West Cumberland” caused by a French newspaper article which claimed that Sellafield’s radioactive emissions could render local animals sterile, whilst a series of articles in the *Sunday Chronicle* investigating the effects of radiation at nuclear facilities had, in the words of one local author,

⁶¹³ National Archives, ‘Letter to Mr. Pennison from unknown author,’ (MAF 298/68).

⁶¹⁴ A. Barnes, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 4 August 2020, p. 15; D. Crellin, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 4 March 2010, p. 11.

⁶¹⁵ Bracey, *Industry and the Countryside*, p. 104.

left the farming community “deeply perturbed.”⁶¹⁶ This suggests that prior to the fire there was, if not a deep rooted anxiety, but an underlying scepticism amongst the farming community about the possible effects radiation could have. The fire tapped into this undercurrent of concern, formalising and helping embed a dystopian imaginary of nuclear technologies as a threat to the economic interests of the farming community and the health of the public more broadly.

In the aftermath of the fire farmers increasingly voiced their anxieties about the long-term consequences of radiation. Writing in 1960, Sinclair observed that “for the first time since the factory began operating, anxiety began to creep into the minds of the farming community”, who expressed concerns about levels of radiation in the local area and the ability of scientists to control them.⁶¹⁷ This is reflected in oral accounts, as residents explained, “I think one of their problems was after the fire when it was admitted that actually some of the boffins didn’t know what to do. That, for the locals was their worst sort of fear, that there was this sort of dragon in their midst and did the boffins really know how to cope with the emergencies and the crises?”⁶¹⁸ This passage exposes the profound sense of vulnerability felt within local farming communities, as the fire exposed the industry’s inability to adequately protect them. Local farmer Ken Mawson explained that we “lost confidence there and it’s never been fully regained since.”⁶¹⁹ The level of concern amongst local farmers culminated in an emergency public meeting of the NFU in the local village of Egremont, where farmers demanded a full government inquiry “into the effect of radiation not only on milk, but on farm-stock.”⁶²⁰ Here,

⁶¹⁶ *West Cumberland News and Star*, 12 November 1955.

⁶¹⁷ Sinclair, *Windscale*, p. 6.

⁶¹⁸ M. Todd ‘Ambleside Oral History Group’, interviewed by J. Pilgrim, 2013, p. 10.

⁶¹⁹ K. Mawson, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 6 August 2010, p. 18.

⁶²⁰ *West Cumberland Times*, 23 October 1957, p. 12; see also, *The Times*, 23 October 1957, p. 6.

farmers expressed their profound concerns about the potential long-term implications of the incident, constructing imagined futures of land and animals harmed by radioactivity.

Expressing the concerned views of members, an NFU spokesman told the local press that whilst business interests may be satisfied that the fire represented no threat to their operations, “farmers have still to be convinced that there is no long-term effect on their livestock through the contamination of grass by iodine.”⁶²¹ A similar meeting in the village of Gosforth a couple of days later drew “the biggest gathering of NFU members a Whitehaven branch meeting has ever attracted.”⁶²² Local reporter William Newall, who attended the meeting, described the tone of the meeting as extremely tense, with an eight-man panel of experts from the Ministry of Agriculture, Fisheries and Foods (MAFF) and the UKAEA being “thrown to the lions”, subjected to a group of concerned farmers who “fired a barrage” of questions at them.⁶²³ Newall describes how farmers interrogated the officials, asking “would young calves fed on milk and growing stock running out on grass, feel any after-effects of iodine radiation?” and demanding “what assurance can we have that a radio-active fallout will not occur again?”⁶²⁴ These public meetings demonstrate how the imaginary of nuclear safety broke down amongst local farming communities, who imagined a dystopian future characterised by the threat of radiation and the long-term effects of prolonged exposure upon their land and livestock.

⁶²¹ At this meeting Windscale Manager H.G. Davey told farmers not to be concerned by “the rumours flying about”, impressing upon them that “it is in your interest to see that confidence is maintained- first, among yourselves [and] in agricultural products in this area,” warning farmers that “unfounded rumours [should] have no place in your attitude towards the future.” (*West Cumberland News*, 26 October 1957, p. 11; *West Cumberland Times*, 23 October 1957, p. 12.)

⁶²² *West Cumberland News*, 26 October 1957, p. 11.

⁶²³ National Archives, ‘Farm Forum – A Momentous Meeting’, 31 October 1957, p. 1, (MAF 298/54); *West Cumberland News*, 26 October 1957, pp. 11.

⁶²⁴ *Ibid.*

Concerned about the mounting levels of tension amongst farming communities, government officials sought to protect the imaginary of nuclear safety by suppressing the true extent of radiation releases. This points to official efforts to embed and stabilise the utopian imaginary in the face of increasing public resistance. In the period following the fire, government ministers wrote to one another with suggestions to placate anxious farmers and to “do something to satisfy farming opinion that the government had a firm hold on the situation” and “allay the general uneasiness.”⁶²⁵ It was therefore decided to amend the radiation figures for the period prior to the fire to cover-up previous incidences of radioactive contamination.

Beginning in 1955, the UKAEA had deliberately and secretly released substantial quantities of radioactive strontium-90 into the atmosphere “as part of a deliberate and organised scientific experiment.”⁶²⁶ Officials, already under considerable pressure from farming interests, expressed their concern that this would “cause considerable alarm” if, in the aftermath of the fire, the public became aware of this.⁶²⁷ Seeking to mitigate a public backlash, officials authorised that the limit for human exposure to strontium-90 could be raised eight-fold, in order to retrospectively account for the increased discharges and thus “remove all need for concern

⁶²⁵ National Archives, ‘E.P Keely, ‘New Permissive Levels for Radio-isotopes: Meeting with Sir Harold Himsworth and Sir William Slater, 3rd November, 1958’, (MAF 298/68).

⁶²⁶ These emissions had first been discovered in 1955 when a study into local contamination found excessively high levels of radiostrontium in the district around Windscale. (National Archives, ‘Standby Statement,’ (HLG 120/297) Despite this, these findings were not released to either the public, or the wider scientific community and had been “suppressed, until it became unavoidable, in the course of reporting on the 1957 fire, to disclose it.” (National Archives, ‘Letter to Mr. Pennison from unknown author,’ (MAF 298/68); National Archives, ‘F.J Ward to Smith, Officer of the Minister for Science, 6 April, 1960,’ (HLG 120/297) Whilst the matter had been brought to the attention of Prime Minister Harold MacMillan, he “gave instructions that the matter should be kept secret.” (National Archives, (AB 16/2689); Welsh, *Mobilising Modernity*, p. 88; McSorley, *Living in the Shadow*, p. 110; National Archives, ‘Letter to A.C. Spark from unknown author’, 20th April 1959, (MAF 298/68); National Archives, (HLG 120/297); Arnold, *Windscale*, p. 37.

⁶²⁷ National Archives, ‘14 March, 1960’, (HLG 120/297). In a private meeting, Sir Harold Himsworth, the distinguished secretary of the Medical Research Council, acknowledged “how difficult the situation would be if recent findings in the Windscale area for SR.90 in milk had become known.” He recognised that, “the figures disclosed around Windscale works would give rise to a good deal of public anxiety when they become known unless very carefully handled.” (National Archives, ‘E.P Keely, ‘New Permissive Levels for Radio-isotopes: Meeting with Sir Harold Himsworth and Sir William Slater, 3rd November, 1958’, (MAF 298/68).

regarding human health.”⁶²⁸ This drastically “watered down” the severity of the releases, ensuring that they could be presented as having amounted to nowhere near the authorised limits, despite the fact that they had, at time of release, exceeded these limits.⁶²⁹ This speaks to the changing pattern of public attitudes in the aftermath of the Windscale fire. Whilst previously public awareness and concern about radioactivity was so low that the UKAEA felt able to deliberately expose the local population to excessive quantities of radiation as part of a scientific experiment, following the fire the government were forced to carefully stage-manage the release of radiation figures so as to stabilise the imaginary of nuclear safety. This suggests that the fire contributed to an increasing awareness and anxiety towards radiation more broadly, as farming communities imagined the undesirable health effects this would have on their cattle, land, and public health. Indeed, the release of these figures did very little to assuage the concerns of local farmers, who embedded imaginaries of radiation hazard by pointing to deformities and abnormalities amongst their livestock in the aftermath of the fire.

In the aftermath of the fire, farmers noticed a series of peculiar, unfamiliar health problems amongst their animals, and began to correlate the strange array of defects with the radiation they received from the plant. Examining lay responses to nuclear contamination, historian Davide Orsini has argued that “in order to make invisible risks (such as radiation) visible, nonexperts and experts alike rely on interpretations of environmental and bodily signs to provide practical evidence through which they can objectify and represent risk in tangible

⁶²⁸ This increased the permissible limits from 250 to 2000 Sieverts per gram of calcium in milk. Whilst the fire had made it impossible to suppress the releases indefinitely, public officials and ministers concocted a PR campaign through which they could strategically time the admission of the Strontium releases so as to minimise public resistance. (National Archives, ‘Letter to A.C. Spark from unknown author’, 20th April 1959, (MAF 298/68); National Archives, ‘Standby Statement,’ (HLG 120/297)

⁶²⁹ National Archives, ‘F.J Ward to A.P.G. Brown,’ 15 August 1960, (HLG 120/297).

ways.”⁶³⁰ Orsini’s study found that ordinary people infer nuclear risk by using environmental and biological signs as “inferential evidence for the presence or absence of radiocontamination.”⁶³¹ He argues that local people, “lacking direct or indirect knowledge of the object (radiation) had to infer its presence or absence by observing their surroundings to see whether radiation effects, as imagined through abstractions of its conceivable consequences, were or were not evident.”⁶³² For West Cumbrian farmers, the number of observed health defects amongst their cattle provided a form of empirical evidence which, whilst highly subjective, pointed towards the negative effects of radiation upon local animals. In this context, the strange array of mutations and abnormalities suffered by Cumbrian farm animals in the aftermath of the fire helped embed dystopian imaginaries of nuclear technologies as a threat to public health more broadly. One local farmer, Mr T. Wallbank, noticed that his cattle and poultry had begun suffering from severe lesions from late 1957 and into 1958. Observing similar incidences from other farms in the locale, he directly correlated these abnormalities to the effects of the Windscale fire and the Strontium releases, noting that the lesions on the muzzles of his cows had not occurred prior to the fire and ceased in 1958, when Strontium contamination ended.⁶³³ A number of farmers noticed similar deformities amongst their livestock.⁶³⁴ In the 7 December 1958 edition of national newspaper the *Sunday Graphic*, local farmer Craven Hodgson wrote that he had spoken to several farmers who “had experienced trouble with their calving cows.”⁶³⁵ He added that half of his herd had shed their

⁶³⁰ D. Orsini, ‘Signs of Risk: Materiality, History, and Meaning in Cold War Controversies over Nuclear Contamination,’ *Comparative Studies in Society and History*, 62.3 (2020), p. 522.

⁶³¹ *Ibid.*, p. 540.

⁶³² *Ibid.*, p. 536.

⁶³³ National Archives, (AB 6/2072; NE75, NE75A; ARC 97/58; ARC 337 A/58; ARC 338/58; ARC 338 A/58; ARC 798 A/58; ARC 789 A/58; ARC 800/58); Arnold, *Windscale*, pp. 70f.)

⁶³⁴ Cattle suffering from these ailments became known locally by the derisive moniker “atomic herds.” (*Cumberland Evening Star*, 18 September 1958 p. 7.)

⁶³⁵ National Archives, Extract from *Sunday Graphic*, dated 7 December 1958, (AB 16/2328); R. Batten, ‘A Significant Moment in the Development of Nuclear Liability and Compensation,’ p. 100.

hair, leaving “large bare patches on their sides.”⁶³⁶ Other residents recalled the abnormally large number of dead sheep following the fire. One Sellafield employee later recounted that her Godmother had “looked out of her hotel window and saw sheep dead in the fields.”⁶³⁷ Imagining the potential links between these issues and radiation exposure, a number of worried farmers, including Mr Wallbank pressed their cases for compensation with the NFU and their local M.P., Frank Anderson.

Despite efforts to gain recognition and compensation for their deformed cattle, MAFF and the NRPB rejected that these issues were related to Sellafield in any way. Anderson remained steadfast in his belief that “authorities had behaved, and were behaving badly in this manner, and were concealing vital evidence.”⁶³⁸ Likewise, George Curwen, local NFU chairman also complained of under-hand tactics, stating that “naturally the Atomic Energy Authority want us to delay our claims... give them enough time and they’ll dodge the issue altogether.”⁶³⁹ Here, the lack of trust between the public and the nuclear industry produced specific ways of thinking about the relationship between sick cattle and radiation exposure. In his study of radiation risk in the US, François Diaz-Maurin has argued that the inability of nuclear authorities to “take seriously the anecdotal evidence provided by the local community can only exacerbate public distrust. And this distrust is more likely to form when experts are recognised as outsiders to the community affected by an environmental and health problem.”⁶⁴⁰ Here, various aspects of local resistance came into alignment, as prejudices about

⁶³⁶ National Archives, Extract from Sunday Graphic, dated 7 December 1958, (AB 16/2328).

⁶³⁷ *Daily Mail*, 19 March 2011. <dailymail.co.uk/news/article-1367776/UK-Government-covered-nuclear-reactor-blaze-caused-death-cancer.html> [accessed 5 July, 2019].)

⁶³⁸ National Archives, ‘Mr Frank Anderson M. P’, 11 September 1958, p. 57, (MAF 298/54).

⁶³⁹ *Sunday Express*, ‘Windscale Farmers Talk of New Fear’, 5 January 1958, p. 3.

⁶⁴⁰ F. Diaz-Maurin, ‘Chronic Long-term Risk of Low-level Radiation Exposure: Bridging the Lay/expert Divide’, *Bulletin of the Atomic Scientists*, 74.5 (2018), p. 338.

insider/outsider identities combined with anxieties about nuclear secrecy to heighten public concerns about the effects of radiation. This embedded disparate strands of the dystopian imaginary, as farmers' cultural biases fed into and co-produced attitudes towards radiation as a significant threat to public health.

Tracing the evolution of this imaginary, it becomes clear that it took shape and became embedded amongst farming communities in the months and years following the fire, as its long-term consequences became more readily apparent. Contrary to popular forms of cultural opposition, this resistance was not characterised by direct action, or even clear patterns of social organisation, but manifested itself in a deep-rooted cultural opposition towards the nuclear industry amongst local farming communities. Exploring their social interactions and indeed their conscious choice *not* to interact with the industry, we can see that farming communities held, articulated, and embedded dystopian imaginaries of radiation hazard in subtle and indirect ways that are not immediately obvious if one is looking for patterns of direct action or protest.

The sociotechnical imaginary emerges as a potent way of exploring and historicising localised resistance, revealing that at times farming communities internalised their resistance to the nuclear industry and expressed it as much in what they *didn't do* as what they *did*. This understanding takes its lead from the agency of the imagination as an intellectual plane capable of performing social work and transcending the often preferred and over-privileged categories of deeds and actions.⁶⁴¹ As Wynne, Waterton and Grove-White have demonstrated, just because ordinary people do not engage in displays of direct and active resistance, does not mean they are accepting or supporting of them.⁶⁴² On the contrary, citizens “may be at best

⁶⁴¹ S. Jasanoff, and S. Kim, (eds.), *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power* (Chicago: University of Chicago Press, 2015), pp. 1- 33.

⁶⁴² Wynne, Waterton and Grove-White, *Public Perceptions*, p. 24.

ambivalent about the hazardous activity and its controlling bodies, but they do not necessarily express these misgivings or worse in public, because they feel they would be exposed to denigration, [or] that it would be a futile protest.”⁶⁴³ Often, a lack of direct opposition to a hazard is taken as a sign of the public’s tacit support, or even apathy towards it. If one scratches beneath the surface however, this veneer of public acceptance is proved superficial, as ostensibly ‘supportive’ citizens are found to hold deeply embedded resistant attitudes towards potential hazards and the organisations that control them. This is particularly true of local farmers, who remained deeply convinced that they had suffered from the effects of radiation and that this had been suppressed by the nuclear authorities.

After four years of consistent appeals and letter-writing to various government bodies and figures, Mr Wallbank gave up his pursuit of compensation in 1961. Still unsatisfied by the findings, he concluded that the government would never own up to the true extent of contamination, deciding that “it would be a waste of everybody's time to pursue his arguments any further.”⁶⁴⁴ The decision not to appeal further for compensation reveals how deeply embedded farmers’ mistrust in the nuclear industry had become- equally convinced that they had been exposed to harmful quantities of radiation and that the UKAEA would never admit any wrongdoing. The decision not to continue fighting the UKAEA on matters of radiation exposure and compensation should therefore be understood not as an act of defeat but paradoxically, an act of resistance which reveals not only the presence of dystopian imaginaries but their power as a social agent. Local farmers, such as, Mr Wallbank transcended the unfavourable power dynamics enacted over them by the nuclear industry, constructing subversive strands of knowledge which juxtaposed the might of the nuclear enterprise against

⁶⁴³ *Ibid.*

⁶⁴⁴ Arnold, *Windscale*, pp. 70f.

local farmers who did not have the power to challenge or prove the ill-effects of radiation exposure. In this way, the illusion of acceptance hid the farmers' overt lack of trust in the nuclear authorities and the deeply embedded nature of dystopian imaginaries of radiation hazard. The permanence of this imaginary becomes particularly apparent when we look at how farmers responded to the debates over radiation following the Chernobyl disaster over thirty years later, in 1986. Here, farmers demonstrated how dystopian imaginaries of nuclear secrecy and radiation hazard had become ingrained within agricultural communities, responding to official claims about radioactive contamination by mobilising their experiences of having been misled and denied compensation following the 1957 fire.

Local farmers were deeply suspicious of official attempts to monitor and restrict the sale of agricultural produce in the aftermath of Chernobyl, articulating concerns that the disaster was being used as a smokescreen to cover-up another incident at Sellafield. In his study of the socio-cultural effects of Chernobyl, sociologist Brian Wynne found that Cumbrian farming communities refuted scientific claims on the basis of “the untrustworthy way in which the experts and authorities had treated them over the 1957 fire, and the longer history of perceived misinformation surrounding Sellafield.”⁶⁴⁵ He found that many farmers embedded their reading of Chernobyl “firmly within the context of the unpersuasive and untrustworthy nuclear institutional body language which had denigrated them for thirty years or more.”⁶⁴⁶ Nearly thirty years after the Windscale fire, farmers framed their responses to Chernobyl through imaginaries of nuclear secrecy and radiation threat. One explained that “this hasn't come from Russia... not with that lot on our doorstep!”⁶⁴⁷ Public scepticism was not just restricted to members of the farming community, either. Interviewees recalled that it was “not

⁶⁴⁵ B. Wynne, ‘Misunderstood Misunderstanding’, p. 291.

⁶⁴⁶ *Ibid.*

⁶⁴⁷ *Ibid.*, pp. 288- 291.

only farmers that said, oh it's all come from Sellafield, ” explaining that “there were still locals that said it was nothing to do with Chernobyl, it was Sellafield where it came from.”⁶⁴⁸ This attests to the role of the Windscale fire in dissolving the trust relations between the local public and the nuclear industry, in so doing subverting the utopian STIM and deeply embedding dystopian imaginaries of nuclear secrecy and radiation threat. The following section will examine this process by focusing upon nuclear workers, arguing that official attempts to blame the fire on operating staff dissolved the trust relations between the UKAEA and local workers, who responded by scrutinising the levels of safety within the plant, embedding dystopian imaginaries about the long-term effects of radiation upon their bodies.

3.6: Nuclear Workers.

The industry’s treatment of its workforce both during and in the aftermath of the fire further eroded the public’s trust in the UKAEA and helped embed dystopian imaginaries of radiation hazard. Many workers had been only yards away from the burning reactor whilst the fire raged, unprotected and unaware of the deadly radiation seeping into the atmosphere around them. Despite this, staff were only advised to take precautionary measures three days after the fire began and around twelve hours since it had been discovered.⁶⁴⁹ In many cases, workers had not been officially informed of an incident, but were aware that something was seriously wrong from the high readings on their radiation monitors. Unsure of the radiation source, workers in buildings adjacent to the burning reactor had shut off air conditioning units in a desperate attempt to minimise the amount of radiation they received. Interviewees described

⁶⁴⁸ K. Mawson, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 6 August 2010, p. 41.

⁶⁴⁹ *Inside Story: Our Reactor Is on Fire*, D. Blakeway. London: BBC, 1990.

that their monitors had gone “absolutely bananas” as they frantically tried to reduce their exposure by taping up window and door seals. One man trapped in an adjacent building recalled his horror at measuring “a beam of contam coming through the keyhole... like a torch beam.”⁶⁵⁰ Concerned staff reported their high exposure readings to plant managers who assured them that their exposure posed no threat to their health and that any contamination would be “walk[ed] off on the way home.”⁶⁵¹ Deeply perturbed by the lack of warning and futile advice given to them, concerned workers appealed to their union representatives, who declared “a state of dispute... until independent investigators examined the site.”⁶⁵² Union members expressed a clear lack of faith in the UKAEA, demanding that “we should get in an outsider to tell us the truth!”⁶⁵³ This reflected workers’ concerns that official reports were being “fiddled” and that there were “things on the site contaminated to a degree which could not possibly be safe.”⁶⁵⁴ This alludes to the cyclical relationship between public trust and nuclear concern, as the UKAEA’s failure to communicate with its workers embedded dystopian imaginaries of radioactive danger. The subsequent governmental report played a key role in this process by revealing official attempts to cover-up the true cause and severity of the fire, calling into question the safety of local workers.

Published as a governmental White Paper on 8 November 1957, the official report fabricated evidence which obfuscated the government’s role in causing the fire and instead publicly blamed the Windscale staff. This provoked a sharp backlash amongst workers who felt an acute sense of injustice at being publicly blamed for a fire that they had either been

⁶⁵⁰ G. Whitney, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 29 July 2010, p. 13.

⁶⁵¹ *Daily Mirror*, 17 October 1957, p. 24.

⁶⁵² *Ibid.*, p. 24.

⁶⁵³ *Daily Express*, 17 October 1957, p. 9.

⁶⁵⁴ *Ibid.*

responsible for extinguishing, or knew nothing about. Lorna Arnold's history of the fire gives a comprehensive overview of Prime Minister Harold MacMillan's decision to amend the contents of the government's internal report into the fire, conducted by Sir William Penney.⁶⁵⁵ Whilst Penney had assigned collective responsibility for the fire to the atomic energy establishment and the political demand for a thermonuclear bomb, MacMillan's public report attributed the fire "to an error of judgement by operating staff."⁶⁵⁶ MacMillan's paper was designed as a sanitised version of events, which, by linking the phrases "faults of judgement" with the inherent "weaknesses of organisation" throughout the UKAEA, was intended to exonerate the Windscale staff, whilst retaining the government's credibility.⁶⁵⁷ Nonetheless, the White Paper "seemed to point an accusing finger at certain avoidable mistakes by a very few, comparatively junior staff."⁶⁵⁸ Whilst this satisfied political desires for a full inquiry into the fire and appeased the majority of the general public, it became a major source of local opposition amongst the Windscale staff who felt "deeply wronged" at being made the scapegoats for the fire.⁶⁵⁹ Characterising attitudes amongst ordinary men, Deputy Works Manager Tom Tuohy later referred to the government officials who shifted the blame onto his

⁶⁵⁵ Penney's report found that the political demand for a megaton thermonuclear bomb had been the major cause of the disaster. MacMillan's private memoirs reveal he was gravely concerned about the Penney Report provoking a public backlash or, worse still, undermining Britain's newly nuclear alliance with the United States. MacMillan considered, "the report, as it stands, might put in jeopardy our chance of getting Congress to agree to the President's proposal." (Arnold, *Windscale*, pp. 80- 83.) In response, he ordered that all copies of the report be destroyed, stating that "it is extremely important... that there is no leakage of the Penney Report." (For further reading, see Arnold, *Windscale*, pp. 82- 96; National Archives, (PREM 19/2140); National Archives, (MAF 298/160); Hamblin, *Poison in the Well*, pp. 122f; A. Horne, *MacMillan: The Official Biography* (London: MacMillan, 2008), p. 53.)

⁶⁵⁶ Welsh has argued that "the need for political legitimation was particularly intense as the accident revealed that the nuclear enterprise had proceeded ahead of the necessary regulatory frameworks before adequate public health and safety measures could be ensured." (Welsh, *Mobilising Modernity*, p. 97.)

⁶⁵⁷ Arnold, *Windscale*, p. 87.

⁶⁵⁸ *Ibid.*

⁶⁵⁹ Official UKAEA historian Lorna Arnold, later wrote of the Windscale men, "after an accident which had become inevitable, they had acted with outstanding courage, resourcefulness and devotion to duty. Yet their actions had been publicly blamed at the highest level as contributing materially to the fire." (Arnold, *Windscale*, pp. 117, 135; National Archives, (AB 16/2318); National Archives, (AB 38/51); National Archives, (AB 16/2698).

men as “a shower of bastards.”⁶⁶⁰ Chief Engineer Christopher Hinton was equally outraged and expressed his disappointment at the treatment of the Windscale staff, who had been subjected to significant criticism in the national media.⁶⁶¹

Workers were pilloried in the national press who made repeated reference to “human misjudgement”, “inexperienced operators” and staff “not well qualified scientifically for the job.”⁶⁶² The *Daily Express* even went so far as to identify one worker who they deemed responsible for “the initial mistake” which led to the fire.⁶⁶³ The unfortunate worker identified had not been on duty at the time and eventually received an apology from the newspaper.⁶⁶⁴ Plagued by negative media coverage, workers appealed to their staff association, the Institute of Professional Civil Servants who produced a memorandum for the UKAEA, in which they raised nine major objections and sought to “defend its members whose professional integrity had been impugned” by the inaccurate judgements made by the White Paper and the subsequent media coverage.⁶⁶⁵ This incited a tremendous amount of acrimony amongst workers who bitterly resented the blame being passed onto them by the government. Lorna Arnold described that “the reaction then was very, very bitter because they felt that blame which was not theirs had been, by implication loaded onto them, by being made to look as though they did not know what they were doing and that it was all their fault.”⁶⁶⁶ Similarly, a senior figure working at the Atomic Energy Research Establishment at Harwell recalled that “I think it was absolutely

⁶⁶⁰ *Daily Telegraph*, ‘Tom Tuohy Obituary’ <<https://www.telegraph.co.uk/news/obituaries/1582801/Tom-Tuohy.html>> [accessed 23 January, 2020].

⁶⁶¹ Arnold, *Windscale*, p. 87.

⁶⁶² National Archives, (AB 16/2442); National Archives, (AB 38/51); Arnold, *Windscale*, p. 94.

⁶⁶³ National Archives, ‘Mayne/Plowden’, 15 November 1957, (AB 16/2318); National Archives, ‘Mayne/Perrot’, 2 December 1957, (AB 16/2318); National Archives, ‘Annex A to Note of Meeting Between AEA Official Side and IPCS at Windscale’, 21 February 1958, (AB 38/51); Arnold, *Windscale*, p. 94.

⁶⁶⁴ Arnold, *Windscale*, p. 94.

⁶⁶⁵ *Ibid.*, p. 117.

⁶⁶⁶ *Windscale: Britain’s Biggest Nuclear Disaster*, S. Aspinall. London: BBC, 2007.

disgraceful to then cast the blame onto junior people who had no means of defending themselves.”⁶⁶⁷ This was a sentiment shared by the Windscale men, one of whom explained that “the fact that they seemed to be blaming people for what *they* did, and the wrong people at that... I think was very bad... we were resentful at the time.”⁶⁶⁸ Another described the White Paper as “a terrible shock”, admitting that “that attitude lives on now, even fifty years later.”⁶⁶⁹ For the men who had fought the fire and received substantial quantities of radiation in their heroic attempts to bring it under control, this represented a particularly cruel blow; a dystopian imposition from an unscrupulous executive intent on pursuing nuclear technologies whilst remaining ignorant of the human or psychological cost to its employees. This subverted the imaginary of public confidence in nuclear science, as the trust between political leaders, nuclear scientists, and ordinary people began to unravel. Supplanting this imaginary, the fire helped embed an alternative vision of the future whereby nuclear workers could not trust the authorities to safeguard their interests or tell the truth about nuclear incidents. This had a profound impact upon the long-term attitudes of ordinary workers who, having witnessed the industry’s duplicity first-hand, began to question the levels of safety within the plant.

In the years following the fire, workers, decoupled from their political and operational loyalties by their callous mismanagement at the hands of the UKAEA, began to question the long-term health effects caused by their fire-fighting efforts. As one local put it, “if the government had covered up the cause of the fire and blamed innocent men, what else could they be hiding?”⁶⁷⁰ Here workers, attentive to their inability to access exposure records and their general lack of autonomy, engaged with the potential dystopian consequences caused by

⁶⁶⁷ *Ibid.*

⁶⁶⁸ *Ibid.* [Emphasis added].

⁶⁶⁹ *Ibid.*

⁶⁷⁰ Author’s interview with Isobel George, 6 March 2019.

their over-exposure during the fire, carving out a psychological and ontological space in which they considered the possible effects of radiation on their bodies. Exploring this process, the following section will again demonstrate the reciprocal relationship between public trust in nuclear authorities and attitudes towards nuclear safety, as weakening trust relations helped embed dystopian imaginaries of radiation danger and nuclear hazard.

The government's cover-up of the cause of the fire caused workers to query the true amount of radioactivity they had received. Official records indicated that all the men who had tackled the fire had been kitted out with respirators, film badges, and protective clothing.⁶⁷¹ Conversely, oral history interviews with workers who had fought the fire revealed that there was little concern for the safety of the men tackling the blaze, who heavily disputed the radiation readings provided and asserted their own levels of exposure. Former employee, Joe Farrell argued that scant attention was paid to safety during the fire, and massive radiation doses went unregistered.⁶⁷² Another worker remembered that there were very few safety precautions taken. He explained that "I was called up from the company hostel where I lived, given a pole and told to get on with it. We would simply post the burning fuel elements out of the [reactor] channels as best we could."⁶⁷³ This was an explanation accepted by future BNFL board member Harold Bolter, who recalled that "it was a matter of all hands to the pump... there wasn't time to organise things properly."⁶⁷⁴ The hurried nature of responses, coupled with the industry's attempts to pin the blame onto innocent workers embedded dystopian imaginaries of radiation danger, as employees imagined a discrepancy between recorded and real exposure levels.

⁶⁷¹ Bolter, *Inside Sellafield*, pp. 39f.

⁶⁷² J. Farrell, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 20 January 2010, p. 15; Bolter, *Inside Sellafield*, pp. 39f.

⁶⁷³ Bolter, *Inside Sellafield*, p. 40.

⁶⁷⁴ *Ibid.*

Many workers believed that they had been exposed to far more radiation than was recorded by the UKAEA, or indeed safe. Arthur Wilson, who had been on duty at the time the fire was discovered, recalled that “the ones who had to go in and sort out the mess, some of them got very high doses and I'm sure things weren't recorded properly then.”⁶⁷⁵ This was an allegation levelled by several workers, who raised concerns about the future ramifications these doses might have. One of these men, Piya Guneratne explained that “I have my grave doubts about the measurements taken in the 1950s. I am not satisfied that all the doses I have had in the nuclear industry have been recorded. I believe that for some doses you could multiply the amount five or six times to get the true figures.”⁶⁷⁶ This was a claim which was repeated in subsequent compensation cases, where the official record-keeping during the early days of the industry was revealed to be incredibly patchy and poorly documented.⁶⁷⁷ Deeply suspicious of the radiation levels they had received, workers revealed that they began testing the UKAEA’s measurements for proof of their over-exposure. These independent tests can be read as acts of resistance, as workers imagined official attempts to over-expose workers and suppress the evidence.

Concerned that radiation levels were higher than the UKAEA were telling staff, Arthur Wilson explained that he began deliberately handing in over-exposed film badges to see if he was pulled out of working in radioactive areas of the plant and decontaminated, as per operational guidelines. He explained that “I decided to test them. I took my radiation badge

⁶⁷⁵ McSorley, *Living in the Shadow*, p. 1.

⁶⁷⁶ *Ibid.*, p. 21.

⁶⁷⁷ Bolter, *Inside Sellafield*, p. 40. (Pile foreman Edward Davis explained that “the radiation dose we were allowed to take then is much higher than it is today. I think if we took the same kind of dosages today there'd be questions asked in the House of Parliament... but that was life then.” (*Windscale: Britain's Biggest Nuclear Disaster*, S. Aspinall. London: BBC, 2007.)

and sat it on top of a very radioactive source in the separation plant. I knew it was radioactive because I had a Geiger counter with me. I then went off and did a job in a nice clean area. I came back, got the badge, handed it in and waited. Not a beep out of them. That badge must've shown I was over exposed, there is no way round it."⁶⁷⁸ For men like Arthur, the incongruity between their own figures and those given by the UKAEA was symptomatic of industry attempts to cover-up the true extent of their exposure. This embedded dystopian imaginaries of radiation as a threat to his health, converting "the merely imagined... into the durability of routines and things" in the form of an over-exposed radiation badge.⁶⁷⁹ Furthermore, the act of self-monitoring also served as a conscious attempt to resist the power structures which denied workers' access to knowing the levels of radiation they had been exposed to. In his visual geography of the Chernobyl exclusion zone, Thom Davies has suggested that "without Geiger counters and scientific training, an individual has no way of knowing if their backyard is safe or 'dirty.'" He argues that "self-monitoring serves as a way of re-asserting the power denied of local inhabitants."⁶⁸⁰ The desire to self-monitor therefore represented something more than an attempt to establish radiation levels, but an act of resistance; a conscious and calculated act designed to subvert the unfavourable power dynamics enacted upon nuclear workers and local residents. In this way, workers like Arthur performed their resistance by constructing subversive strands of radiation knowledge, at once imagining and performing an alternative reality whereby workers were able to establish safety levels and transcend the industry's control over radiation knowledge.

⁶⁷⁸ McSorely, *Living in the Shadow*, pp. 2f.

⁶⁷⁹ Jasanoff, 'Imagined and Invented Worlds', in S. Jasanoff, and S. Kim, (eds.), *Dreamscapes of Modernity*, p. 323.

⁶⁸⁰ T. Davies, 'A Visual Geography of Chernobyl: Double Exposure', *International Labour and Working-Class History*, 84.1 (2013), p. 127.

The awareness that the UKAEA were doctoring radiation figures prompted workers to speculate about the true amount of radiation they had been exposed to, imagining the potential consequences that this may have upon their bodies. This helped embed the imaginary of nuclear danger as citizens correlated health problems they had experienced in the years following the fire with the long-term effects of radiation on their bodies. Whilst these claims have always been vociferously denied by the UKAEA and later BNFL (although some cases have resulted in out-of-court settlements, which BNFL stressed were goodwill gestures and not an admission of guilt), they are indicative of the permanence and embedded nature of imaginaries of nuclear danger amongst sections of the community, for whom the radiobiological legacy of the Windscale fire can be found in the number of local people who have suffered from health issues and cancers in the years since.⁶⁸¹

During interviews, residents repeatedly stressed the links between their health problems and the 1957 fire. For locals who suffered from uncommon types of cancers or experienced significant health problems in their youth, these experiences reinforced imaginaries of nuclear danger, understood as a direct consequence of the Windscale fire. Alex Bryson, who grew up next to Sellafield explained that “there is no doubt in my mind that there is a link” between her thyroid cancer and the radiation dose she received during the fire. Alex was a child at the local girls’ school in 1957, one of a number of girls outside playing hockey whilst the reactor burned, a factor she directly correlated to her diagnosis with thyroid cancer, a type of cancer extremely uncommon and most commonly caused by exposure to radiation.⁶⁸² One moving example came from former employee Cyril McManus, who had taken early retirement from Sellafield after receiving too much radiation. He described that he had become “a radiation leper”,

⁶⁸¹ Bolter, *Inside Sellafield*, p. 151.

⁶⁸² McSorley, *Living in the Shadow*, p. 15.

simultaneously “a free-man, but plutonium exposed...”⁶⁸³ Having vividly engaged with the effects of radiation on his own body, Cyril tragically succumbed to cancer a few months after the interview. Likewise, former worker Piya Guneratne developed cancer of the lymph glands, a condition he too directly attributed to the fire. He explained that, “the radiation exposure that caused my cancer obviously came from the dose I received whilst I was at Windscale.”⁶⁸⁴ This was an all too common theme within the local community, as citizens sought to articulate coherent perspectives and imagine the effects of the Windscale fire upon their bodies.

For many local people, the number of rare health problems experienced within the local community were proof that they had been over-exposed to radiation. One local woman explained how she grew up watching her neighbours suffer from rare types of cancer. She explained that “it is impossible to prove that the illnesses were caused by the fall-out from the fire, but we just knew.”⁶⁸⁵ Likewise, other residents interpreted the passing of family members through the lens of the Windscale fire: “My godmother died of cancer in her fifties. It was never established whether the disease was linked to her exposure to radiation, but our family certainly suspect she was one of Windscale’s many silent victims.”⁶⁸⁶ These examples show how local people disengaged with the narratives of industry and state which assured them that no health effects could be attributed to the fire. Instead, we see locals articulating subversive strands of

⁶⁸³ C. McManus, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 12 March 2010, p. 47.

⁶⁸⁴ He explained that, “my consultant at the royal infirmary is of the opinion, and so are his team of doctors, that this can only be caused by radiation.” (McSorley, *Living in the Shadow*, p. 21; ‘Links Between Nuclear Industry Workers and Leukaemia’, ITN News, 23 January 1992, <<https://www.gettyimages.co.uk/detail/video/links-between-nuclear-industry-workers-and-leukemia-itn-news-footage/815904386>> [accessed 2 September 2019]). Similarly, the widow of “Windscale’s Radioactive Man” Stan Ritson, one of the men who had pushed the burning fuel elements out the back of the blazing reactor with scaffolding poles, pressed for compensation following his premature death, aged just 50. In another case, Elizabeth Reay sued Sellafield for £150,000 damages after her husband, George Reay, a Sellafield fitter died after a twelve-year fight with stomach cancer. (Bolter, *Inside Sellafield*, p. 164; McSorley, *Living in the Shadow*, p. 49.)

⁶⁸⁵ *Daily Mail*, 19 March 2011. <dailymail.co.uk/news/article-1367776/UK-Government-covered-nuclear-reactor-blaze-caused-death-cancer.html> [accessed 5 July, 2019].

⁶⁸⁶ *Ibid.*

radiation knowledge and embedding dystopian imaginaries of nuclear danger, constructing an alternative reality whereby the fire was responsible for the poor public health within the local area.

Conclusion.

This chapter has shown that the Windscale fire exposed the misleading nature of the utopian nuclear imaginary, challenging and in many cases overwriting imaginaries of nuclear safety. The accident not only provided irrefutable proof that nuclear technologies could go wrong but, by exposing official attempts to hide the threat that they posed to the public, eroded the local community's trust in both the UKAEA and the government to adequately protect them. By analysing oral testimonies which provide a new and unique insight into the fire, alongside local and national newspaper articles and archival sources, we can see how declining public trust heightened citizens' concerns about the threat that the fire, and radiation more broadly posed to public health. This helped embed dystopian imaginaries of radiation hazard as citizens were forced to articulate coherent perspectives on personal and public health through the lens of incomplete, partisan, and overtly misleading information provided by the nuclear industry. Engaging with this process through the lens of the STIM framework, we can see that the fire prompted a much greater degree of localised resistance than previous studies have acknowledged, as local citizens imagined the extent of their exposure to radiation, its effects upon the human body, and the long-term health implications that this may have upon them and their families. This also alludes to the delicate production of nuclear meaning making at both local and national scales, with the Windscale fire representing a watershed in social responses to nuclear technologies, as citizens began to increasingly publicly challenge official explanations and reassurances regarding their environmental effects. As the following chapter

will show, the period from the Windscale fire (1957) to the Windscale enquiry (1977) was characterised by the embedding of a dystopian nuclear imaginary which highlighted the environmental, radiobiological, social, and ethical implications of nuclear technologies to resist future nuclear development.

4: The ‘Windscale Inquiry’.

This chapter will focus on the decision to reprocess foreign nuclear fuels at Sellafield and the Local Public Inquiry surrounding the subsequent construction of the Thermal Oxide Reprocessing Plant (known as THORP) on the Sellafield site.⁶⁸⁷ The ‘Windscale Inquiry’ as it became known, offers a window into the contested and fluid nature of nuclear culture during the 1970s. Taking this focus, this chapter will argue that the Windscale Inquiry provided a highly public ‘contact zone’ between competing nuclear imaginaries, as the officially maintained utopian imaginary clashed with a new dystopian STIM which extended issues of environmentalism, secrecy, state power and its geographic distribution, domestic governance, and morality into debates around nuclear technologies.⁶⁸⁸ Tracing the emergence of this dystopian imaginary, I will demonstrate that the inquiry produced new kinds of resistance towards nuclear technologies, which were not only predicated upon their viability and necessity, but also towards the state and methods of governance that sustained them. I argue that nuclear reprocessing became a conduit for wider social inequalities and their spatial components, representative of a nefarious ‘nuclear state’, socially and geographically detached from the British public and in particular, ‘peripheral’ communities where these technologies would be located. Ultimately, this saw the localised forms of resistance witnessed in the previous chapter give way to more widespread resistance amongst the national public, as ordinary citizens (often assembled in organised groups) inextricably linked the expansion of the nuclear industry with dystopian environmental, social, and moral futures. This develops the final strand of this chapter, which argues that the inquiry represents an important window into

⁶⁸⁷ The name ‘Local Public Inquiry’, whilst the inquiry’s official title, is somewhat misleading as it suggests the inquiry was largely a local issue. On the contrary, the inquiry attracted a great deal of national and international interest and involved a number of national NGOs, pressure groups, and global experts.

⁶⁸⁸ The term ‘contact zone’ borrows from Mary Louise Pratt’s interpretation, and will be covered in more detail in the subsequent pages. See, M. Pratt, ‘Arts of the Contact Zone’, *Profession*, 91.0 (1991), p. 34.

social attitudes towards nuclear technologies during the 1970s, where scant historiographical attention has been directed.⁶⁸⁹ This contributes to the broader argument that the anti-nuclear politics of the 1980s were directly shaped by the dystopian nuclear imaginary that emerged and took shape throughout the 1977 Windscale Inquiry.

Focusing on the 1970s, this chapter sits within a relatively under-researched period of Britain's nuclear history, sandwiched between the anti-nuclear decades of the 1960s and 1980s. This echoes broader trends in British historiography, where the 1970s have represented something of a "lost decade", largely characterised as a depressing, unfashionable decade, left unexamined "in the shadows of its immediate neighbours."⁶⁹⁰ Andrew Tompkins' recent study of European anti-nuclear movements argued that the 1970s "is often seen as a transitional period in Western Europe, sandwiched historically between the upheavals of the late 1960s and

⁶⁸⁹ For evidence of this trend, see J. Burkett, 'Re-Defining British Morality: 'Britishness' and the CND, 1958-68', *Twentieth Century British History*, 21.2 (2010), pp. 184- 205; H. Nehring, *Politics of Security: British and West German Protest Movements and the Early Cold War, 1945-1970* (Oxford: Oxford University Press, 2013); A. Young, *Femininity in Dissent* (London: Routledge, 1990); McKay, 'Just a Closer Walk', pp. 261- 281; J. Schell, *The Fate of the Earth and the Abolition* (California: Stanford University Press, 2000); A. Rojecki, *Silencing the Opposition: Antinuclear Movements and the Media in the Cold War* (Illinois: University of Illinois Press, 1999); L. Wittner, 'Gender Roles and Nuclear Disarmament Activism, 1954-1965', *Gender and History*, 12.1 (2000), pp. 197- 222; L. Scott, 'Labour and the Bomb: the First 80 Years', *International Affairs*, 82.4 (2006), pp. 685- 700; M. Phythian, 'CND's Cold War', *Contemporary British History* 15.3 (2001), pp. 133- 156; J. Stafford, 'Stay at Home: The Politics of Nuclear Civil Defence, 1968- 1983', *Twentieth Century British History*, 23.3 (2012), pp. 383- 407; J. Preston, 'The Strange Death of UK Civil Defence Education in the 1980s', *History of Education*, 44.2 (2015), pp. 225- 242; C. Laucht, and M. Johnes, 'Resist and Survive: Welsh Protests and the British Nuclear State in the 1980s', *Contemporary British History*, 33.2 (2019), pp. 226- 245; Atashroo, 'Weaponising Peace', pp. 170- 186; Cordle, *Late Cold War Literature and Culture*.

⁶⁹⁰ Scholars have traditionally subscribed to and proliferated popular epistemologies of the 1970s as a period of sustained decline, pointing to issues such as strikes, the three-day week, the 'winter of discontent', power cuts, stagflation, uncollected rubbish, and 'declinist' colloquialisms such as Britain as "the sick man of Europe." See, L. Black, 'An Enlightening Decade? New Histories of 1970s Britain', *International Labour and Working-Class History*, 82.0 (2013), p. 174. For exceptions to this trend, see D. Haslam, *Young Hearts Run Free: The Real Story of the 1970s* (London: Harper Perennial, 2010); H. Sounes, *Seventies: Sights, Sounds and Ideas of a Brilliant Decade* (London: Pocket Books, 2006); G. De Groot, *The Seventies Unplugged: A Kaleidoscopic Look at a Violent Decade* (London: Pan Books, 2010); L. Black, H. Pemberton, and P. Thane (eds.), *Reassessing 1970s Britain* (Manchester: Manchester University Press, 2013); A. Turner, *Crisis? What Crisis? Britain in the 1970s* (London: Aurum Press, 2008); A. Beckett, *When the Lights Went Out: Britain in the Seventies* (London: Faber and Faber, 2009); N. Ferguson, (et al.), *The Shock of the Global: The 1970s in Perspective* (Cambridge: Belknap, 2010).

the revival of Cold War tensions in the 1980s.”⁶⁹¹ Despite this, recent years have seen a number of revisionist accounts as scholars have identified the period as one of social rupture, where counter-cultural movements flourished.⁶⁹² In their study of British social life, cultural historians Laurel Forster and Sue Harper position the 1970s as “a period of extraordinary cultural ferment”, where “there was a restless push against old boundaries and limitations.”⁶⁹³ This perception is shared by political historian Mark Garnett, who argues that the 1970s were characterised by a disillusionment with democracy, government, and mainstream political organisations.⁶⁹⁴ Elsewhere, Robinson *et al.* have taken this one step further, identifying the 1970s as a turning point in the second-half of the Twentieth Century, pointing to the rise of popular individualism and the “breakdown of social democracy” throughout the decade.⁶⁹⁵ They have argued that the role of the state in ordinary life came under challenge and scrutiny by increasingly vocal activist groups and ordinary citizens, who became “less deferential [and] more critical of government and knowledge elites.”⁶⁹⁶ The Windscale Inquiry can be read within this broader trend, as ordinary people and environmental activist groups resisted the state ordained pursuit of nuclear technologies, mobilising a range of arguments that centred on the incursion of the state within ordinary life, and anxieties about the impact of nuclear reprocessing on the environment. In this regard, the inquiry was not only the product of the growing political and social unrest characteristic of the decade, but also of the growth and rapid

⁶⁹¹ Tompkins, *Better Active than Radioactive!* p. 4.

⁶⁹² L. Segal, S. Rowbotham, and H. Wainwright, *Beyond the Fragments: Feminism and the Making of Socialism* (London: The Merlin Press, 1979).

⁶⁹³ L. Forster, and S. Harper (eds.), *British Culture and Society in the 1970s: The Lost Decade* (Cambridge: Cambridge University Press, 2010), p. 8.

⁶⁹⁴ M. Garnett, *From Anger to Apathy: The Story of Politics, Society and Popular Culture in Britain since 1975* (New York: Vintage, 2009).

⁶⁹⁵ E. Robinson (et al.), ‘Telling Stories about Post-war Britain: Popular Individualism and the ‘Crisis’ of the 1970s’, *Twentieth Century British History*, 28.2 (2017), p. 271.

⁶⁹⁶ They explain that “people were increasingly insistent, by the 1970s about defining and claiming their individual rights, identities and perspectives [as] many expressed desires for greater personal autonomy and self-determination, even if these desires were not realised.” See, Robinson et al., ‘Telling Stories’, pp. 273, 302; Black, Pemberton, and Thane, *Reassessing 1970s Britain*, p. 5.

expansion of the environmental movement which, beginning in the 1960s, had become a major agent for social change throughout the industrialised world.

In the period between the Windscale fire (1957) and the decision to reprocess nuclear fuels at Sellafield (1974), political scientist John McCormick argues that “there had been an environmental revolution.”⁶⁹⁷ Traditionally associated with the publication of Rachel Carson’s *Silent Spring* (1962), and the recognition of the dangers of radioactive fallout from nuclear testing, by the early years of the 1970s these nascent environmental concerns had “blossomed into a fervent mass movement which swept the industrialised world.”⁶⁹⁸ Numerous studies have examined this transition, pointing to the aforementioned effects of thermonuclear testing and pesticides on the environment, but also to a series of environmental disasters such as the spillage of the oil tanker ‘Torrey Canyon’ off the coast of South-West England in 1967, the Aberfan disaster in Wales in 1966, and the Sahelian droughts throughout the 1970s as raising public awareness of environmental issues and “creating a new climate of heightened public activism.”⁶⁹⁹ The Windscale inquiry was therefore the product of these trends, as a growing

⁶⁹⁷ J. McCormick, *Reclaiming Paradise: The Global Environmental Movement* (London: Belhaven Press, 1989), p. 47.

⁶⁹⁸ McCormick, *Reclaiming Paradise*, p. 47; see also D. Worster, *Nature’s Economy: A History of Ecological Ideas* (Cambridge: Cambridge University Press, 1977), p. 340; J. McNeill and C. Unger, ‘The Big Picture’ in J. McNeill, and C. Unger (eds.), *Environmental Histories of the Cold War* (Cambridge: Cambridge University Press, 2010), p. 11.

⁶⁹⁹ McCormick, *Reclaiming Paradise*, p. 62. For further reading on the rise of the environmental movement, see J. McNeill, ‘The Environment, Environmentalism, and International Society in the Long 1970s’, in N. Ferguson et al., *The Shock of the Global*, pp. 263- 278; R. Nixon, *Slow Violence and the Environmentalism of the Poor* (Harvard: Harvard University Press, 2011); McNeill and Unger, ‘The Big Picture’, in McNeill and Unger, (eds.), *Environmental Histories*; J. Hamblin, *Arming Mother Nature: The Birth of Catastrophic Environmentalism* (Oxford: Oxford University Press, 2013); Hamblin, *Poison in the Well*; Worster, *Nature’s Economy*; For further reading on the Torrey Canyon disaster, see A. Green, and T. Cooper, ‘Community and Exclusion: The Torrey Canyon Disaster of 1967’, *Journal of Social History*, 48.4 (2015), pp. 892- 909; T. Cooper, and A. Green, ‘The Torrey Canyon Disaster: Everyday Life, and the ‘Greening’ of Britain’, *Environmental History*, 22.1 (2017), pp. 101- 126; For pesticides, see R. Carson, *Silent Spring* (Boston: Houghton Mifflin Harcourt, 1962). For Aberfan, see M. Johnes, ‘Aberfan and the Management of Trauma’, *Disasters*, 24.1 (2000), pp. 1- 17. For the Sahelian drought, see C. Agnew, and A. Chappel, ‘Drought in the Sahel’, *GeoJournal*, 48.0 (1999), pp. 299- 311.

sense of public unrest, declining faith in democratic governance, and an increasing anxiety about the long-term effects of society's activities upon the environment came into direct collision. Windscale thus became as much about issues of governance, ecology, and the relationship between the state and populace, as it was about nuclear energy. This illuminates one of the most significant aspects of the inquiry: it functioned as a fulcrum through which ordinary citizens and oppositional factions resisted the imbrication of state and nuclear power, constructing dystopian environmental, social, and political imaginaries of 'the nuclear state.'⁷⁰⁰

4.1: Context.

In 1971 control of the Sellafield site had passed from the UKAEA to the newly formed British Nuclear Fuels Ltd (BNFL).⁷⁰¹ In 1974, BNFL began negotiating with a consortium of Japanese electricity companies to reprocess their spent nuclear fuel, ultimately committing to reprocessing spent nuclear fuel from Japan, Germany, Switzerland, Spain, Italy, and Sweden, as well as handling Britain's domestic supply.⁷⁰² This instigated a significant public backlash

⁷⁰⁰ This was aided and abetted by the rise of environmental activist groups such as Friends of the Earth and latterly Greenpeace, who had risen to political prominence throughout the 1970s as an increasingly vocal (and direct) critic of nuclear technologies. Their contribution to the inquiry and anti-nuclear debate more broadly will be considered within the following two chapters- for further reading see F. Zelko, *Make it a Greenpeace: The Rise of Countercultural Environmentalism* (Oxford: Oxford University Press, 2013).

⁷⁰¹ The change was the result of a demerger of the UKAEA's product divisions, under the Atomic Energy Authority Act of 1971. This saw the UKAEA split into three sections: Radiochemical Centre Ltd assumed production of medical and industrial radioisotopes; BNFL took over the production of nuclear fuel and fissile material at Springfields, Capenhurst, Windscale, Calder Hall and Chapelcross; whilst the UKAEA retained control over research activities at Harwell. For further reading, see W. Patterson, *Going Critical: An Unofficial History of British Nuclear Power* (Colorado: Paladin Press, 1985), p. 17.

⁷⁰² An attempt had been made to reprocess oxide nuclear fuel in the late 1960s, when building B204, previously used to separate plutonium from other fissile materials, was converted into an oxide reprocessing plant. This experimental building operated until September 1973 when a serious 'blow-back' incident occurred, which contaminated thirty-five workers and increased the plant's discharge of iodine-131 by a factor of forty. Despite the limited success of this venture, it was on the basis of this experimental research that BNFL based the economic and scientific credibility of reprocessing. See, Bolter, *Inside Sellafield*, p. 146; C. Aubrey, D. Grunberg, and N. Hildyard, (eds.), 'Nuclear Power: Shut it Down: An Information Pack on Nuclear Power and the Alternatives,' *The Ecologist*, (1990), p. 319.

in the U.K following a *Daily Mirror* article entitled ‘Plan to Make Britain World’s Nuclear Dustbin’, published in October 1975.⁷⁰³ This damning critique of the reprocessing of foreign fuels marked the beginning of a major public inquest into nuclear power, culminating in a Local Public Inquiry into the planning application for the new Thermal Oxide Reprocessing Plant (THORP) to be constructed on the Sellafield site.⁷⁰⁴ For 100 days between Summer and Autumn 1977, the Cumbrian town of Whitehaven, situated just up the coast from Sellafield, hosted what became known as the ‘Windscale Inquiry.’

The inquiry was commissioned by the Labour government under James Callaghan at the behest of Secretary of State for the Environment, Peter Shore, who had been asked to ratify Cumberland County Council’s decision to authorise the THORP project. This decision had been met with staunch opposition by environmental groups, such as Friends of the Earth (FoE), and the local anti-nuclear organisation Half-Life. Similar opposition came from the Conservation Society, the Town and Country Planning Association and South Lakeland District Councillor Edward Acland, all of whom called upon the Labour government to refer the matter to a public inquiry, presenting a petition with more than 18,000 local signatories collected over just ten days.⁷⁰⁵ Unwilling to accept final responsibility on the matter, Environment Secretary Peter Shore, together behind-the-scenes involvement from Secretary of State for Energy Tony Benn, decided to call a Local Public Inquiry, announced by Shore on 7

⁷⁰³ *Daily Mirror*, 21 October 1975, p. 1; C. Aubrey, *Thorp: The Whitehall Nightmare* (Oxford: Oxford University Press, 1993), p. 5.

⁷⁰⁴ Aubrey, *Thorp*, p. 6; Bolter, *Inside Sellafield*, p. 169.

⁷⁰⁵ H. Herring, ‘Energy Utopianism and the Rise of the Anti-nuclear Power Movement in the UK’, unpublished PhD thesis, The Open University, (2003) <<http://oro.open.ac.uk/59417/1/288345.pdf>> [accessed 25 August 2019], pp. 55ff; G. Boyle, *Nuclear Power: the Windscale Controversy* (Milton Keynes: The Open University Press, 1983), p. 21; B. Wynne, *Rationality and Ritual: the Windscale Inquiry and Nuclear Decisions in Britain* (London: British Society for the History of Science, 1982), p. 82.

March, 1977.⁷⁰⁶ Overseen by High Court Judge, and future Lord Justice of Appeal Sir Justice Roger Parker, the remit of the inquiry was to establish the viability and necessity of the construction of the THORP plant on the Sellafield site for the purposes of reprocessing spent nuclear fuels from domestic and foreign nuclear reactors.⁷⁰⁷

Whilst the inquiry appeared to all intents and purposes as a judicial review into the legality and viability of reprocessing at both the Sellafield site and possible future locations throughout Britain, the government was under no obligation to act upon the findings of the inquiry, despite its length and public cost. Local public planning inquiries are not judicial proceedings, in spite of their appearance. Rather they enable “interested parties to come together, and present their arguments and evidence and examine a specific proposal in detail.”⁷⁰⁸ In this way, they serve as “advisory mechanisms”, designed to aid the “implementation of a pre-existing policy” by “informing the minister’s mind” regarding the proposed impact of a particular application.⁷⁰⁹ Indeed, it is important to note that both Cumberland County Council and the government had publicly announced their support for the THORP project in March and November 1976 respectively, some months before the inquiry

⁷⁰⁶ Herring has written that Tony Benn saw the nuclear power debate as an opportunity to “practice his ideas on open government, and thus have a great debate on all aspects of nuclear policy in Britain.” In the build-up to the inquiry, Benn had organised two public debates on nuclear power, held in Westminster in January and June 1976 respectively. See, Herring, ‘Energy Utopianism’, pp. 66, 71.

⁷⁰⁷ In doing so, the inquiry heard a dizzying array of scientific, political, social, and environmental interpretations from both sides of the nuclear debate; encompassing testimonials and evidence from scientific experts both within and outside of the nuclear industry, environmental and political organisations, BNFL itself, and local citizens- both as individual witnesses and organised collectives. For a comprehensive overview of key players at the inquiry, and a summary of their arguments, see D. Pearce, L. Edwards, and G. Beuret, (eds.), *Decision Making for Energy Futures: A Case Study of the Windscale Inquiry* (London: Palgrave MacMillan, 1979), pp. 236- 296.

⁷⁰⁸ E. Rough, ‘Policy Learning Through Public Inquiries? The Case of UK Nuclear Energy Policy, 1955-61’, *Environment and Planning C: Government and Policy*, 29. 0 (2011), pp. 24- 45.

⁷⁰⁹ R. Wraith, G. Lamb, *Public Inquiries as an Instrument of Government* (London: Allen and Unwin, 1971), p. 31; Wynne, *Rationality and Ritual*, p. 53.

convened.⁷¹⁰ We may therefore consider Windscale within the wider context of other nuclear inquiries, all of which had resulted in planning applications granted, despite localised objections (see Fig. 1.0). In this regard, the Windscale Inquiry was no exception, as the recommendations given by Lord Justice Parker found in favour of the THORP plant, advising that the plant should be built without delay to obviate storage and disposal problems and “keep the nuclear industry alive.”⁷¹¹ This was a decision strongly endorsed and ratified by James Callaghan’s Labour government, who ultimately authorised the project in the House of Commons in May 1978.

⁷¹⁰ Pearce, Edwards, and Beuret, *Decision Making for Energy Futures*, p. 135. In this regard, it seems reasonable to agree with Drapkin’s argument that public inquiries served a mere strategic political function, providing a “safety valve” through which opponents could “blow off steam.” (D. Drapkin, ‘Development, Electricity and Power Stations: Problems in Electricity Planning and Decisions’, *Public Law*, 19.0 (1974), p. 243.) This echoes scholarly work on civil defence which has suggested that official protection procedures represented a necessary façade and were designed so as to be politically defensible rather than practically applicable. In this way, Windscale represented the fore-runner to a series of nuclear planning procedures throughout the 1980s which offered a politically expedient smoke-screen from which to defend nuclear policy-making. (M. Grant, *After the Bomb: Civil Defence and Nuclear War in Britain, 1945–68* (Palgrave MacMillan: Basingstoke, 2010), pp. 8f; J. Preston, ‘The Strange Death of UK Civil Defence Education in the 1980s’, *History of Education*, 44.2 (2015), p. 226.)

⁷¹¹ *Daily Telegraph*, ‘Sir Roger Parker Obituary’, 23 May 2011

<<https://www.telegraph.co.uk/news/obituaries/8531683/Sir-Roger-Parker.html>> [accessed 7 April 2019];

Aubrey, *Thorp*, p. 7; R. Parker, *The Windscale Inquiry: Report by the Hon. Mr. Justice Parker, presented to the Secretary of State for the Environment on 26 January 1978* (London: HMSO, 1978), pp. 1- 586.

Fig. 1.0: 'Public Inquiries into the Construction or Expansion of Nuclear Power Plants (1956-1988)', (H. Herring, 'Energy Utopianism and the Rise of the Anti-nuclear Power Movement in the UK', unpublished PhD thesis, The Open University, (2003) <<http://oro.open.ac.uk/59417/1/288345.pdf>> [accessed 25 August 2019], p. 22.)

Nuclear Power Station	Dates	Duration	Outcome
Bradwell	April-May 1956	5 days	Permission Granted
Hunterston	January-June 1957	12 days	Permission Granted
Hinkley Point	May 1957	2 days	Permission Granted
Trawsfynydd	February 1958	3 days	Permission Granted
Dungeness	February 1958	3 days	Permission Granted
Oldbury	April-May 1960	3 days	Permission Granted
Wylfa	May-June 1961	4 days	Permission Granted
Sellafield	June-November 1977	100 days	Permission Granted
Sizewell B	Jan 1983	2 years	Permission Granted
Hinkley Point C	1988	1 year	Permission Granted

Despite the anti-nuclear lobby's failure to prevent the construction of THORP, the inquiry represents a nuanced insight into cultural attitudes towards nuclear technologies during the 1970s and the social processes behind their creation. The inquiry brought into contact disparate elements of the anti-nuclear lobby and formalised a new dystopian imaginary, serving as a 'contact zone' for public debates over the environmental impact of nuclear technologies, state-secrecy, and the nefarious methods of political and social governance that they engendered. This draws upon the work of Mary Louise Pratt, who has defined contact zones as "social spaces where cultures meet, clash, and grapple with each other, often in contexts of highly asymmetrical relations of power."⁷¹² This is a fitting description of the inquiry process, as a space in which the concerns and anxieties of local individuals and a host of newly-formed political and environmental alliances met the combined political and economic might of the military-industrial complex for the first time.⁷¹³ Windscale therefore represented the first public audit of nuclear power in the environmental era.⁷¹⁴ This offered a "a rare point of contact between the public, national groups, policy makers and industry," bringing the officially-maintained, utopian imaginary of nuclear power into direct conflict with a new, dystopian imaginary of nuclear technologies as a threat to the environmental, social, and political fabric of British society.⁷¹⁵

The following section will examine this process, arguing that the historical value of the inquiry can be found by reading 'against the grain' of official narratives and discourse and

⁷¹² Pratt, 'Arts of the Contact Zone', p. 34.

⁷¹³ Whilst public inquiries relating to nuclear energy had occurred in the past, these had been far smaller in scope. All seven up to this point had lasted for a combined thirty-two days, in comparison with Windscale's one hundred. Likewise, no inquiry had taken place in the previous sixteen years, during which time the environmental movement had emerged and taken a front seat in debating issues of nuclear power and radiation. (R. Williams, *The Nuclear Power Decisions: British Policies 1953-1978* (London: Croom Helm, 1980), p. 263.)

⁷¹⁴ C. Conroy, *What Choice Windscale? the Issues of Reprocessing* (London: Friends of the Earth and Conservation Society, 1978), p. 5.

⁷¹⁵ E. Rough, 'Policy Learning Through Public Inquiries?', p. 24.

through close attention to the range of assumptions and subjectivities disclosed throughout the various debates and examinations within the inquiry process.⁷¹⁶ Once again, the sociotechnical imaginary offers a nuanced framework to think through these responses, as the state-sponsored imaginary of nuclear prosperity clashed with a public imaginary of nuclear technologies as an environmental threat and an abuse of state power unfairly burdened by geographically isolated and socially ‘peripheral’ communities.

4.2: Secrecy.

This section will demonstrate how the Windscale Inquiry helped embed dystopian imaginaries of nuclear secrecy as a threat to the rights of ordinary civilians, particularly at the local level where citizens imagined the THORP project through the lens of the industry’s history of public deception and subterfuge. Through the testimonies of local witnesses at the inquiry (both independent and affiliated to NGOs and environmental groups such as FoE), we can see how local people resisted official attempts to situate the THORP project within the utopian STIM by mobilising memories of being misled over the Windscale fire. The fire had a marked effect on the way local citizens imagined the THORP project. Residents drew comparisons between the present debate and the fire, remarking that “I began to worry from the first 1957 incident and I have become more and more concerned as the years have gone on, as I have heard more and more of minor incidents that have not been disclosed to the public.”⁷¹⁷ During the inquiry one local councillor testified that “my own experience as a member of the Cumberland fire service at the time of the 1957 accident led me to have little confidence in the management of the works’ complex at Windscale. Nothing that has happened since has made

⁷¹⁶ A. Stoler, *Along the Archival Grain: Epistemic Anxieties and Colonial Common Sense* (Princeton: Princeton University Press, 2009).

⁷¹⁷ Whitehaven Archives and Local Studies Centre, (DH/372/1/60).

me chance my views.”⁷¹⁸ Residents referenced the “difficult relationship between the local community and the BNFL works [whereby] fear, suspicion, and unease bore heavily in the minds of local people.”⁷¹⁹ Others complained that “the past performances of BNFL and their apologists have served us, the local community, very badly in the past, and accounts for much of the mistrust and suspicion that still exists.”⁷²⁰ Here, the historical conduct of the nuclear authorities contributed towards present-day scepticism, as citizens invoked memories of the fire to resist official attempts to embed the THORP project within the utopian STIM. Conversely, local citizens constructed dystopian imaginaries of nuclear secrecy as an over-extension and abuse of state power. Specifically, citizens challenged the industry’s repression of the local population, embedding dystopian imaginaries of nuclear technologies as a threat to democratic values and freedom of speech.

Residents used the inquiry as a means to challenge local power relations, embedding dystopian imaginaries of nuclear secrecy as a subversion of local interests. As the region’s largest employer, they explained that BNFL dominated the local economy and controlled local politics. Describing the unequal power relations this imposed, locals alluded to the culture of silence and fear that this had cultivated amongst ordinary people, a process they described as “blackmail operating at its crudest.”⁷²¹ One local farmer and Greenpeace supporter explained that people weren’t prepared to speak out against the plant because “they’ve made the whole population dependent on them; their bread and butter comes from them.”⁷²² Another resident

⁷¹⁸ National Archives, ‘The Windscale Planning Inquiry: Proof of Evidence given by Mr. Bill Dixon’, (AT 103/267), p. 4.

⁷¹⁹ Whitehaven Archives and Local Studies Centre, ‘James Mitchell, FoE West Cumbria to Council Clerk, 20th August 1978’, (YSPC 1/170).

⁷²⁰ Whitehaven Archives and Local Studies Centre, (YSPC 1/170).

⁷²¹ Whitehaven Archive and Local Studies Centre, (24/ NUC), *The Windscale File: A Lay Guide to Living (and Dying) with a Nuclear Neighbour*, (London: Greenpeace, 1983), p. 1.

⁷²² *Ibid.*

described how they were “frightened” of the nuclear industry, adding that “they are so powerful in West Cumbria they could do what they liked.”⁷²³ This was a point repeatedly made by FoE who claimed to be representing anxious citizens, a great many of whom “are wary of the claimed benefits to be derived from the expansion, but since the majority have some connection with the plant, they are afraid to speak out.”⁷²⁴ Several local residents admitted they did not feel able to speak freely about the plant for fear of recrimination, social ostracism, or indirectly harming the career prospects of family members and friends employed at the plant. One resident explained that “people are genuinely afraid to speak up because of jobs.”⁷²⁵ Two local women, Florence Corkhill and Marjorie Higham (who had measured the levels of radiation in her colleagues’ hair after they had cycled into work during the Windscale fire), commented that many “do not feel free to come to this inquiry to voice any objection they may have”, adding they felt “unable to speak freely” since “their livelihood is threatened if the planning permission for the THORP plant is refused.”⁷²⁶ Mrs Higham admitted that local people were “afraid that their jobs or careers will suffer, or that they “might inadvertently say something out of turn.”⁷²⁷ Residents expressed similar sentiments when interviewed years later. They outlined that “very, very few lone voices raised against them [BNFL]”, explaining “that just reflects how the nuclear industry has managed the whole population.”⁷²⁸ In this context, citizens imagined the THORP expansion as a threat to the cultural autonomy of local people, embedding dystopian imaginaries of nuclear technologies as cultivating a hostile climate of fear and suppressing public opinion.

⁷²³ P. Adamson and O. Adamson, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 20 August 2010, p. 12.

⁷²⁴ Whitehaven Archives and Local Studies Centre, (DH/372/1/60), p. 3.

⁷²⁵ McSorley, *Living in the Shadow*, p. 34.

⁷²⁶ Whitehaven Archives and Local Studies Centre, ‘The Windscale Planning Inquiry: Proof of Evidence given by Nurse Florence Corkhill’, (DH/372/1/60), p. 7; Whitehaven Archives and Local Studies Centre, ‘The Windscale Planning Inquiry: Proof of Evidence given by Marjorie Higham,’ (DH/372/71), p. 2.

⁷²⁷ Whitehaven Archives and Local Studies Centre, ‘The Windscale Planning Inquiry: Proof of Evidence given by Marjorie Higham,’ (DH/372/71), p. 2.

⁷²⁸ M. Steele, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 20 August 2010, p. 27

Local groups and independent politicians developed this point, complaining about a state-sponsored policy of “suppression” and “censorship” enacted upon the local people, who were being given “unbalanced” and “misleading” information about THORP through BNFL’s stage-management of local politics.⁷²⁹ Specifically, they argued that BNFL exerted undue influence over policymakers. In particular, they refuted the council’s decision to allow BNFL use of a council owned building in Whitehaven to host a three month-long exhibition displaying the alleged benefits of reprocessing. Their sense of injustice was particularly acute, since FoE’s attempts to set up an ‘alternative public exhibition’ on the economic and environmental issues of reprocessing were rejected by the council, on the grounds of it being controversial. This decision was derided by local groups and independent politicians, who referenced “the conspiracy of silence” cultivated by the nuclear industry through its control of local politics.⁷³⁰ One local resident surmised the situation, describing that BNFL was like “an octopus with tentacles... its arms spread everywhere.”⁷³¹ Similar claims came from local councillor Bill Dixon, who explained that his opposition to the THORP proposals had collapsed because of pressure placed upon some of his supporters by a “leading local politician who is also a Windscale employee.”⁷³² Having granted BNFL permission to develop THORP, he divulged that two members of the council planning committee were BNFL employees, but had not declared a conflict of interests when voting on the proposal.⁷³³ Laying bare the extent of BNFL’s influence within local politics, the inquiry revealed the industry’s involvement within ostensibly democratic processes. This helped embed dystopian imaginaries of nuclear secrecy

⁷²⁹ National Archives, ‘The Windscale Planning Inquiry: Proof of Evidence given by Chris Haworth’, (AT 103/267), p. 6.

⁷³⁰ Whitehaven Archives and Local Studies Centre, (DH/372/1/60), p. 4.

⁷³¹ N. Garbutt, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 22 March 2010, p. 27.

⁷³² National Archives, ‘The Windscale Planning Inquiry: Proof of Evidence given by Councillor Bill Dixon’, (AT 103/267), p. 2.

⁷³³ *Ibid.*

by depicting the nuclear industry's role in undermining local democracy and misleading the local public.

BNFL, for its part, sought to counter the notion that it operated in secret from the local population by emphasising the role of intermediary bodies such as the Local Liaison Committee (LLC). Set up as one of the recommendations following the 1957 fire, the LLC was designed to act as a go-between for plant management and the local community. Conversely, this organisation substantiated the dystopian STIM by demonstrating the lack of political autonomy afforded local citizens who were excluded from voicing their concerns by the group's highly selective membership and representation. Opponents argued that the LLC held very little credibility in the eyes of the local population, who saw it as a public relations vehicle designed to foster an illusion of transparency. Since its conception, the committee had met infrequently and had failed to establish any meaningful channel of communication between the management and local public. Indeed, local citizens looked upon it with scepticism and hostility, interpreting it as a façade and “nothing more than a white-washing front-organisation... stage-managed by BNFL [to produce] a blocked channel of communication to the public.”⁷³⁴ This was a claim reinforced by the LLC's own members, one of whom admitted the group was “absolutely useless... it was just staged.”⁷³⁵ Another former member explained that the committee “never disseminated anything to anybody.”⁷³⁶ She explained that the majority of people on the committee had never attended a meeting, and “most of the authorities that were represented on it didn't exist.”⁷³⁷ She described that the LLC was smokescreen for

⁷³⁴ National Archives, ‘The Windscale Planning Inquiry: Proof of Evidence given by Peter Haworth’, (AT 103/267), p. 7.

⁷³⁵ A. Postlethwaite, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 18 March 2010, p. 11.

⁷³⁶ M. Higham, ‘Sellafield Stories: Oral History Project’, interviewed by G. Wilkinson, 23 March 2010, p. 31.

⁷³⁷ *Ibid.*

BNFL to canvass favour with local leaders by “giving everybody a nice lunch” to “butter them up.”⁷³⁸ This criticism reflected the make-up of the group, whereby BNFL officials held the positions of Chairman, Vice-Chairman, and Treasurer of the Committee, and made up a vast majority of its representatives.⁷³⁹ This helped embed dystopian imaginaries of nuclear secrecy as residents argued that BNFL’s vast political influence and stage-management of organisations such as the LLC maintained a gagging effect upon the local population, through which it was able to foster an illusion of public support for its activities. Furthermore, BNFL’s status as a government organisation produced concerns about the affinity between nuclear stakeholders and government ministers, through which the nuclear industry appeared to not only have the tacit support of the state but was to an extent devolved from and beyond the jurisdiction of democratic politics. This point formed one of the most potent arguments against the THORP expansion, as local residents communicated dystopian imaginaries of nuclear technologies as an ancillary mechanism of state power.

The repression of local opinion was linked to the state both through their overall management of BNFL, which fell under the jurisdiction of various government ministries and through the official narratives procured by government ministers, who asserted that the THORP project was wholeheartedly endorsed by the local West Cumbrian population. This was a point strongly rejected by the local public, as local witnesses testified that “this is untrue” adding that “there are a great many people who are seriously worried and against the expansion of Windscale,” and that “the bulk of the population does not support this proposal.”⁷⁴⁰ This

⁷³⁸ On the one occasion she did recall a council representative complaining about the levels of radioactivity found in the Irish Sea, she explained that BNFL “told the county council representatives to muzzle him.” (*Ibid.*)

⁷³⁹ Whitehaven Archives and Local Studies Centre, (YSPC 1/170), pp. 10; National Archives, ‘The Windscale Planning Inquiry: Proof of Evidence given by Chris Haworth,’ (AT 103/267), p. 6.

⁷⁴⁰ National Archives, ‘The Windscale Planning Inquiry: Proof of Evidence given by Jean MacLeod’, (AT 103/267); Whitehaven Archives and Local Studies Centre, ‘The Windscale Planning Inquiry: Proof of Evidence given by Nurse Florence Corkhill’, (CH/372/1/60), p. 7.

subverted the government's official line, whereby the Secretary of State for the Environment, Peter Shore had told the House of Commons that the local population was overwhelmingly in favour of the THORP expansion.⁷⁴¹ Proving that this perception "defied all credibility", local objectors had obtained the signatures of some 27,000 local residents over a period of just five days, all of whom called for an independent inquiry to express their objections to the THORP expansion.⁷⁴² The discrepancy between government statements and local opinion helped embed dystopian imaginaries of state power, revealing the government's suppression and ignorance of local attitudes. The FoE were particularly vocal on this matter, arguing that the incongruity between official narratives and public opinion exposed the superficial pretence of popular support for the THORP project. FoE referred to the industry's "multi-million pound propaganda exercise" which maintained a façade of public support "despite the fact that it [THORP] is opposed by the majority of the population."⁷⁴³ This confirmed the concerns of the Director of Planning for the THORP project, who privately admitted to government ministers that "those supporting BNFL's proposals in total consisted essentially of company employees."⁷⁴⁴ Similar points were also made by local residents such as housewife Enid Huws-Jones, who told the inquiry that it was only government and industry figures who backed the proposals, adding that "people outside the industry seem to feel bewildered."⁷⁴⁵ These arguments blended into and merged with a wider criticism of the role of the state in sustaining the power of the nuclear industry as anti-nuclear opponents embedded dystopian imaginaries centred around the autocratic powers of 'the nuclear state.'

⁷⁴¹ *The Times*, 3 November 1976.

⁷⁴² Whitehaven Archives and Local Studies Centre, 'The Windscale Planning Inquiry: Proof of Evidence given by Nurse Florence Corkhill', (CH/372/1/60), p. 7

⁷⁴³ Windscale Archives and Local Studies Centre, (YDSO/184/1/2); C. Aubrey (et al.), *Nuclear Power: Shut it Down!* p. 449.

⁷⁴⁴ National Archives, (AT 103/267).

⁷⁴⁵ National Archives, 'The Windscale Planning Inquiry: Proof of Evidence given by Enid Huws Jones', (AT 103/267).

4.3: 'Nuclear State.'

The concept of the 'nuclear state' derives from the German political writer Robert Jung who coined the term in 1970, denoting the hierarchical order which sustains and proliferates the development of nuclear technologies.⁷⁴⁶ The following section of the chapter argues that concerns over nuclear secrecy fed into dystopian imaginaries of a centralised, authoritarian 'nuclear state' detached from and at odds with the British public. This echoes scholarly work on late Twentieth Century anti-nuclear protest culture, which has shown that nuclear resistance was rarely focused entirely on a single-issue such as reprocessing, but was often "entwined with wider political and moral concerns."⁷⁴⁷ In many cases "the specific anti-nuclear position might not be precisely defined" and instead may represent "a generalised expression of outrage or fear [or] a nebulous desire to challenge the assumption that nuclear [technologies] were an inevitable part of contemporary experience."⁷⁴⁸ In this context, nuclear issues often functioned as "a vehicle to protest against government policy more broadly", reflective of "wider political problems rather than a self-contained issue in themselves."⁷⁴⁹ As the following section will demonstrate, debates over reprocessing borrowed from and fed into a more nuanced and complicated set of attitudes towards contemporary society, state hegemony, and authoritarianism. These broader contexts helped embed the dystopian STIM, as nuclear technologies became imbricated with the centralisation of state power and the breakdown of democracy.

⁷⁴⁶ R. Jung, *the Atomic State: From Progress to Inhumanity* (Reinbek: Rowohlt, 1970); Aubrey, *Nuclear Power*, p. 449.

⁷⁴⁷ C. Laucht, and M. Johnes, 'Resist and Survive: Welsh Protests and the British Nuclear State in the 1980s', *Contemporary British History*, 33.2 (2019), p. 227.

⁷⁴⁸ Cordle, *Late Cold War Literature and Culture*, p. 49.

⁷⁴⁹ Laucht, and Johnes, 'Resist and Survive', p. 227.

Opponents to nuclear power, such as The Windscale Appeal, The Oxford Political Ecology Research Group, Greenpeace, and scientific figures used the inquiry to challenge the relationship between the state and nuclear industry. This helped embed dystopian imaginaries of an autocratic nuclear state unrepresentative of the British public. Representatives of the Windscale Appeal argued that the relationship between nuclear science and the state had produced a techno-scientific elite of policymakers and scientists, at once “out of control and able to tap government money at will” and removed from the general public in their pursuit of increasingly hazardous nuclear technologies.⁷⁵⁰ Likewise, opponents from the *Ecologist* magazine argued that “the UKAEA, BNFL, the electricity boards and the reactor building industry have created a highly centralised technological elite that enjoys full-bodied government backing”, referring to the “immense” power of the pro-nuclear lobby.⁷⁵¹ Sir Kelvin Spencer, former Chief Scientist at the Ministry of Fuel (which oversaw much of the early work on Britain’s civil nuclear power program), was particularly critical of the state’s “lavish financing of nuclear activities.”⁷⁵² He argued that:

Nuclear energy has gathered a momentum which has made it almost unstoppable. Instead of recognising that some of the problems are unsolvable on any acceptable time scale and at an acceptable cost- the controlling bodies nationally and internationally set up to set safety standards have lowered those standards as and when expedient, so that the nuclear juggernaut could go on.⁷⁵³

⁷⁵⁰ Pearce, *Fallout*, p. 107. Elsewhere, the Oxford Political Ecology Research Group (PERG) argued that nuclear power had become a symbol of the status quo. It centred its criticisms around the belief that the successful construction of the THORP project represented “the continuation of the present pattern” and existing social hierarchies. (Whitehaven Archives and Local Studies Centre, (DH/372/89), p. 82.)

⁷⁵¹ Aubrey, *Nuclear Power*, p. 449.

⁷⁵² Whitehaven Archives and Local Studies Centre, (DH/372/86), p. 31.

⁷⁵³ *Ibid.*

This reflected the concerns of many at the inquiry that nuclear technologies were incongruous with the prosperity of wider society. Exploring energy infrastructure projects, James C. Scott coined the term ‘high modernism’ to describe how civil projects such as nuclear power substantiated the hegemony of the state, particularly over the environment and ordinary citizens.⁷⁵⁴ This process is reflected in Fig. 2.0, published by the Scottish Campaign to Resist the Atomic Menace (SCRAM). Whilst not a major voice at the inquiry, SCRAM’s image shows that anti-nuclear protestors held deep-seated concerns about the increasing power of the nuclear state over the British public. This helped embed dystopian imaginaries of nuclear technologies as a threat to the interests of the British public, as reprocessing became a conduit for broader political debates regarding democratic governance and the balance of power between state and populace.

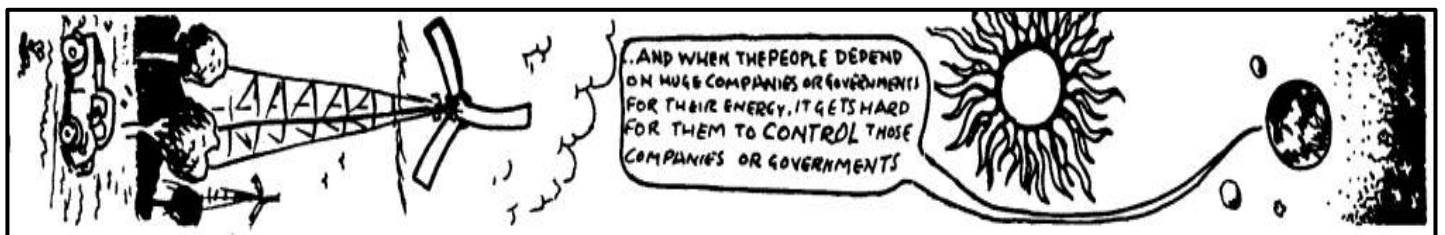


Fig. 2.0: SCRAM (Scottish Campaign to Resist the Atomic Menace), ‘Energy Bulletin’ (April/May 1978).

Embroiled within debates over state hegemony, the inquiry rapidly encompassed broader social and cultural elements as the issue of reprocessing became a prism through which the socio-cultural fabric of British society was subject to interrogation and contest. Whilst much of the inquiry was devoted to issues of nuclear scientific and technical concern, this represented a point of departure from which oppositional groups mounted a broader challenge to the legitimacy of the nuclear state. The following section will demonstrate how opponents

⁷⁵⁴ J. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, CT: Yale University Press, 1999).

of nuclear power linked seemingly disparate elements such as nuclear secrecy and issues of community liaison with wider social critiques of capitalism and the relationship between citizens and state, imagining a dystopian future whereby nuclear technologies were accompanied by the rise of a police state and the suppression of civil liberties.⁷⁵⁵

4.4: Police State.

Local activists argued that THORP represented an encroachment of state power upon the British public, imagining the suppression of their civil liberties under the creeping advances of the police state.⁷⁵⁶ Quoting from the foreword of Aldous Huxley's dystopian 1932 novel *Brave New World*, the West Cumbrian branch of FoE invoked Huxley's prophetic warning that the "non-human fact of atomic power" would disrupt "all the existing patterns of life... and new patterns will have to be improvised to conform" with the "far from painful operations directed by highly centralised totalitarian governments."⁷⁵⁷ In this context, FoE imagined a future reality rooted in contemporary experience, pointing to the armed nuclear police-force housed at Sellafield as a cautionary symbol of nuclear expansion.⁷⁵⁸ Whilst Sellafield had always maintained a small police presence, the THORP application planned to create a full-time armed nuclear police-force with extensive powers and legal jurisdiction throughout the local area. Anti-nuclear groups argued that this represented a threat to freedom of expression and the rights of ordinary civilians. Whilst the Atomic Energy Authority Constabulary was

⁷⁵⁵ This gives a more detailed insight into British social history, as the issue of nuclear reprocessing offers a window into the social relationships between government and citizenry within late twentieth century Britain. Using the Windscale inquiry as an access point into this social dynamic, it becomes clear that the decision to site the THORP reprocessing plant at Sellafield contributed to an increasing social distance between the public and the state, instigating an othering process which saw the 'nuclear state' emerge as a coherent entity, removed and socially unrepresentative of the British public.

⁷⁵⁶ Tompkins, *Better Active than Radioactive!* p. 30.

⁷⁵⁷ A. Huxley, *Brave New World* (London: Chatto and Windus, 1932).

⁷⁵⁸ Whitehaven Archives and Local Studies Centre, 'FoE Souvenir Programme', (YDSO 184/1/2).

ostensibly under the control over the government, both national and West Cumbrian branches of FoE expressed scepticism regarding the extent of its autonomy from the government, arguing that this represented “the only private police force in the country unaccountable to any democratic organisation.”⁷⁵⁹ This formed a key argument amongst local anti-nuclear groups, who cautioned against the increasing autonomy of the nuclear industry, embedding an imagined future whereby “we may ultimately find ourselves paying for nuclear power with our cherished civil liberties.”⁷⁶⁰ This reflected broader social trends throughout the 1970s, as the centralisation of police and state power came under increasing public examination.

In their study of the role of the police in British society, John Brewer *et al.* have argued that throughout the latter half of the Twentieth Century there was “a growing politicisation of policing and what appeared to be an increasing use of the police force for partisan political ends.”⁷⁶¹ Here, they identify that the public resisted the “enhanced resources and powers bestowed [upon the police] by a supportive government”, arguing that this was linked “to trends towards authoritarianism and centralisation within the British state” more broadly.⁷⁶² Police and state power, they argue, existed in a symbiotic relationship which came under “almost universal attack” throughout the 1970s.⁷⁶³ Robert Reiner identifies the 1970s as a period of change, whereby state and police power increasingly homogenised, with “deleterious consequences” for the relationship between ordinary people, the police, and the state.⁷⁶⁴ In this context, groups opposing THORP, such as FoE, the National Council for Civil Liberties

⁷⁵⁹ *Ibid.*

⁷⁶⁰ *Ibid.*

⁷⁶¹ This study analyses multiple national contexts, although only work focusing on Britain is referred to here. (J. Brewer (et al.), (eds.), *The Police, Public Order and the State: Policing in Great Britain, Northern Ireland, the Irish Republic, the USA, Israel, South Africa and China* (London: Palgrave MacMillan, 1996), p. xiii.)

⁷⁶² *Ibid.*, p. xiii f.

⁷⁶³ *Ibid.*, p. xiv.

⁷⁶⁴ *Ibid.*

(NCCL), and the National Peace Council framed their responses towards nuclear technologies through the context of wider social and civic unrest. They imagined the increased power of the police as a symbol of a dystopian future whereby civil liberties came under threat from the creeping advances of the state. In this context, nuclear power was seen as an ancillary mechanism to extend state power and surveillance under the guise of nuclear security.

In his transnational study of anti-nuclear movements, environmental historian Andrew Tompkins argued that opponents feared that “the security apparatus necessitated by nuclear power was a means by which the state would extend its power over citizens.”⁷⁶⁵ He argues that nuclear technologies were pejoratively viewed as “the perfect symbol of a new order, one that would be based on the technocratic power of the state [and] military-police power.”⁷⁶⁶ In this context, imaginaries of nuclear power were influenced by contemporary attitudes towards state power and policing. A visual representation of this process is offered in Fig. 3.0, where a female FoE member protesting against THORP brandishes a placard which directly links the development of nuclear technologies with the increasing power and autonomy of the police.



Fig. 3.0: G. Boyle, *Nuclear Power: The Windscale Controversy* (Milton Keynes: Open University, 1983), p. 21.

⁷⁶⁵ Tompkins, *Better Active than Radioactive!* p. 57.

⁷⁶⁶ *Ibid.*

Whilst this shows police constables and activists smiling, seemingly enjoying a level of cordiality, this alludes to the emergence and performance of dystopian imaginaries amongst sections of British society. Here the police presence served as a tangible representation of an imagined dystopian future, imbricating nuclear technologies with the centralisation of police and state power.

Opponents argued that the expansion of the nuclear project would result in increased levels of surveillance over ordinary people, as attitudes towards the police state fed into and embedded dystopian imaginaries of state repression. Debates thus centred around the surreptitious control of civilians by the police state and its encroachment upon daily life, as opponents testified to the increasing surveillance of their activities and “a growing climate of suspicion towards all opposition to nuclear power.”⁷⁶⁷ Throughout the inquiry, groups such as the Oxford Political Ecology Research Group (PERG) and FoE described that nuclear power represented “the reality of a system that requires ever more centralisation, bureaucratic decision making, and the consequent loss of freedom for the individual in the organisation of daily life.”⁷⁶⁸ This built upon the sentiments of a report published by the Royal Commission on Environmental Pollution in 1976.⁷⁶⁹ This had argued against the proposed Windscale expansion, acknowledging that the further development of the nuclear programme would necessitate the cessation of civil and political rights, increasing surveillance and the centralisation of state power. Presented as evidence at the inquiry by FoE, the report argued that the nuclear programme would require “unprecedented security service examination of political beliefs and personal associations of many people working in non-government sectors

⁷⁶⁷ P. Wright, *The Times*, 28 October 1976.

⁷⁶⁸ Whitehaven Archives and Local Studies Centre, (DH/372/89), p. 83.

⁷⁶⁹ Royal Commission on Environmental Pollution, *Nuclear Power and the Environment*, (London: HMSO, 1976). Also known as the ‘Flowers Report’, after its chairman, Sir Brian Flowers.

of the electricity industry.”⁷⁷⁰ This, it acknowledged, “might include the use of informers, infiltrators, wire-tapping, checking on back accounts and the opening of mail.”⁷⁷¹ These concerns not only painted a bleak picture of daily life under the power of a nuclear-police state, but were based upon precedents elsewhere in Europe and Australia, where nuclear technologies had placed significant restrictions upon citizens’ rights.

Concerns regarding the encroachment of the nuclear state upon daily life were reinforced by the presence of the National Council for Civil Liberties (NCCL) at the inquiry, who embedded dystopian imaginaries of state repression by referencing global trends. The NCCL argued that the transportation of plutonium necessitated as part of the THORP project could “only be made relatively safe by infringements of civil liberties.”⁷⁷² They also cautioned against the haunting spectre of a police state, embedding a dystopian future whereby “informers, spies, phone tapping, mail opening, rubber bullets, and tear gas” became an increasing feature of daily life.⁷⁷³ These fears were based upon precedents elsewhere throughout Europe, particularly France and Germany, which had seen multiple violent protests between ordinary civilians, anti-nuclear groups, and political authorities.⁷⁷⁴ Tompkins has shown that anti-nuclear protests in France and West Germany were often characterised by police checkpoints, armoured vehicles, heavily armed police, stun grenades, and water cannons, describing that “the state’s heavy-handed repression of protest [represented] a sign of the police state that nuclear power necessarily entailed.”⁷⁷⁵ Referencing these global trends, the

⁷⁷⁰ P. Wright, *The Times*, 28 October 1976.

⁷⁷¹ Whitehaven Archives and Local Studies Centre, ‘FoE Souvenir Programme’, (YDSO 184/1/2).

⁷⁷² M. Morris, and M. Pithers, *Windscale: A Summary of the Evidence and the Argument* (London: Guardian Newspapers, 1977), p. 93.

⁷⁷³ *Ibid.*

⁷⁷⁴ For a comprehensive reading on this subject, see Nehring, *Politics of Security: British and West German Protest Movements and the Early Cold War, 1945-1970*; and Tompkins, *Better Active than Radioactive!*

⁷⁷⁵ Tompkins, *Better Active than Radioactive!* pp. 2, 3, 57.

NCCL also warned about the effects of Australia's highly controversial uranium transportation programme, quoting from the words of the Australian Council of Trade Unions, who explained that "uranium is putting Australian against Australian... it raises the terrible possibility of bloodshed in the streets."⁷⁷⁶ These examples fed into and formalised dystopian imaginaries by warning that the transportation of plutonium and other fissile materials could have similar consequences in Britain.⁷⁷⁷

Speaking into an imagined future of state repression, both FoE and Greenpeace explained that the THORP project would result in the surveillance of anti-nuclear groups and prominent individuals who were suspected of anti-nuclear dissent. Greenpeace activists already held deep suspicions that anti-nuclear groups had already been infiltrated in the lead up to the inquiry and that subversive tactics had been used to undermine them ahead of the inquest.⁷⁷⁸ This belief was well-founded, as it was later proven that environmentalists protesting against expansion of the nuclear plant at Sizewell had been systematically spied upon and bugged, having had their phones tapped at the behest of MI5 who employed a group of infiltrators to "manoeuvre themselves into specific groups of objectors and obtain recordings or transmissions of specific conversations."⁷⁷⁹ Whilst no evidence directly proved such activities at Sellafield, activists noted the presence of new members in the build-up to the inquiry, recognising "one or two people at our meeting who we felt weren't quite our sort of campaigners."⁷⁸⁰ Stopping short of directly claiming that they had been infiltrated by either

⁷⁷⁶ Morris, and Pithers, *Windscale: A Summary*, p. 93.

⁷⁷⁷ Similar arguments were raised in 1980, when Manchester City Council refused the transportation of nuclear materials through its territories, becoming the first of a series of county, district, and city councils to declare themselves a 'Nuclear-free zone.' For further reading, see Atashroo, 'Weaponising Peace', pp. 170- 186.

⁷⁷⁸ J. Cutler, 'Surveillance and the Nuclear State', *Index on Censorship*, 18.6-7 (1989), p. 445. (The author was a TV documentary maker who was affiliated to FoE and Greenpeace during the inquiry.)

⁷⁷⁹ In a similar incident two protestors opposing the nuclear dump at Fulbeck in Lincolnshire were beaten up and assaulted by unknown assailants who appeared to have links with the Ministry of Defence, whilst their legal representative had her car broken into and confidential papers searched. (*Ibid.*)

⁷⁸⁰ *Ibid.*

government spies or private agencies seconded to monitor their activities, activists expressed fears of a dystopian future where this would become the norm, arguing that nuclear technologies represented a weapon of an increasingly autocratic nuclear state.

The NCCL warned that the infringement of civil liberties would in future make up an essential part of the nuclear industry, embedding an imagined dystopian future which linked nuclear reprocessing with the cessation of workers' rights. They argued that if THORP went ahead, workers would be subjected to increasing surveillance and monitoring, explaining that "workers would be thoroughly vetted by checks on their families and friends," whilst "scientists, even their wives and friends, who had shown any radical leanings- perhaps at university- would find it hard to get a job" within the industry.⁷⁸¹ Opponents suggested that trade unions would be banned "and strikes outlawed because of the threat to national security", whilst "transport workers would come under police surveillance" as "potentially subversive" threats to domestic security.⁷⁸² In this context, they contended that "wide powers of search would be used" with ordinary citizens coming under surveillance: "files would be opened on them, mail intercepted, phones tapped, bank accounts revealed [and] citizens might well have to carry identity cards."⁷⁸³ This, they argued, would encourage an atmosphere whereby informers and spies would operate "and agents provocateur would emerge."⁷⁸⁴ Once again, these fears were not without substance, as a BNFL public relations officers later admitted that they held company files on specific protestors, and individuals were routinely placed within

⁷⁸¹ Morris, and Pithers, *Windscale: A Summary*, p. 93.

⁷⁸² *Ibid.*

⁷⁸³ *Ibid.*

⁷⁸⁴ *Ibid.*

anti-nuclear groups to monitor and spy upon their activities.⁷⁸⁵ Here, we can see a wider critique of the subversive methods of governance that accompanied nuclear technologies, as opponents resisted the increasing surveillance and vetting processes by the nuclear state. In this context, the THORP debate borrowed from and fed into public imaginaries about the totalitarian power of the state, and the declining political and moral values of government. The inquiry therefore needs to be situated within a wider context of an increasing social resistance to state control, as attitudes towards nuclear power and the THORP expansion simultaneously embodied and embedded dystopian political, social, and moral imaginaries.

4.5: Moral Outlook.

Nuclear power was situated within broader debates regarding post-war British society, as opponents argued that nuclear technologies were symptomatic of declining social and moral values. As we have seen, the inquiry encompassed a multitude of social elements which constructed “a shared critique of ‘nuclear society.’”⁷⁸⁶ Whilst opponents held a variety of anti-nuclear sentiments, often incongruous with one another, their resistance sought to symbolically and practically oppose the cultural and political direction of British society, “even if they did not necessarily agree on the precise nature of the problems or solutions.”⁷⁸⁷ In this context, controversies surrounding the THORP application “signalled not only differing views on nuclear strategy, but a whole host of other beliefs”, reproducing in microcosm a series of

⁷⁸⁵ One worker was sacked for being a member of environmental group Greenpeace. Despite the lack of evidence against him, twenty-eight-year-old Phillip Cundy was sacked by BNFL who suspected him of leaking plant information as he had been seen wearing a Greenpeace badge. (Cutler, ‘Surveillance and the Nuclear State’, p. 448.)

⁷⁸⁶ Tompkins, *Better Active than Radioactive!* p. 29.

⁷⁸⁷ Laucht, and Johnes, ‘Resist and Survive’, p. 237.

broader debates regarding the direction and morality of society.⁷⁸⁸ Engaging with the various arguments put forward throughout the inquiry, we can see that the issue of reprocessing came to symbolise diametrically opposite ways of looking at the world, as pro- and anti-nuclear factions constructed divergent social futures based upon the proliferation or cessation of nuclear technologies. For its opponents, further nuclear development had profound moral implications for the future, representative of an outdated way of viewing society and the relationships between government and populace, and humanity and the environment. This belief is epitomised in the cartoon below (Fig. 4.0), which neatly summarises anti-nuclear protestors' belief that nuclear technologies led to a lower quality of life, committing society to a dystopian future of economic prosperity at the expense of declining living standards and the suppression of ordinary individuals.

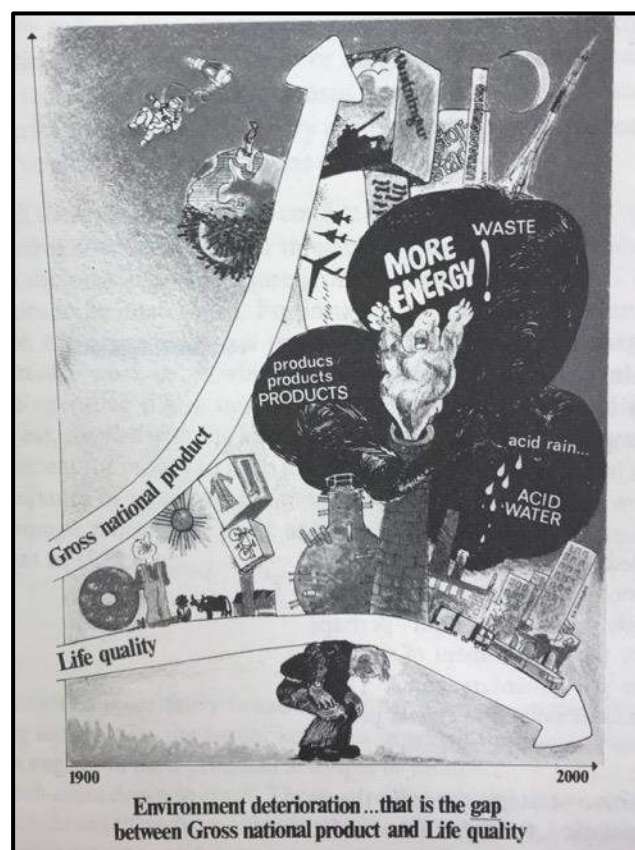


Fig. 4.0: G. Boyle, *Nuclear Power: The Windscale Controversy* (Milton Keynes: Open University, 1983), p. 51.

⁷⁸⁸ D. Cordle, 'Protect/Protest: British Nuclear Fiction of the 1980s', *British Journal of the History of Science*, 45.4 (2012), p. 658.

During the inquiry, opponents such as PERG and FoE embedded their opposition to THORP within a broader critique of capitalism and state greed. Local residents centred much of their criticism around the perceived financial incentivism of the state, which looked to reprocessing as a potent cash-cow. One local woman testifying for FoE lamented: “has this country really reached the depths where we have become so besotted with our own decline in world status, that we face danger and degradation in this county by becoming a dustbin to the world- for money?”⁷⁸⁹ The reprocessing of foreign waste therefore became symptomatic of a series of negative social changes, through which Sellafield and the THORP project embodied “all that is wrong with the nuclear industry and with the kind of society it promotes.”⁷⁹⁰ As literary historian Dan Cordle has argued of nuclear weapons, competing views on nuclear power “often revealed entirely antithetical conceptions of the social world” and “came to epitomise a Cold War logic run amok.”⁷⁹¹ This strand of resistance had a particularly left-wing focus, as left-leaning opponents imbued nuclear power with specific political and social epistemologies. They spoke of a “growing change in human values [and] a growth of conflicting philosophies” within which “nuclear power has become a symbol of that conflict in values.”⁷⁹² This betrayed a broader resistance to the social technocratic climate of the late-1970s which saw the rise of a more radical form of Conservatism under Margaret Thatcher and a wider crisis of faith in the political establishment during the Labour years of Harold Wilson and James Callaghan.⁷⁹³ In this context, debates over nuclear reprocessing drew upon broader

⁷⁸⁹ National Archives, ‘The Windscale Planning Inquiry: Proof of Evidence given by Jean MacLeod, (AT 103/267.)

⁷⁹⁰ Whitehaven Archive and Local Studies Centre, (24/ NUC), *The Windscale File: A Lay Guide to Living (and Dying) with a Nuclear Neighbour*, (London: Greenpeace, 1983), p. 1.

⁷⁹¹ Cordle, ‘Protect/Protest’, p. 658; Cordle, *Late Cold War Literature*, p. 5.

⁷⁹² Whitehaven Archives and Local Studies Centre, (DH/372/89), p. 82.

⁷⁹³ For another reading on the decline of British society during the 1970s, see K. Morgan, ‘Britain in the Seventies – Our Unfinest Hour?’, *French Journal of British Studies*, 22.0 (2017), pp. 1- 18.

socio-political conflicts, helping embed dystopian imaginaries of state greed and Britain's declining morality.

Protests against economic capitalism were a feature of the anti-nuclear movement elsewhere in Europe, specifically in France in Fessenheim and Malville, and West Germany at Kalkar, where opponents depicted nuclear technologies "as a symbol of capitalism or the state."⁷⁹⁴ In Britain, opponents mobilised similar beliefs, arguing that nuclear power represented "the unacceptable face of capitalism" and the manifestation of an industrialised way of looking at ordinary people and the natural world as an economic resource, rather than an entity in their own right.⁷⁹⁵ This left-leaning focus dovetailed with emergent strands of environmental and ecological resistance towards nuclear technologies, as the environment became a key pressure point in debates regarding reprocessing.

Environmental activists embedded dystopian imaginaries of the environmental consequences of nuclear power, locating these imagined futures within the similarly dystopian social order envisioned by groups such as the NCCL and PERG, as together, groups opposing THORP fashioned a series of undesirable futures predicated on the environmental, moral, and social consequences of nuclear reprocessing. Here, resistant nuclear imaginaries overlapped and intertwined with one another, producing new, vociferous forms of resistance towards the nuclear project. The everyday forms of resistance witnessed in the past aligned with wider (and more organised) forms of resistance in the shape of the emerging environmental movement, to challenge and interrogate the dominant nuclear imaginaries cultivated by the state. This gives an indication of why resistance to the nuclear project was far greater during the Windscale

⁷⁹⁴ Tompkins, *Better Active than Radioactive!* p. 3.

⁷⁹⁵ Whitehaven Archives and Local Studies Centre, (DH/372/95), p. 13.

Inquiry than had been witnessed before, as shared ideas motivated and mobilised people to resist nuclear proliferation and create change.

Propelled forward by the success of books such as Rachel Carson's *Silent Spring* and the work of Stanford biologist Paul Ehrlich, by the late 1970s the ecological and environmental movements had begun to radically transform the way elements of society viewed the interrelationship between human life and the global environment. In the eyes of environmental groups represented at the inquiry such as Greenpeace, FoE, and the ad-hoc consortium the 'Windscale Appeal', the issue of nuclear reprocessing embodied the mismanagement of the natural environment and reflected outdated modes of thinking that were incongruous with the attitudes and fundamental principles of the age of ecology.⁷⁹⁶ The following section will examine how the issue of environmentalism dovetailed with existing critiques of nuclear governance to produce new forms of nuclear resistance, largely unseen in the British context prior to this point. Here, I will make the argument that the Windscale Inquiry represented a significant moment in the evolution of the environmental movement in the UK which, having bubbled under the surface of debates regarding nuclear technologies throughout the previous decade and a half (during which it had amassed a considerable following), galvanised and propelled itself into the heart of the anti-nuclear movement.⁷⁹⁷

⁷⁹⁶ McCormick, *The Global Environmental Movement*; McNeill, 'The Environment, Environmentalism, and International Society', in Ferguson, *The Shock of the Global*, pp. 263- 278.

⁷⁹⁷ This augments the findings of studies examining social responses to nuclear technologies in multiple national contexts, which have found that public resistance tends to lie muted and dormant within society. Specifically, environmental geographer Karen Parkhill and anthropologist Françoise Zonabend have noted that public attitudes towards nuclear technologies "bubble to the surface" at particular moments of temporary anxiety, conflict, or social change. This also reflects the thinking of sociological practitioners who have suggested that it is at times of conflict and crisis that socio-cultural identities become most visible to the external observer. (S. Gunn, and R. Morris, 'The Spatial Turn: Changing Histories of Space and Place', in S. Gunn, and R. Morris, (eds.), *Identities in Space: Contested Terrains in the Western City Since 1850* (London: Ashgate Publishing, 2001), p. 9; K. Parkhill, D. Venables, and P. Simmonds, 'From the Familiar to the Extraordinary: Local Residents' Perceptions of Risk When Living With Nuclear Power in the UK', *Transactions of the Institute of British Geographers*, 35.1 (2010), pp. 39- 58; Zonabend, *The Nuclear Peninsula*, p. 124.

As sociologist Roger Williams has demonstrated, environmental groups had become increasingly critical of nuclear power throughout the 1970s. He argued that, whilst “opposition to nuclear power had increased throughout the seventies in all the liberal democracies, drawing strength from a substantial measure of international co-ordination, the movement in Britain remained distinctly muted until the Windscale issue in 1976-7.”⁷⁹⁸ Whilst more traditionally associated with the later efforts of Greenpeace, the involvement of environmental groups (such as FoE and the consortium of environmental groups represented by the Windscale Appeal), fused the multifaceted concerns of local residents and the social and moral arguments against reprocessing within the framework of the broader environmental movement, laying the foundations for the environmental activism against the nuclear industry throughout the 1980s.⁷⁹⁹

4.6: Environment.

As the previous chapter demonstrated, the Windscale fire had raised local concerns about the environmental effect of nuclear technologies. These fears were largely based on the environmental consequences of issues like radiation and particularly how they pertained to human (and farm-animal) health. Throughout the inquiry, we can see how these localised

⁷⁹⁸ This is something of a simplification, as environmental resistance towards nuclear technologies had been growing since the early 1960s, and global environmental factors were one of the key reasons for the Partial Test Ban Treaty of 1963. In the British context, the two organisations most associated with leading the environmental movement against nuclear power, Friends of the Earth and latterly Greenpeace did not emerge until the 1970s. Specifically, beginning in 1973, FoE began to oppose nuclear power, despite having “shown decided favourability towards nuclear power between 1970 and 1973”, whilst Greenpeace had devoted their initial efforts towards opposing nuclear weapons, and then turned their attention towards ecological issues such as marine preservation and whale hunting. (Williams, *The Nuclear Power Decisions*, pp. 262f; Herring, ‘Energy Utopianism’, p. 50; Zelko, *Make it a Greenpeace*, pp. 112- 161; For further reading on the history and trajectory of the environmental and ecological movements see op. cit., ref 709.

⁷⁹⁹ This will be covered in more detail within the following chapter.

concerns were galvanised by the wider environmental movement, producing new forms of resistance which advanced the belief that nuclear technologies (and their pollutants) represented outdated modes of thinking regarding society's relationship with, and stewardship of, the natural environment. Nuanced forms of resistance emerged, as the localised imaginaries of radiobiological contamination witnessed in the previous chapter underwent a process of extension, amalgamating with and feeding into dystopian imaginaries of environmental pollution operating at broader national and international levels.

By examining the witness testimonies and the range of arguments mobilised throughout the inquiry by local residents, we can see that the local public increasingly interpreted the nuclear project through the lens of the environmental movement. Environmental discourse saturated the inquiry, as local residents described the environmental impact of the plant as both “a stunning assault” and indicative of “the daily social and domestic life of an increasingly polluted world.”⁸⁰⁰ Pointing to the much lower levels of pollution emitted by the Cap de la Hague nuclear plant in France, opponents criticised BNFL's apparent disregard for the environmental impact of its activities, and its “immense threat to our fragile environment.”⁸⁰¹ This is reflected in the Greenpeace cartoon pictured below (Fig. 5.0), which characterises the French reprocessing plant as a model of environmental cleanliness, in marked juxtaposition with its British equivalent, seen leaking nuclear waste into the environment and spewing contaminants into the atmosphere.

⁸⁰⁰ National Archives, ‘The Windscale Planning Inquiry: Proof of Evidence given by Enid Huws-Jones,’ (AT 103/267).

⁸⁰¹ Whitehaven Archive and Local Studies Centre, (24/ NUC), *The Windscale File: A Lay Guide to Living (and Dying) with a Nuclear Neighbour*, (London: Greenpeace, 1983), pp. 1, 18.

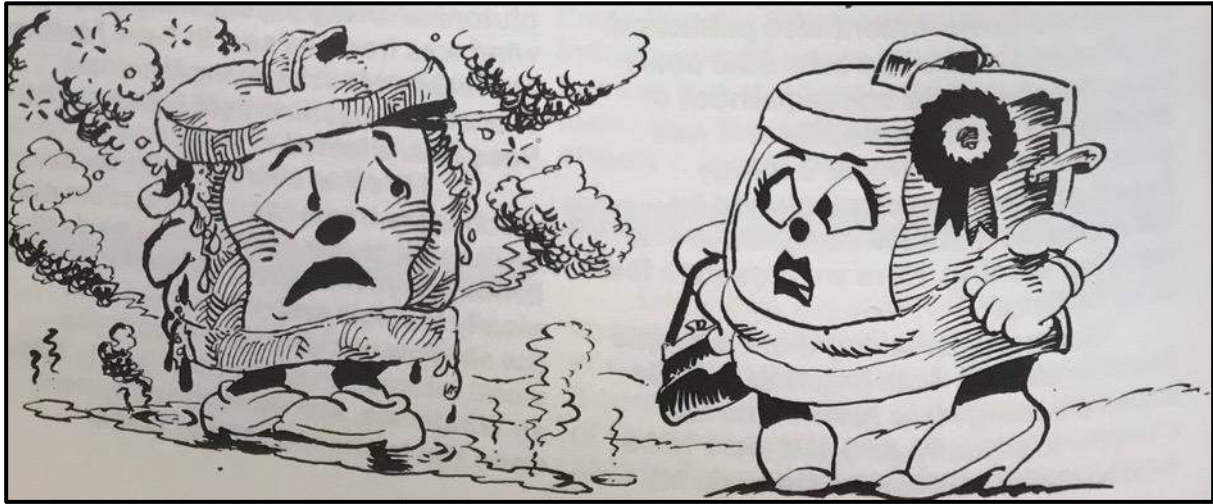


Fig. 5.0: Whitehaven Archive and Local Studies Centre, *The Windscale File: A Lay Guide to Living (and Dying) with a Nuclear Neighbour*, (London: Greenpeace, 1983), p. 18, (24/ NUC),

Opponents argued that Sellafield posed a substantive threat to the marine environment. This was particularly emphasised by a delegation from the Isle of Man government, who contended that “considerable anxiety had been expressed in the island about the expansion, and particularly about Irish Sea pollution”, emphasising the “possible danger arising from the long-term build-up of radioactivity in the sea.”⁸⁰² Local fisherman also expressed their fears that increasing discharges would see the area off the Cumbrian coast closed to fishing, as it was in area to the south of Sellafield where sewage pollution meant they were no longer allowed to fish for shellfish.⁸⁰³ Here, the specific concerns of local fishing interests dovetailed with a broader international consensus on the hazards of marine discharge, as regional interest groups, together with the environmental movement co-produced dystopian imaginaries of THORP and

⁸⁰² Morris, and Pithers, *Windscale: A Summary*, p. 70.

⁸⁰³ *Ibid.* p. 66; For further reading, see P. Ineson, *Pollution in Cumbria* (Huntingdon: Institute of Terrestrial Ecology, 1985).

the Sellafield plant more widely as an environmental scourge.⁸⁰⁴ This was a point forcibly impressed by FoE and the Lancashire and Western Sea Fisheries Joint Committee, who pointed to the presence of airborne plutonium in the area surrounding the plant and the high levels of radioactive caesium 134 and 137 discovered in fish caught in the Irish Sea and off the coast of Western Scotland. This, they claimed, had caused “significant genetic damage to the general population,” referencing a recent report by the Ministry of Agriculture, Fisheries and Foods which had shown that local fish eaters were exposed to “one-third of the maximum allowable [radiation] dose in their diet alone.”⁸⁰⁵ Concerns about the levels of marine contamination were a feature of opposition from both English and Scottish groups, such as SCRAM, who published the image below (Fig. 6.0) in their *Atomic Energy Bulletin* during the inquiry. This demonstrates how environmental groups embedded dystopian imaginaries of nuclear power as a dual threat to humanity and nature as an ecological and environmental hazard.

⁸⁰⁴ This was a significant strand of the environmental movement, which had asserted the hazards of marine contamination throughout the previous twenty years, culminating in the London Convention of 1975, an international agreement to restrict the pollution of the sea by the dumping of pollutants. Environmental historian, Jacob Hamblin’s book *Poison in the Well* gives a detailed insight into the issues of radioactive waste disposal throughout the 1950s, 1960s, and 1970s, showing that, through the routine releases of radioactive effluent from Windscale, and the marine dumping of radioactive waste, Britain discharged more radionuclides into the ocean than any other Western nation. Hamblin has shown that “in the Atlantic, where the lion’s share of waste was dumped, Britain was responsible for some 77.5 percent” of the radiation found in the sea. Furthermore, he evidences that Britain was responsible for over 40% of the global radioactive waste dumped at sea between 1946 and 1993. (Hamblin, *Poison in the Well*, p. 253; Hamblin, *Arming Mother Nature*; Elsewhere, Frank Zelko provides a detailed insight into Greenpeace’s activities in this area, see Zelko, *Make it a Greenpeace*; see also, M. Schenker, ‘Saving a Dying Sea: The London Convention on Ocean Dumping’, *Cornell International Law Journal*, 7.0 (1973), pp. 32- 48.

⁸⁰⁵ Morris and Pithers, *Windscale: A Summary*, pp. 66, 92; Whitehaven Archive and Local Studies Centre, (24/ NUC), *The Windscale File: A Lay Guide to Living (and Dying) with a Nuclear Neighbour*, (London: Greenpeace, 1983), p. 18.



Fig. 6.0: SCRAM 'Energy Bulletin' (October/November, 1977).

Concerns about Sellafield's environmental impact were reflected in the work of a local poet, Norman Nicholson, who authored the poem 'Windscale' in 1972, in which he denounced what he saw as the deliberate contamination of the local environment.

Windscale

The toadstool towers infest the shore:

Stink-horns that propagate and spore

Wherever the wind blows.

Scafell looks down from the bracken band,

And sees hell in a grain of sand,

And feels the canker itch between his toes.

This is a land where the dirt is clean,
And poison pasture, quick and green,
And storm sky, bright and bare;
Where sewers flow with milk, and meat
Is carved up for the fire to eat,
And children suffocate in God's fresh air.⁸⁰⁶

This poem embodied local sentiments towards the perceived environmental blight of the nuclear industry as local residents allied with wider environmental groups such as FoE, PERG, and Society for Environmental Improvement (amongst others) to resist imaginaries of nuclear safety and embed dystopian imaginaries of nuclear technologies as a threat to the environment. Such arguments were not altogether new, and as we have seen, debates over nuclear safety had been ongoing (to varying degrees) for as long as the nuclear industry had been operating. Despite this, the inquiry saw the environmental consciousness of the local public galvanise, as the industry's poor safety record merged with wider social and moral concerns to produce ardent, more vociferous imaginaries of nuclear technologies as a threat not only to public health, but to the environment more broadly.

The inquiry laid bare the extent of the plant's poor safety record, aligning dystopian imaginaries of environmental hazard with wider concerns towards the state's management of nuclear technologies. From the mid-1950s, Sellafield's safety levels entered into a sustained period of decline, as multiple incidents of atmospheric and marine contamination befell the

⁸⁰⁶ N. Nicholson, *A Local Habitation* (London: Faber and Faber, 1972).

plant.⁸⁰⁷ The plant's safety record was so bad that by the end of the 1970s, Windscale had become "for many people... a byword for the dirty end of a dangerous industry."⁸⁰⁸ Official UKAEA historian Lorna Arnold explained that the plant's chequered history of incident, mishap, and "near-misses" had made the names 'Windscale' and 'Calder' a byword for environmental negligence, so much so that BNFL decided to re-brand the plant 'Sellafield' shortly after the inquiry in an attempt to whitewash its recent past and avoid any further negative publicity.⁸⁰⁹ This speaks to the deeply embedded nature of dystopian imaginaries at both local and national levels, as officials were compelled to change the plant's name in an attempt to disassociate nuclear technologies with imaginaries of environmental hazard.

Differing in their severity, the inquiry revealed that there had been a total of 194 recorded incidents between 1950 and mid-1977, as plant leaders were forced to admit that there had been a number of incidents that had been covered-up by management.⁸¹⁰ Only the previous year, there had been a substantial leak of radioactive water discovered from silo 'B38', found by chance during building work.⁸¹¹ Subsequent attempts to rectify this had uncovered another huge leak from adjacent 'Building 701', which was thought to have been empty. From 'Building 701', 100,000 curies of radioactive strontium and caesium had escaped, seeping into the groundwater over a period of eight years before the leak was discovered.⁸¹² (To place this leak into context, less than one millionth of a curie of radioactivity can prove lethal depending

⁸⁰⁷ Future public relations manager, Harold Bolter acknowledged that "there had been a lamentable lack of investment in Sellafield for some years. Housekeeping standards on the site had fallen and morale was low." See, Bolter, *Inside Sellafield*, p. 90.

⁸⁰⁸ Macgill, *The Politics of Anxiety*, p. 12.

⁸⁰⁹ Arnold, *Windscale 1957*, p. xiii.

⁸¹⁰ For further reading on the industry's history of incidents, see Arnold, *Windscale 1957*; Pearce, *Fallout: Disasters, Lies*; B. Wynne, C. Waterton and R. Grove-White, (eds.), 'Public Perceptions', pp. 1- 78; Aubrey, *Thorp*; Bolter, *Inside Sellafield*; Blowers, *The Legacy of Nuclear Power*.

⁸¹¹ Harold Bolter gives a comprehensive overview of this incident, in his 1996 book, *Inside Sellafield*. See pp. 92ff.

⁸¹² BNFL chief Con Alday ruefully told the *Financial Times* that "people forgot it was there and they shouldn't have." (*Ibid.*, p. 92.)

on which organ it is absorbed by).⁸¹³ These incidents bolstered public concerns about the environmental impact of nuclear technologies and contributed to a wave of hostile public opinion against the plant's perceived environmental mismanagement. This process is characterised in the cartoon sketch below (Fig. 7.0), published in the *Daily Telegraph*. This image depicts an irate BNFL official and a sheepish scientist as little concerned about the effects of radioactive contamination, focusing instead on the negative press coverage it would engender. Whilst a satirical swipe at BNFL, this image embodies public attitudes towards the integrity and environmental negligence of the nuclear industry. This unified environmental, political, and moral strands of the dystopian imaginary, imagining state efforts to pursue nuclear technologies and cover-up their hazardous effects. The experiences of local citizens helped embed this imaginary, pointing to recent incidents of radioactive contamination that had been suppressed by the nuclear industry.



Fig. 7.0: G. Boyle, *Nuclear Power: The Windscale Controversy* (Milton Keynes: Open University, 1983), p. 29.

⁸¹³ *Ibid.*, pp. 93f.

Residents explained that BNFL regularly conducted hazardous discharges without informing the public. They described a recent incident whereby radioactive effluent was released into the local River Calder without public knowledge. Witnesses called by FoE told the inquiry that residents had not been warned about the contamination of the river, despite the fact that it served as a popular bathing spot amongst locals. They lambasted BNFL's careless attitude towards the environment, and in particular its failure to inform the local population, especially as "children were still allowed to bathe whilst the river-bed was being excavated in an effort to remove contaminated material."⁸¹⁴ Sceptical residents highlighted that it was only since additional scrutiny had been placed on the plant by opposition groups and media outlets in the run up to the inquiry that BNFL had begun to truthfully communicate with the local population. They noted that "of late many more incidents have been notified and we wonder how many more have been hushed up in the past."⁸¹⁵ In this context, attitudes towards state secrecy blended with environmental anxieties to formalise and embed imaginaries of nuclear technologies as an environmental hazard.

Local citizens' experiences of nuclear secrecy blended with and co-produced social, moral, and environmental strands of the dystopian imaginary. Locals explained that the official radiation figures did not reflect the numerous incidents which were covered up by management, but known to the public. Referencing the recent river contamination, one resident explained that, "although at that time I knew no one who was employed at Windscale or even who was connected with the plant, I was quite aware of the incident in question..."⁸¹⁶ This aligned with broader concerns about the morality and transparency of managers and politicians in charge of the nuclear programme. One local witness admitted that, "it worries me tremendously to read frequent reports of leakages from the plant, yet we are always assured that there is "no danger." My technical and scientific skill is nil, yet I cannot understand how anyone with a vestige of

humanity can insist in the face of frequent spillages and leakages of these deadly substances that there really is no danger.”⁸¹⁷ In this quote the environmental, political, social, and moral strands of the dystopian imaginary came together, as local citizens constructed and disseminated an idea of the nuclear industry as an environmental threat; at once complicit in the contamination of the local area and the systematic cover-up of its activities. As the following section will demonstrate, the effects of local environmental pollution had a profound impact upon local attitudes towards the THORP proposals, as local citizens increasingly refuted the socio-spatial implications of the environmental risks they were being exposed to in the national interest.

4.7: ‘Peripheralisation.’

The environmental costs of reprocessing, whilst ostensibly a national and global issue, resonated profoundly amongst local people, who looked to the decision to cite the THORP project in West Cumbria as indicative of wider social inequalities, and their perceived marginalization at the hands of the nuclear state. Examining where nuclear infrastructures are located, environmental geographer Andrew Blowers has used the sociological concept of ‘peripheralisation’ to describe the social inequalities of nuclear citing policy and its spatial implications.⁸¹⁸ He has described the Sellafield region as “the archetype of a peripheral community”, identifying the region’s geographic remoteness, economic marginalization,

⁸¹⁴ National Archives, ‘The Windscale Planning Inquiry: Proof of Evidence given by Jessie Norman’, (AT 103/267).

⁸¹⁵ *Ibid.*

⁸¹⁶ National Archives, ‘The Windscale Planning Inquiry: Proof of Evidence given by Jean MacLeod’, (AT 103/267), p. 5.

⁸¹⁷ *Ibid.*

⁸¹⁸ Blowers, *The Legacy of Nuclear Power*; Blowers, and Leroy, ‘Power, Politics and Environmental Inequality: A Theoretical and Empirical Analysis of the Process of Peripheralisation’, *Environmental Politics*, 3.2 (1994), p. 222. See also, K. Bickerstaff, “‘Because we’ve got History Here’: Nuclear Waste, Cooperative Siting, and the Relational Geography of a Complex Issue’, *Environment and Planning A*, 44.0 (2012), p. 2621.

political powerless, social homogeneity, and proximity to an environmental hazard (in the form of Sellafield) as the defining characteristics of its peripheral status on the fringes of mainstream society.⁸¹⁹ Developing this final point, he contends that these socio-spatial relations have led to the local community carrying a “disproportionate share of the burden of environmental degradation or risk resulting from modern environmental processes” and adopting a servile relationship with the nuclear industry.⁸²⁰ Building upon these insights, the following section will show that the environmental, social, and political costs of reprocessing helped embed a locally-specific dystopian imaginary, as local citizens imagined their marginalisation at the hands of the nuclear state. Demonstrating the role of identity in this process, I will demonstrate how subjective notions of ‘peripherality’ fed into and embedded environmental, political, and social strands of the dystopian imaginary.

This reading of subjectivity has implications for our understanding of STIM, showing the role that identity plays in embedding and resisting sociotechnical imaginaries, whilst also highlighting the social processes which underpin formations and expressions of identity. This sits alongside work on subjectivity by social psychologists Roy Baumeister and Mark Muraven, who have argued that identity “does not come into being in a vacuum” and can be more accurately understood as adaptation to a social context. Here, they argue, individuals

⁸¹⁹ This owes something to the notion of ‘core and periphery’ and even Hechter’s concept of ‘internal colonialism’ indicative of a hegemonic ‘core’ region exploiting ‘peripheral’ communities located on the fringes of mainstream society. However, “in contrast to the geographical notion of a ‘periphery’, which is synonymous with distance to a centre and being situated on the fringes of a city, region or nation, research on ‘peripheralization’ describes the production of peripheries through social relations and their spatial implications.” (See, M. Kuhn, ‘Peripheralization: Theoretical Concepts Explaining Socio-Spatial Inequalities’, *European Planning Studies*, 23.2 (2015), p. 367; M. Hechter, *Internal Colonialism: The Celtic Fringe in British National Development* (New Jersey: Transaction Publishers, 1998), pp. 202ff; See also, A. Blowers, and P. Leroy, ‘Power, Politics and Environmental Inequality: A Theoretical and Empirical Analysis of the Process of Peripheralisation,’ *Environmental Politics*, 3.2 (1994), pp. 197- 228; B. Wynne, ‘Misunderstood Misunderstanding: Social Identities and Public Uptake of Science’, *Public Understanding of Science*, 1.3 (1992), pp. 281- 304.)

⁸²⁰ Blowers, and Leroy, ‘Power, Politics and Environmental Inequality’, p. 222.

exercise “considerable choice and influence on their identities”, fashioning a version, or multiple versions of the self which “enable them to get along best in that context.”⁸²¹ This is an interpretation shared by geographer Keith Halfacree, who explains that identities can be as much a product of what we, as “what we are not.”⁸²² Baumeister and Muraven go on to explain that “the self constructs for itself a definition that allows it to get along reasonably well in its social environment, reflective both of the hegemony of these social relations, but also local citizens’ uneasiness with them.”⁸²³ Developing this understanding, identity can be understood as a historical window into and a product/producer of sociotechnical imaginaries, as citizens respond to and resist particular orderings of power. The following pages will demonstrate how local citizens adapted to the dominant power relations of the nuclear state by producing and performing new forms of identity.⁸²⁴ I will demonstrate how these subjectivities helped embed the dystopian imaginary by challenging the socio-spatial inequalities of peripheralisation, imagining a regional future characterised by the deleterious environmental, political, and social costs of reprocessing.

This builds upon the work of anthropologist Joseph Masco, who has examined the relationship between nuclear technologies and identity. Masco shows that where nuclear projects are situated reveals the state’s equation of citizenship, producing “human and environmental costs that are borne by particular bodies in particular places.”⁸²⁵ He explains that these consequences evoke new forms of social identity amongst the citizens who bear

⁸²¹ Baumeister, and Muraven, ‘Identity as Adaptation to Social, Cultural, and Historical Context’, *Journal of Adolescence*, 19.0 (1996), p. 405. Roy Baumeister has written extensively on the self, for further reading, see R. Baumeister, ‘The Self’, in D. Gilbert, S. Fiske, and G. Lindzey (eds.), *The Handbook of Social Psychology* (Boston: McGraw-Hill, 1998), pp. 680- 740.

⁸²² Robertson, and Richards (eds.), *Studying Cultural Landscapes*, p. 16.

⁸²³ Baumeister, and Muraven, ‘Identity as Adaptation to Social, Cultural, and Historical Context’, *Journal of Adolescence*, 19.0 (1996), p. 415.

⁸²⁴ *Ibid.*, pp. 405- 415.

⁸²⁵ Masco, *Nuclear Borderlands*, p. 12.

them, as they engage with nuclear technologies and the state which controls and sustains them.⁸²⁶ Expanding upon his findings within the context of this chapter, we can see that local citizens resisted the social inequalities of reprocessing by emphasising (and resisting) their identity as the recipients of “everyone’s else’s unwanted nuclear waste.”⁸²⁷ Furthermore, within articulations of resistance at the inquiry and in the years since, we can see that local people imagined reprocessing as indicative of an undesirable future whereby their handling and storage of hazardous nuclear waste pushed them to the fringes of British society.⁸²⁸

The arrival of foreign nuclear fuels exacerbated the peripheral nature of the region by becoming the location for both domestic nuclear waste and the major global storage facility for spent nuclear fuels. Here, the citing of THORP on the Sellafield site intensified “the sense of local stigma in being seen as a weak and subservient community”, forced to adopt a servile relationship with the nuclear industry.⁸²⁹ This sentiment was encapsulated by the *Daily Mirror*’s emotive metaphor of Britain, and particularly West Cumbria, as the ‘World’s Nuclear Dustbin’, in an article published in October 1975 (Fig. 8.0).⁸³⁰ This article galvanised the anti-THORP agenda amongst the local population and embedded the dystopian imaginary, showing that the government was prepared to sacrifice the safety of the local public in the pursuit of hazardous nuclear technologies and lucrative reprocessing contracts. In this context, the safety

⁸²⁶ *Ibid.*

⁸²⁷ Wynne, Waterton and Grove-White, (eds.), ‘Public Perceptions’, p. 38.

⁸²⁸ *Ibid.*

⁸²⁹ This also had economic dimensions as local citizens expressed anxieties that the economic hardship seen after the decline of the iron and steel industries could be replicated if reprocessing become economically unviable. They stated that “West Cumbria’s past prosperity was built on the contribution of coal and iron, and the subsequent decline of both has left a legacy of social, economic and environmental deprivation, and the parallel between the past and the present can be drawn, we think, all too clearly.” Similarly, they emphasised the plant’s socio-economic impact which would further increase their dependency on the nuclear industry by draining labour from other occupations, inducing immigration, and stalling the development of other industry. These factors, coupled with the plant’s limited lifespan appeared to represent a threat to the future economic prosperity of the region, further marginalising the local community by leaving the area almost entirely reliant on the nuclear industry. (Whitehaven Archive and Local Studies Centre, (YSPC 1/170), p. 12.)

⁸³⁰ *Daily Mirror*, 21 October 1975, p. 1.

of the local population appeared as a trade-off in the state's production of energy, as citizens refuted the "risks to which Cumbrians are exposed in the 'national interest.'"⁸³¹ In this way, the environmental inequalities of nuclear technologies produced specific forms of identity which helped embed the dystopian imaginary, as citizens resisted the exploitation of the local region by the nuclear industry and policy-makers.



Fig. 8.0: *Daily Mirror*, 21 October 1975, p. 1.

⁸³¹ Whitehaven Archive and Local Studies Centre, (24/ NUC), *The Windscale File: A Lay Guide to Living (and Dying) with a Nuclear Neighbour*, (London: Greenpeace, 1983), p. 7. This article also betrayed the xenophobic undertones that accompanied the public's response to reprocessing foreign nuclear waste. This bore striking similarities with public reactions to reprocessing in France, where Zonabend found "there is no getting away from the fact that genuine popular mobilisation occurred only when demonstrations were directed against the unloading of spent fuel from other countries." It appears as though the issue of domestic reprocessing was one issue, but the arrival of foreign nuclear waste was another entirely. This further emphasised the region's peripherality, not only at a national but international level, as the chosen location for the bulk of the world's hazardous nuclear waste. (Zonabend, *The Nuclear Peninsula*, p. 65.)

Residents resisted the THORP project by emphasising their peripheral identity, complaining that “the risks associated with nuclear projects would not be borne by the bureaucrats in capital cities who planned them or by the managers of energy companies that profited from them, but rather by those living close to the sites in question.”⁸³² They complained that West Cumbria was becoming increasingly marginalised by the siting and operational practices of the nuclear state, which subjected the region to hazardous elements of the nuclear fuel-cycle. One local resident stated that “I am appalled that the government has taken so few steps to safeguard the people in this county. On the contrary it seems to me they are in favour of this proposed expansion regardless of us, who have no alternative but to remain in the area no matter our feelings and fears.”⁸³³ Others explained that “it was tacitly acknowledged it was a dangerous plant and so we’ll put it somewhere out of the way, so it affects as few people as possible.”⁸³⁴ This saw direct comparisons made between West Cumbria and the desert location of the Manhattan project in Los Alamos, as citizens referenced their geographic remoteness, emphasising that the government thought of Cumbria as the British equivalent to “the middle of the desert”, remarking pointedly “except it’s not a desert.”⁸³⁵ Within this context, THORP appeared as “an injustice imposed on them by outside powers whose intervention in local affairs might harm residents and their material interests”, as locals bore a disproportionate share of the economic and environmental burden of reprocessing whilst others benefitted.⁸³⁶

⁸³² Tompkins, *Better Active than Radioactive!* p. 34.

⁸³³ National Archives, ‘The Windscale Planning Inquiry: Proof of Evidence given by Jean MacLeod’, (AT 103/267).

⁸³⁴ E. Robson, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 19 March 2010, p. 6.

⁸³⁵ D. Raaz, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 16 March 2010, p. 13.

⁸³⁶ Tompkins, *Better Active than Radioactive!*, p. 34.

Concerns over the region's peripheral status aligned readily with existing social attitudes towards the incursion on local life by the rich and powerful, and the imposition of London-centric policy-makers upon northern communities.⁸³⁷ This was predicated upon long-standing resentments towards the supposed 'othering' of the north by southern policy-makers, through which the region had been "'northernised' as an inferior place" that existed "in contrast to Southern England."⁸³⁸ This sentiment was a feature of oral interviews conducted years later, as it appears as though these peripheral identities have only grown stronger over time. Residents explained that hazardous facilities were more commonly placed in the North, stating that "there's a lot more fuss about a [nuclear] new-build at Bradwell, or places down South than there would be about the Sellafield site."⁸³⁹ Here, we can see how peripheral identities helped embed dystopian political and social imaginaries revolving around the centralisation of power within Southern England, and a perceived political imbalance between the North and South.⁸⁴⁰ Similar sentiments were contained within a local newspaper reports a few years after the inquiry, which mocked that "the real way to solve the differences between the two sides would be to move the nuclear industry to the South East... if Battersea Power Station became 'Windscale's Laundry' then any problem would be solved by the government within six months."⁸⁴¹ The same article added, "given that Southeast England has as good a water supply as the Lake District, would BNFL have been allowed to operate on the Thames estuary and discharge plutonium waste off the Kent coast? It is this suspicion that anything nasty is acceptable as long as it occurs north of Watford that rouses anger in those affected."⁸⁴² In these

⁸³⁷ *Ibid.*

⁸³⁸ J. Paxman, *The English: A Portrait of a People* (London: Michael Joseph Ltd, 1998), p. 157; P. Taylor, 'Which Britain? Which England? Which North?', in D. Morley, and K. Robins (eds.), *British Cultural Studies* (Oxford: Oxford University Press, 2001), p. 136.

⁸³⁹ M. Kipling, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 7 January 2010, p. 13.

⁸⁴⁰ West Cumbria therefore became a periphery within a periphery; an area of social marginalization and economic depravity within an already neglected area of the UK.

⁸⁴¹ *West Cumberland Times and Star*, 19 November 1983, p. 13.

⁸⁴² *Ibid.*, p. 12.

examples, we can see how local citizens responded to the siting policies of the nuclear industry by producing new forms of ‘peripheral’ identity. These subjectivities contributed to a sense of ostracism between West Cumbria and wider society, helped embed an imagined dystopian future wherein local citizens were separate from mainstream British society.

The environmental costs of reprocessing and its social implications contributed to a weakening of the bonds between the state and local public by decoupling citizens from notions of the nation-state. Joseph Masco argues that “the social contexts informing nuclear projects evoke questions about historical presence and identity, often of race and rights, always of citizenship and sacrifice.” He shows that “how individuals engage the nuclear complex puts them in a tactile experience not only with [nuclear] technology... but also with the nation state that controls it.”⁸⁴³ Developing this argument, we can see how the issue of reprocessing drove a wedge between the state and local citizens, who increasingly imagined themselves as the collateral pawns of a detached and nefarious nuclear state. Residents complained that “the people of this county have always been the last in the queue for any government aid and jobs”, using this as a pragmatic basis for their beliefs that “I don't think we should be exploited by people who don't have to suffer the consequences of their decisions by virtue of their abode!”⁸⁴⁴ Embittered residents sardonically asked, “would a reprocessing plant be acceptable in Whitehall?” and satirised government policy: “Oh its dangerous- we don't want it down here, but it's okay to be dangerous in Cumbria...”⁸⁴⁵ Here we see how the socio-spatial inequalities of reprocessing fed into local identities and helped embed dystopian nuclear imaginaries by weakening the bonds of citizenship between the local population and the nation-state. This had

⁸⁴³ Masco, *Nuclear Borderlands*, p. 12.

⁸⁴⁴ *West Cumberland Times and Star*, 26 November 1983, p. 8.

⁸⁴⁵ D. Raaz, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 16 March 2010, p. 13; Whitehaven Archives and Local Studies Centre, (DH/372/1/60), p. 3.

profound implications for local citizens' understanding of ideas of nationhood and the wider Cold War conflict itself as citizens "made connections between the nuclear threat and the wider state of British and global society."⁸⁴⁶

Literary scholar Dan Cordle has argued that nuclear hazards mobilise shared forms of human identity, as "the omnipotent threat of nuclear technology can decouple people from allegiance to their political masters and against the citizens of another country, and suggests instead alliances between peoples against their political establishments."⁸⁴⁷ Applying his recent work on 1980s nuclear-themed literature, we can see that the THORP project contributed to an increasing schism between the local public and the state by reconceptualising the protagonists and antagonists within the wider Cold War conflict. By focusing on the shared environmental threat posed by the THORP project (and nuclear technologies more widely), local citizens reconceived the British political establishment as "complicit in threatening ordinary people" through its possession of nuclear technologies and a seeming scant regard for the environmental and social costs this bore upon host communities. Cordle argues that this shift saw the axis of conflict over nuclear policy shift from horizontal conceptions of the Cold War as a conflict between competing nation-states, to a vertical orientation of ordinary civilians versus political establishments, their leaders, and "the nuclear-military machine."⁸⁴⁸ By locating the social and environmental costs of nuclear reprocessing within one specific locale (particularly one which had expressed a vociferous and vocal opposition to it), the THORP proposals embedded the dystopian nuclear imaginary by placing the local population at odds

⁸⁴⁶ Laucht ,and Johnes, 'Resist and Survive', pp. 227- 237.

⁸⁴⁷ Cordle, *Late Cold War Literature*, p. 666.

⁸⁴⁸ *Ibid.*, p. 129; Cordle, 'Protect/Protest', p. 666. Kate Brown makes a similar point in *Plutopia*, where she argues that workers at the US nuclear facility in Richland saw themselves as either front-line workers at the precipice of the battle against Communism, or the collateral victims of the state's reckless pursuit of nuclear supremacy. See, Brown, *Plutopia*, p. 21.

with the state. This sheds new light upon the significance of the Windscale Inquiry as a moment of profound social rupture between the local community and the nation; a development which not only informs our understanding of the chronology of nuclear cultures, but points to the significance of the 1970s in shaping anti-nuclear activism of the following decade.

By engaging with the wider concerns registered within the inquiry, we can see that the issue of reprocessing helped embed dystopian social, political, and environmental imaginaries, offering a glimpse into the 1970s as the decade which foregrounded the resistance towards nuclear weapons, power production, and state throughout the 1980s. The Windscale Inquiry therefore challenges existing scholarly understandings of the decade, pointing to the mid-1970s as a period in which social resistance towards the nuclear state and governance; traditionally associated with the decade of the 1980s, emerged at a localised level within West Cumbria, dovetailing with similar sentiments amongst national and transnational anti-nuclear groups such as Friends of the Earth, Greenpeace, and the National Council for Civil Liberties, amongst others. The inquiry's role in embedding the dystopian imaginary renders it an important turning point in the chronology of public attitudes towards nuclear technologies in a period which has been largely ignored by nuclear and Cold War scholars. Often eschewed in favour of the anti-nuclear decades of the 1960s and 80s, we can understand the inquiry as a crucial turning point in social attitudes towards nuclear technologies and the state. This shows the evolution of nuclear imaginaries between the initial periods of optimism and nuclear utopianism which emerged and became embedded in British society throughout the 1940s and 1950s, and the overt nuclear resistance which characterised social attitudes throughout the 1980s.

This chapter has argued that the inquiry not only offers a bridge between utopian and dystopian nuclear imaginaries, but points to this evolution as part of a process. Where the 1960s

were largely characterised by resistance towards weapons proliferation, the 1980s saw arguments about weapons proliferation merge with a broader rejection of the nuclear state. Previous studies have characterized the 1980s as a period in which the social contract between state and citizenry broke down over issues of nuclear policy, giving rise to a ‘politics of vulnerability’ amongst anxious citizens who felt they could not rely upon the state to ensure their ‘security’ from nuclear technologies.⁸⁴⁹ Engaging with the myriad of concerns raised within the inquiry, it appears as though the historical flashpoints favoured amongst the existing historiography, such as the Three Mile Island incident in 1979 and the bungled release of the Civil Defence pamphlet ‘Protect and Survive’ in 1980, sat within an existing current of social, environmental, and political resistance to nuclear policy substantiated throughout the Windscale inquiry. We may therefore consider the Windscale Inquiry as a point of departure which helps us understand the broader social, political, and cultural resistance to the nuclear state which characterised the 1980s.

Conclusion.

Exploring the Windscale Inquiry through the lens of the sociotechnical imaginary, this chapter has demonstrated how reprocessing induced new forms of nuclear resistance and helped embed a new dystopian nuclear imaginary at both local and national levels. Predicated upon issues of nuclear secrecy, the social and geographic centralisation of state power, government incursion upon personal freedoms, a perceived decline in social morality, and the state’s environmental negligence, this imaginary both produced and was produced by a series of political, moral, social, and environmental concerns, bringing these issues into direct contact

⁸⁴⁹ Cordle, *Late Cold War Literature*; Cordle, ‘Protect/Protest’, pp. 653– 669; Nehring, *Politics of Security*; Grant, *After the Bomb*; Phythian, ‘CND’s Cold War’; Burkett, ‘Re-Defining British Morality’; Bolsover, and Minnion, (eds.), *The CND Story* (London: Allison and Busby, 1983).

with the imaginaries of nuclear utopianism propagated by the state. Exploring this process throughout the inquiry, we can see how anti-nuclear groups and ordinary citizens resisted nuclear expansion, imagining further nuclear development as representative of an undesirable future whereby ordinary people would become increasingly marginalised by the autonomous powers of the nuclear state and subjected to the hazardous environmental effects of nuclear technologies. This moves our understanding of the 1970s as a period of relative social stability between the anti-nuclear decades of the 1960s and 1980s, foregrounding the significance of the decade in shaping the social upheavals and mass anti-nuclear movements of the 1980s.

5: ‘Nuclear Dustbin/Nuclear Laundry’.

The previous chapter demonstrated how public support for nuclear technologies declined throughout the 1970s, particularly amongst the local population and sections of the public concerned with issues of environmentalism and civil liberties, as nuclear power became imbricated within wider social, environmental, and political inequalities. Through the analysis of contemporary source material such as documentary film, local and national newspaper articles, government paperwork, and oral testimony, this chapter will argue that the 1980s were defined by clear patterns of resistance towards the nuclear power programme at both local and national level, as a dystopian nuclear imaginary became embedded within British society.

This chapter centres on two significant incidents involving Sellafield during November 1983 which generated mass media attention and placed BNFL under intense scrutiny. The first was the broadcast of an exposé television documentary by Yorkshire Television on 1 November 1983, entitled *Windscale: The Nuclear Laundry*.⁸⁵⁰ This focused upon the significant excess of cancers amongst children in the immediate vicinity of the Sellafield plant, attributing this excess to the atmospheric and marine discharges emanating from Sellafield. This was followed on 19 November 1983 by a major contamination incident where radioactive materials were discharged into the Irish Sea, causing a radioactive slick to severely contaminate the Cumbrian shoreline. Together, these two incidents placed BNFL and Sellafield at the centre of a political and public health crisis as the national media imbricated nuclear power with excess levels of childhood cancer and global marine contamination. Taking these two incidents as a point of departure, I will show how events at Sellafield built upon and formalised the

⁸⁵⁰ *Windscale: The Nuclear Laundry*, G. McKee, N. Gray, Yorkshire Television: ITV, 1983. The documentary was released by ITV on 1 November, 1983 as part of the ‘First Tuesday’ programme which ran between 1983 and 1993. It can be accessed at <<https://www.youtube.com/watch?v=gidQewCtTqY&t=1480s>> [accessed 3 January 2019].

dystopian environmental and ecological imaginary which emerged during the Windscale inquiry. In particular, I will demonstrate how the media coverage which accompanied these events embedded a dystopian sociotechnical imaginary which 1) stressed the hazardous environmental effects of nuclear power, 2) emphasised the threat to public health through the contamination of the marine and atmospheric environments, and 3) inextricably linked radiation, and more specifically Sellafield, with an observed excess of cancers both within the immediate vicinity of the plant, and throughout the North-West and Scotland.

The chapter explores how this process was more diverse and nuanced at the local level, as citizens were forced to mediate between the dystopian imaginary which emerged in the national media, and the assurances provided by BNFL, which assured them that the plant represented no threat to public health. This leads to the final strand of this chapter, which explores how local citizens became caught between competing imagined nuclear futures and ultimately responded to this context by producing their own locally specific forms of nuclear knowledge which were simultaneously the product of these imaginaries and their own experiential knowledge. By unravelling the social processes behind these responses and identifying that citizens inferred nuclear risk by relying upon their own experiences and interpretations of nuclear technologies, the industry that controlled them, and their innate knowledge of the local environment, it is clear that residents used this repository of knowledge to make sense of and fashion their own intensely localised nuclear imaginaries.

The sudden influx of national attention which accompanied these incidents alludes to Sellafield's role as a barometer and arbiter of public opinion; an important social agent capable of both reflecting and shaping nuclear imaginaries. This also makes a broader point about the power of rural, peripheral communities in national social life. Marianna Dudley's work on wind

energy in Orkney has shown that peripheral communities are “materially and imaginatively capable of disrupting” state power and dominant cultural imaginaries. This chapter substantiates this belief, pointing to Sellafield's role in the production of national nuclear culture, and the role of ordinary people as agents of social change.⁸⁵¹ Furthermore, this calls for a greater engagement with the role of nuclear sites such as Sellafield in shaping the historical trajectory of British attitudes towards nuclear technologies. This case study is particularly poignant, falling in the period immediately prior to the Chernobyl disaster in the former Soviet Union in 1986. Whilst historical (and recently, televisual) accounts of the development of nuclear power throughout the 1980s have (rightfully) emphasised the role of the Chernobyl disaster in shaping both societal and political responses to nuclear technologies, this chapter shows that the British public's rejection of nuclear power can be traced back further.⁸⁵² This provides a nuanced insight into the evolution of nuclear culture between the latter years of the 1970s and into the 1980s, as the British public increasingly resisted the alleged benefits of nuclear power, instead engaging with and asserting an imagined dystopian future, wherein nuclear power represented an environmental scourge and a substantial threat to the public health of the nation.

5.1: Windscale: The Nuclear Laundry.

The broadcast of *Windscale* sat within a current of anti-nuclear televisual depictions throughout the early 1980s in popular comedic televisual programmes such as *Spitting Image*,

⁸⁵¹ M. Dudley, ‘The Limits of Power: Wind Energy, Orkney, and the Post-war British State’, *Twentieth Century British History*, 31.2 (2020), p. 316.

⁸⁵² The literature on Chernobyl is vast. For a select list of recommendations for further reading, see K. Brown, *Manual for Survival: A Chernobyl Guide to the Future* (New York: W.W. Norton and Company Ltd, 2019); J. Mahaffey, *Atomic Accidents: A History of Nuclear Meltdowns and Disasters: From the Ozark Mountains to Fukushima* (New York: Pegasus Books, 2015); A. Blowers, and D. Pepper, *Nuclear Power in Crisis: Politics and Planning for the Nuclear State* (Asbury: Nichols Publishing Company, 1987); ‘Chernobyl’, C. Mazin, and J. Renck, Home Box Office (HBO), 2019.

Only Fools and Horses, and *The Young Ones*, as well as darker, more politicised terrestrial films such as *Threads*, *On the Eighth Day* (1984), *The Day After* (1983), and the infamous *The War Game* (1985). Indeed, only a few months prior to *Windscale*, ITV had broadcast an anti-nuclear documentary by John Pilger, entitled *The Truth Game*, which adopted a similar investigative, exposé style to highlight the threat nuclear technologies posed to ordinary people through their destructive power and government propaganda. Whilst documentary sources are designed to reflect and embed a specific agenda, they also function as historical documents, capable of reflecting “dominant patterns of vision” from the period of their creation, providing a discursive context for making sense of social imaginaries.⁸⁵³ It is their inherent subjectivity that provides their value as historical sources, not as “a passive depository of facts but an active process of creation of meanings.”⁸⁵⁴ In this way, we can see how the number of nuclear-themed televisual sources from this period serve as a “testimony to the anxieties of their creators”, reflecting a wider pattern of public concern towards nuclear technologies, which helped to “underline and naturalise distrust of the nuclear state” and embed anti-nuclear imaginaries within national culture.⁸⁵⁵

Sitting within this current of televisual depictions, *Windscale* detailed the findings of recent research from a team of experts at the University of Manchester, who had identified a ten-fold increase in childhood leukaemia cases within Seascale and hypothesised a causal relationship between these cancers and radioactive emissions from the Sellafield plant.⁸⁵⁶

⁸⁵³ P. Rabinowitz, ‘Wreckage Upon Wreckage: History, Documentary and the Ruins of Memory’, *History and Theory*, 32.2 (1993), p. 119; Hogg, ‘Normalising Nuclear War’, in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence*.

⁸⁵⁴ A. Portelli, ‘What Makes Oral History Different’, in R. Perks and A. Thomson (eds.), *The Oral History Reader* (Routledge, London, 2006), p. 38.

⁸⁵⁵ L. Bennett, ‘The Bunker: Metaphor, Materiality and Management’, *Culture and Organization*, 17.2 (2011), pp. 158; Hogg, *British Nuclear Culture*, p. 153.

⁸⁵⁶ J. Day, and J. Cross, ‘Am-241 From the Decay of Pu-241 in the Irish Sea’, *Nature*, 292 (1981), pp. 43- 45.

Produced by Yorkshire Television and broadcast by ITV as part of the ‘First Tuesday’ series of programmes, *Windscale* depicted Sellafield as the cause of local childhood leukaemia cases within Seascale. Noting the upward trend in cancer cases since the plant’s construction and specifically since the 1957 fire, the programme identified an apparent causal relationship between childhood cancer and radiation exposure. Whilst a community the size of Seascale would expect less than one case of childhood leukaemia in this period, the programme found ten separate cases within the locale, a figure later amended to fourteen as subsequent cases were identified.⁸⁵⁷ The programme traced atmospheric radiation figures throughout the region and recorded the radioactivity of household dust from local residents’ vacuum bags, which were collected and analysed by a team of experts from the University of Manchester. Viewers were shown that plutonium, americium, ruthenium, and caesium could be found in measurable doses within local homes, as residents were found to be living alongside and breathing in radioactive dust particles. Atmospheric testing also found greater-than-average concentrations of radiation within the Ravenglass estuary, local beaches, and Seascale, which were many times more radioactive than could be accounted for by background radiation. Taking these figures, the programme identified Sellafield as the source of the ‘clusters’ of local cancers. This animated local and national anxieties about Sellafield’s long-term environmental and biological impact, producing a volatile blend of intense media and public scrutiny which placed the nuclear industry firmly on the back-foot. Even the *Times* alluded to the film’s “most alarming disclosures”, whilst the national BBC News acknowledged that “the evidence seems very damning...”⁸⁵⁸ Thus the burden of proof fell upon industry figures to disprove claims that

⁸⁵⁷ Initial figures only took into account individuals who still resided in the area, those who had moved away and become ill, or were unknown to the documentary makers did not form part of initial statistics. For further reading, see Macgill, *Politics of Anxiety*, p. 30; McSorley, *Living in the Shadow*, p. 130.

⁸⁵⁸ *The Times*, 31 October 1983; *BBC News*, 31 October 1983; for further pre-broadcast national news reports, see the *Guardian*, *Daily Telegraph*, *Daily Mail*, *Daily Express*, *Daily Star*, and *Morning Star* (all 31 October 1983).

nuclear power represented an environmental and biological hazard. In this manner events would conspire against BNFL as its efforts to disprove these allegations were toppled by a major incident at the plant a mere fortnight later.

Fig. 1.0: A still from the documentary, which presented the apparent correlation between the Sellafield plant and rare types of childhood cancer within the local area. (See cit. 911).



SEASCALE CHILDHOOD CANCER			
1954	Boy	Age 6	Brain Tumour
1955	Girl	2	Lymphatic Cancer
1956	Girl	8	Leukaemia
1960	Boy	2	Leukaemia
1969	Boy	11	Leukaemia
1970	Boy	6	Leukaemia
1971	Girl	3	Leukaemia
1975	Girl	15	Sarcoma
1979	Boy	21	Leukaemia
1979	Girl	4	Leukaemia
1983	Boy	9	Lymphatic Cancer

5.2: The 'Beach Incident'.

The *Windscale* documentary attracted the attention of environmental group Greenpeace, which had become increasingly concerned about nuclear power following the Windscale Inquiry and the meltdown of an American nuclear reactor at Three Mile Island in

1979.⁸⁵⁹ Spurred on by the strength of public responses to the documentary, in November 1983 the Greenpeace marine vessel ‘Cedarlea’ (Fig. 2.0) anchored offshore from Sellafield and started monitoring the levels of radiation within the Irish Sea.

Fig. 2.0: The Greenpeace Vessel ‘Cedarlea’
<<https://media.greenpeace.org/archive/MV-Cedarlea-27MZIFINBWLY.html>>
[accessed 28 October 2019].



Soon after monitoring began, on 14 November a team of divers taking radiation measurements (Fig. 3.0) discovered high concentrations of radioactive effluent at the end of Sellafield’s marine discharge pipeline.⁸⁶⁰ Their Geiger counters revealed a reading of 200 times normal background radiation along the pipeline, where a highly radioactive solvent slick had formed, floating on top of the sea.⁸⁶¹

⁸⁵⁹ This was a partial meltdown of reactor number two at the Three Mile Island Nuclear Generating Station in Pennsylvania, USA. This incident released substantial quantities of radioactive iodine into the environment and has been understood as a significant factor in the decline of the American civil nuclear programme from the 1970s onwards, as public and political opinion increasingly turned against nuclear power production. For further reading, see J. Gofman, and A. Tamplin, *Poisoned Power: The Case Against Nuclear Power Plants Before and After Three Mile Island* (Emmaus: Rodale Press, 1979), p. xvii; J. Walker, *Three Mile Island: A Nuclear Crisis in Historical Perspective* (Berkeley: University of California Press, 2004).

⁸⁶⁰ Greenpeace had also been loosely involved in the making of the documentary in a consultancy role and the director of Greenpeace UK, Peter Wilkinson featured as one of the interviewees within the programme and was one of the studio guests invited to debate the show’s findings as part of the ‘First Tuesday’ broadcast.

⁸⁶¹ Such was the extent of this radioactivity that the equipment used by the divers was later classified as radioactive waste and, in an ironic twist, had to be disposed of at the nearby Drigg waste repository. (*Daily Telegraph*, 21 November 1983; National Archives, ‘Correspondence between Mr Handyside and F.S. Feates’, 18 November 1983, (AT 31/55).

Fig. 3.0: ‘Greenpeace Inflatable off Windscale Taking Samples of Nuclear Radiation’, <<https://media.greenpeace.org/archive/Greenpeace-Inflatable-off-Windscale-taking-samples-of-nuclear-radiation--UK-27MZIFLPOPOP>> [accessed 28 October 2019].



The slick was the result of a massive contamination incident at the Sellafield plant just days earlier, where highly radioactive effluent was released down the pipeline and into the Irish Sea. During the annual shut-down of reprocessing plant ‘B205’ on the night of 10 November 1983, radioactive liquid was sent from B205 to a sea tank, designed to store and monitor effluent prior to sea transferral. This triggered an alarm, showing that the liquid was too radioactive to be safely released to sea. Following instructions, plant operators tried to return the effluent to B205, pending long-term storage or treatment.⁸⁶² Despite this, the internal pipeline between the two plants had become blocked, leaving plant operators with only one option; to release the radioactive effluent to sea. Measuring equipment indicated that the effluent was significantly radioactive, yet could be safely dispersed at sea without a substantial

⁸⁶² Operators were poorly trained and ill equipped for an incident of this nature, forced to follow procedures laid out in instruction manuals, covered in pencil annotations and later deemed “out-of-date” and “open to misinterpretation.” (National Archives, ‘BNFL Sellafield Discharge of Liquid Radioactive Waste to the Irish Sea Leading to Closure of a Beach: Report 2’, 23 November 1983, p. 1, (AT 31/55).

increase in radiation levels.⁸⁶³ However, plant operators were unaware that the effluent had mixed with a highly radioactive layer of ‘crud’ at the base of the sea tank.⁸⁶⁴ This produced a mixture which, once released into the Irish Sea, formed a deadly cocktail of radioactive solvent which sat atop the sea’s surface as the calm sea and wind conditions began to float the slick back towards the shore. Over the coming days, radioactive flotsam washed up along the Cumbrian shoreline, contaminating a ten-mile stretch of beach with radioactive seaweed, solvent, and debris. After Greenpeace revealed the extent of the contamination, a small section of coastline was temporarily closed by armed police as official monitoring efforts took place. After eleven days of consistent high readings and flotsam appearing along the coastline, on 30 November the Department for the Environment closed a forty kilometre stretch of coastline between St Bees in the North and Eskmeals in the South, initiating a six-month ban on public access to the Cumbrian coastline.⁸⁶⁵

Together with the *Windscale* documentary only days before, the beach incident contributed to a wave of local and national opposition against Sellafield as the plant became embroiled in a public relations scandal which saw nuclear power linked with childhood cancer victims through atmospheric and marine pollution. With the public still reeling from the findings of *Windscale*, the timing of the beach incident could not have been worse for BNFL. Together, the two incidents “became inextricably mixed in the public mind, especially outside West Cumbria”, bolstering the anti-nuclear agenda and producing what one BNFL director

⁸⁶³ BNFL later admitted that “at the time, there was no quantitative estimate of total activity discharged in this period and no samples were taken.” National Archives, (AT 31/55).

⁸⁶⁴ ‘Crud’ has a specific definition within nuclear reprocessing. BNFL’s own glossary defines it as “particulate material which collects at the boundary between an aqueous and solvent layer during extraction. In nuclear reprocessing it contains degradation products of solvent caused by the intense radioactivity. The crud itself is very radioactive.” National Archives, ‘BNFL Sellafield Discharge of Liquid Radioactive Waste to the Irish Sea Leading to Closure of a Beach: Report 2’, 23 November 1983, p. 1, (AT 31/55); National Archives (AT 31/59); F. Pearce, *Fallout: Disasters, Lies, and the Legacy of the Nuclear Age* (Boston: Beacon Press, 2018), p. 108.

⁸⁶⁵ National Archives, (AT 31/59).

described as an “overwhelming extent of public antipathy towards the site.”⁸⁶⁶ In isolation, either of these incidents would have represented a considerable body-blow for BNFL. Together, they posed a legitimisation crisis as the nuclear industry became besieged by an overwhelmingly critical tide of national public opinion. The sudden national attention afforded the 1983 controversy did not come into being in a vacuum; rather it built upon and formalised the dystopian environmental and ecological imaginaries which took shape during the Windscale inquiry. Together, *Windscale* and the beach incident provided two concrete incidents which actualised and made real the imagined, hypothetical dystopias developed throughout the inquiry. They represented a corporeal manifestation of these undesirable environmental and radiobiological futures. No longer were these imaginaries purely hypothetical, or indeed ‘imaginary’, but they had become a material reality; an uncomfortable present that impinged upon pasts, presents, and futures.

Rosanna Farbøl's recent article on the role of ‘ruin towns’ (training facilities in which villages were deliberately ‘ruined’ to create life-like and realistic training grounds for civil defence responses) has pointed towards the important role material artefacts play in embedding particular imaginaries. Drawing upon previous research on the cultural agency of landscape and the power of fallout bunkers in shaping British culture, she argues that “the debris and rubble of [the] ruined village gave “mass and solidity” to the imaginary and dystopian war civil defence prepared for.”⁸⁶⁷ Developing her insights, I will argue that Sellafield and the surrounding areas acted as a stage for a dystopian future manifested through the hazardous discharge practices of the nuclear industry. Through the efforts of *Windscale* and

⁸⁶⁶ Bolter, *Inside Sellafield*, p. 214.

⁸⁶⁷ R. Farbøl, ‘Ruins of Resilience: Imaginaries and Materiality Imagineered and Embedded in Civil Defence Architecture’, in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*, p. 1; Mitchell, *Landscape and Power*; Bennett, ‘The Bunker’, pp. 155– 173; S. Jasanoff, ‘Imagined and Invented Worlds’, in S. Jasanoff, and S. Kim, (eds.), *Dreamscapes of Modernity*, p. 322.

the national media, the West Cumbrian coastal region (and by extension, neighbouring land areas and places linked by ocean currents or domestic tributaries) “imagineered” a future characterised by radioactive contamination, providing the “merely imagined” environmental and ecological dystopias observed during the previous chapter, with “concrete, tangible expression.”⁸⁶⁸ In this way, the controversies of 1983 “added materiality, spatiality, realism and presence to what was largely speculative, discursive and imaginary,” providing “shape, mass and solidity to the imagined nuclear catastrophe” and formalising the dystopian environmental and radiobiological imaginary of nuclear power.⁸⁶⁹

Events such as the Three Mile Island power plant incident in the US had raised the British public’s “concerns about impacts on health and environment and fear about [nuclear] accidents.”⁸⁷⁰ The Windscale inquiry in the UK increased public awareness of Sellafield’s environmental impact and issues of nuclear environmentalism more broadly. Both incidents confirmed and reinforced dystopian nuclear imaginaries, which influenced how citizens understood and conceptualised the events of 1983. This points towards the evolution and embedding of a dystopian nuclear imaginary at the national level throughout the latter years of the 1970s and into the 1980s. The following section will demonstrate that the media played a vital role in this process, sustaining the public’s engagement with issues of nuclear contamination and helping further embed an imagined dystopian future wherein nuclear power represented an environmental and biological threat to the British public.

⁸⁶⁸ D. Monteyne, *Fallout Shelter: Designing for Civil Defense* (Minneapolis: University of Minnesota Press, 2011); Farbøl, ‘Ruins of Resilience’, p. 3.

⁸⁶⁹ Farbøl, ‘Ruins of Resilience’, pp. 3, 28.

⁸⁷⁰ As historian Natasha Zaretsky explains, Three Mile Island “revived earlier fears of radiation and rerouted them to nuclear power plants.” See, N. Zaretsky, ‘Atomic Nightmares and Biological Citizens at Three Mile Island’, in E. Conze, M. Klimke, and J. Varon, (eds.), *Nuclear Threats, Nuclear Fear and the Cold War of the 1980s* (Cambridge: Cambridge University Press, 2017), p. 56; See also, A. Blowers, ‘Why Dump on us? Power, Pragmatism and the Periphery in the Siting of New Nuclear Reactors in the UK’, *Journal of Integrative Environmental Sciences*, 7.3 (2010), p. 164; Hecht, *Being Nuclear*, p. 10; Cordle, ‘Protect/Protest’, p. 665.

5.3: The Role of the Media.

Sheila Jasanoff has argued that “it often falls to legislatures, courts, the media, or other institutions of power to elevate some imagined futures above others.”⁸⁷¹ The following section will show how the sustained engagement of the media helped elevate dystopian nuclear futures and embedded these imaginaries within British society. In his study of official and unofficial nuclear narratives within late Twentieth Century Britain, historian Jonathan Hogg has argued that newspaper articles play an important role in both shaping and reflecting public opinion; “often pitched at what is assumed to be the dominant worldview or to appeal to an assumed set of shared opinions.”⁸⁷² Newspaper articles might be used as “a window into the social creation and reinforcement of [nuclear] meaning”, observing how the print media simultaneously reflected and helped embed resistant nuclear imaginaries at the national level by conveying particular assumptions about the threat of radiation.⁸⁷³ The sequential timing of the two incidents was key to this process, ensuring that the story survived multiple news cycles and captivated the print media over several weeks.

The sustained media engagement ensured that debates regarding nuclear safety were thrust into public consciousness, increasing people’s scepticism and sense of vulnerability towards nuclear power. Studies of risk-perception have found that heightened media coverage serves to compound residents’ anxieties about the issue in hand, often leading people to “overestimate the probability of certain risks” by devoting a disproportionate amount of coverage to them and making their consequences more comprehensible to the

⁸⁷¹ S. Jasanoff, ‘Future Imperfect’ in Jasanoff, and Kim, (eds.), *Dreamscapes of Modernity*, p. 4.

⁸⁷² Hogg, *British Nuclear Culture*, pp. 8- 11.

⁸⁷³ *Ibid.*, p. 11.

public.⁸⁷⁴ Research on the communication of risk by Malcolm Peltu has shown that journalistic symbols, language, and imagery used to convey and communicate nuclear issues often leads to negative evaluations and connotations being drawn.⁸⁷⁵ This is recognised within wider nuclear literature, where it is a well understood phenomenon that “heightened coverage of nuclear power, even where balanced or slightly pronuclear, will tend to increase public fears and thus opposition.”⁸⁷⁶ Anthropologist Joseph Masco and literary scholar Dan Cordle have identified that even ‘protection’ discourses only heighten public anxieties about nuclear issues, providing “a sense of increasing and heightened insecurity” by exposing the public’s “intense vulnerability” towards nuclear technologies.⁸⁷⁷ In this context, the degree of media engagement in the controversies exacerbated public fears towards radioactivity and prompted a greater degree of engagement with its imagined dystopian consequences.

Evidencing this growing trend, regional newspapers throughout the UK, particularly within the North-West and Scotland, devoted a significant amount of coverage to the controversy, and the potential ramifications it may have upon various locales. Whereas previously opposition had been largely restricted to elements of the local population and the environmental movement, the national scale of press responses reflected the public’s growing awareness and concern about the cumulative effects of Sellafield’s discharges. A pattern of concern began to emerge at the national level, as different groups began to recognise the threat of marine contamination upon regional and national scales. This reflected both the public’s

⁸⁷⁴ G. Barnes, J. Baxter, A. Litva (et al), ‘The Social and Psychological Impact of the Chemical Contamination Incident in Weston Village, UK: A Qualitative Analysis’, *Social Science and Medicine*, 55.0 (2002), p. 2229; Eiser, van der Plight, and Spears, *Nuclear Neighbourhoods*, p. 111.

⁸⁷⁵ M. Peltu, ‘The Role of the Communications Media’, in H. Otway, and M. Peltu, (eds.), *Regulating Industrial Risks: Science, Hazards, and Public Protection* (London: Butterworth, 1985), pp. 128- 148.

⁸⁷⁶ Eiser, van der Plight, Spears, *Nuclear Neighbourhoods*, p. 111.

⁸⁷⁷ Cordle, *Late Cold War Literature and Culture*, p. 48; Masco, *Nuclear Borderlands*, p. 3; See also A. Mazur, ‘Media Influences on Public Attitudes toward Nuclear Power’, in W. Freudenberg, and E. Rosa, (eds.), *Public Reactions to Nuclear Power: Are There Critical Masses?* (Washington: Westview Press, 1984), pp. 97- 114.

increasing anxiety towards the health and environmental effects of nuclear power and a widening of scale, as an ostensibly localised incident animated regional and national concerns.

Scottish newspaper reports revealed citizens' anxieties about the levels of Sellafield radiation in coastal fishing waters and possible pathways to the population.⁸⁷⁸ Analysing the content of various newspaper outlets and ministerial speeches, it is clear that citizens expressed strong concerns about the recent statistical rise in cancers throughout Western Scotland, drawing upon environmental dystopian imaginaries which offered discursive and political support to claims of contamination. Indeed, several newspapers and local Labour M.P., George Foulkes argued that Sellafield was responsible for contamination along the West coast of Scotland and increasing levels of leukaemia within the region. This developed the insights within *Windscale*, which emphasised the wider threat not just to the Cumbrian population, but to the coastal communities surrounding the Irish Sea. Fig. 4.0 shows how concerns over marine pollution were emphasised by visual elements within *Windscale*, which played a significant role in embedding dystopian environmental and biological imaginaries.

⁸⁷⁸ Recently uncensored government files also reveal that similar concerns were held in Northern Ireland, where ministers warned that “the question of radioactive pollution from Windscale and the associated cancer scare has raised a great deal of concern in certain coastal areas of the district, for example at Kilclief (County Down).” ‘NI state papers: Files Reveal Secret Dumping of Radioactive Waste’ <<https://www.bbc.co.uk/news/uk-northern-ireland-25470028>> [accessed 4 January 2021].

Fig. 4.0: A Still from the *Windscale* Documentary showing the Dispersion of Radionuclides along the Western Coast of England and Scotland.



Peter Bennesved and Casper Sylvest have drawn attention to the ways in which visual media play an important role in embedding imaginaries of nuclear futures, pointing to the significance of visual (and moving) media in “structure[ing] the imagination of nuclear war and ways of surviving such a catastrophe.”⁸⁷⁹ They describe that film served as “a potent medium [...] aimed at large audiences” which possesses “special properties in relation to authenticity, anticipation, persuasion, and disciplining.”⁸⁸⁰ This develops James Carey’s argument that “communication is a symbolic process whereby reality is produced, maintained, repaired, and transformed,” extolling the role of moving imagery in “assist[ing] the

⁸⁷⁹ Bennesved, and Sylvest, ‘Embedding Preparedness, Assigning Responsibility: The Role of Film in Sociotechnical Imaginaries of Civil Defence’, in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*, p. 3.

⁸⁸⁰ *Ibid.*, p. 5.

imagination of audiences in negotiating leaps between the present and the future, fear and hope, realism and utopianism.”⁸⁸¹ In this context, the visual depiction of radioactive contamination dispersing and washing up along the shore-line of the North-West and Western Scottish seaboard provided a potent visual symbol of an otherwise invisible threat, giving material form to dystopian imaginaries of environmental and radiobiological nuclear hazards; playing an important role in both “publicly performing” and, given *Windscale's* national audience and position on prime-time terrestrial television, “institutionally stabilising” the dystopian imaginary of nuclear environmental and radiobiological threat.⁸⁸² Substantiating the validity of this image, the programme’s creators accompanied it with a reference from a recent government report, in which scientists had found that Sellafield’s marine discharges were contaminating coastal waters and aquatic life within the Irish Sea, and introducing a toxic pathway into the human body through the consumption of irradiated fish and the ingestion of radiative silt particles washed up along the Solway Firth.⁸⁸³ This added to the image’s authenticity, as together these visual and textual elements embedded a dystopian imaginary of the environmental and radiobiological hazard posed to the British public by the Sellafield plant.

The report was also published as a major feature in the *Glasgow Herald*, wherein it described that between 1980 and 1981 “high radiocaesium concentrations in fish from the western Irish sea and Scottish waters” led to a 30% increase in the collective radiation dose to the UK population, with Scottish doses purported to be even higher.⁸⁸⁴ The *Galloway News*

⁸⁸¹ *Ibid.*, p. 7; J. Carey, *Communication as Culture* (London: Routledge, 2008), p. 19.

⁸⁸² Jasanoff, and Kim, ‘Future Imperfect’, pp. 4f.

⁸⁸³ Within *Windscale*, Dr Phillip Day had taken readings of silt from the Solway Firth in South-Western Scotland, finding levels of radiation well above background readings; *Northern Echo*, 21 November 1983, p. 14.; D. Pierson, R. Cambray, P. Cawse (et al.), ‘Environmental Radioactivity in Cumbria’, *Nature*, 300 (1982), pp. 27- 31.

⁸⁸⁴ *Glasgow Herald*, 21 November 1983, p. 14; A. Mackenzie, and R. Scott, ‘Radiocaesium and Plutonium in Intertidal Sediments from Southern Scotland’, *Nature*, 299 (1982), pp. 613- 616.

explained that samples of household dust from nine homes in the coastal village of Kippford contained “amounts of plutonium.”⁸⁸⁵ Alongside the claims within *Windscale*, these newspaper articles embedded a dystopian imaginary which foregrounded the recent rise in cancer cases in Western Scotland as the product of radiation from Sellafield. This imaginary became embedded at multiple levels of Scottish society. A House of Commons discussion on the Sellafield discharges was punctuated by the Labour M.P for Carrick, Cumnoch, and Doon Valley George Foulkes, who explained that “there was a great anxiety among Scottish people that leukaemia increases in Western Scotland were linked to higher radioactivity levels in Scottish waters”, whilst the M.P. for the Western Isles, Donald Stewart expressed that “there is a good deal of alarm” amongst his constituents.⁸⁸⁶

These interventions show how anxiety was not restricted to areas in the immediate vicinity of Sellafield. Another report from the *Glasgow Herald* acknowledged that “people as far away as the Western Isles are worried about the possibility of waterborne radioactivity exposing their children to leukaemia.”⁸⁸⁷ This concurred with recent scientific reports which showed that Hebridean citizens had eight times as much radioactive caesium 137 in their kidneys than English citizens, a finding that researchers believed was due to “output from Windscale.”⁸⁸⁸ The Scottish Campaign to Resist the Atomic Menace (SCRAM) noted that the sediments of the Irish Sea contained over a quarter of a tonne of plutonium, adding that “no civilising and cautious industry [could] really justify the casual pumping of a known

⁸⁸⁵ *Galloway News*, 3 November 1983.

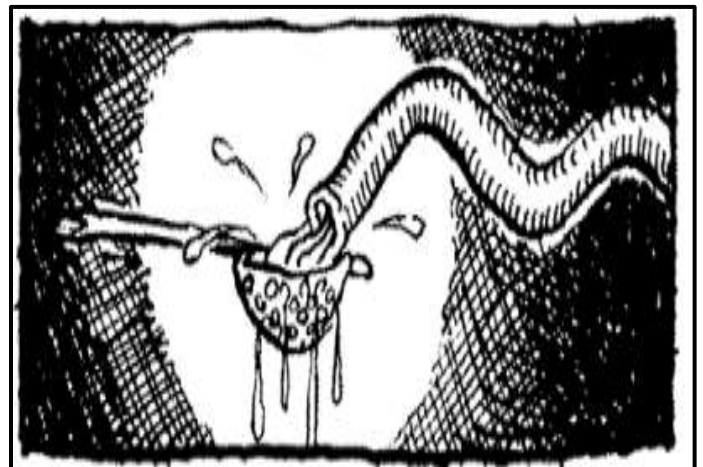
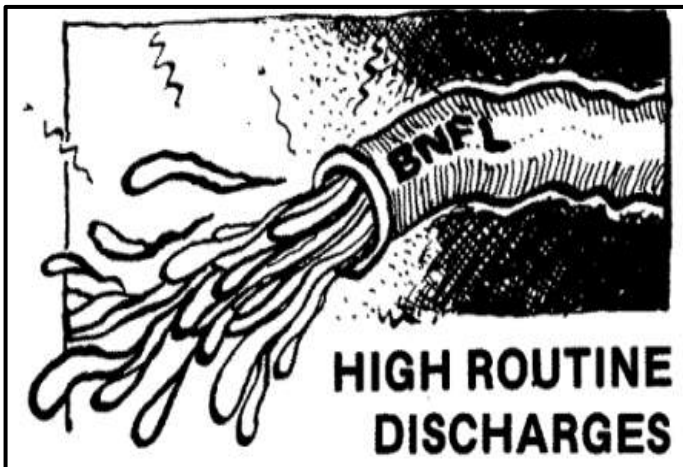
⁸⁸⁶ *Ibid.*; *Guardian*, 1 December 1983.

⁸⁸⁷ Indeed, this was an issue George Foulkes M.P. repeatedly pushed over the following years. (See Hansard, 21 May 1984; 20 June, 1984; 9 July 1984; 12 July 1984; 23 July 1984; 21 December 1984; 24 February 1984; 8 April 1986; 22 April 1987, <<https://api.parliament.uk/historic-hansard/people/mr-george-foulkes/index.html>> [accessed 3 November, 2019]; *Glasgow Herald*, 21 November 1983; *Whitehaven News*, 8 December 1983.

⁸⁸⁸ D. Newton, G. Tyler, E. Williams, (et al.), ‘Caesium-137 Levels in Residents of the Scottish Mainland and Hebrides’, *Health Physics*, 42.5 (1982), pp. 735-738; ‘Windscale: The Nuclear Laundry’, G. McKee, N. Gray, Yorkshire Television: ITV, 1983.

carcinogen of plutonium’s toxicity into an enclosed, shallowed and heavily fished waterway such as the Irish Sea”, describing the health effects upon the Scottish people as “nothing short of a scandal.”⁸⁸⁹ Figs 5.0 and 6.0, taken from the October/November 1983 edition of the bi-monthly *SCRAM Journal* epitomise Scottish attitudes towards BNFL’s contamination of the marine environment, depicting the murky and bulbous protuberance of the Sellafield pipeline, secreting toxic nuclear waste into the clean, tranquil marine environment.

Figs. 5.0 and 6.0 (left to right): Taken from ‘The Anti-Nuclear and Safe Energy Journal’, *SCRAM*, 38.0 (October/ November 1983), p. 3.



The images’ visual similarity to the male reproductive system presents the juxtaposition between its life-bestowing capabilities and the deadly effects of radioactive pollution. Specifically, Fig 6.0 represents the immorality of marine pollution, invoking cultural and biblical imagery of the serpentine qualities of the pipeline to depict its immoral threat to ordinary civilians. This also invokes Sellafield’s threat to the public through the consumption of irradiated foodstuffs. The spoonful of radioactive waste alludes to the contamination of seafood and the threat to the public through the consumption of local produce. These textual and visual sources show how Scottish citizens drew upon *Windscale* and the findings of recent

⁸⁸⁹ ‘The Anti-Nuclear and Safe Energy Journal’, *SCRAM*, 38.0 (October/November 1983), p. 3.

government and public health studies, confirming dystopian imaginaries of Sellafield as a threat to the health of the Scottish public through the carcinogenic effects of marine discharge and the irradiation of fish supplies.

Similar patterns of concern appeared throughout Northern England, as Sellafield's discharges became an increasingly regional and national issue. Newspaper outlets throughout the North-West devoted a considerable amount of attention to the incidents, specifically to the monitoring procedures ongoing along the coast.⁸⁹⁰ Reports emphasised the high radioactivity within the Irish Sea, noting that monitoring efforts had uncovered "bits of string, seaweed and plastic [...] with a radioactive reading of 1000 times the normal level."⁸⁹¹ These reports exacerbated public anxieties about the threat of radiation, referring to the "growing fears of a health hazard from dumping by nuclear plants."⁸⁹² The *Blackpool Gazette* demanded "a nuclear doom-watch on the county's coastal waters", whilst the *Lancashire Evening Post* called for "strong measures to check the threat to Lancashire's beaches from radioactive waste."⁸⁹³ This asserted the regional threat Sellafield posed, again drawing definitive links between the plant and its recent spike in cancer deaths. As observed in the Scottish context, Sellafield became an ecological scapegoat for a series of environmental and biological problems throughout the North-West and Scotland, as regional newspapers correlated existing health statistics with the nuclear industry, contributing to a dystopian imaginary whereby Sellafield was responsible for local cancer excesses. These regional patterns formed part of a broader trend throughout

⁸⁹⁰ It is possible, and indeed likely, given the amount of national coverage devoted to these incidents that similar findings could be observed elsewhere throughout the UK, as various regional newspapers assessed the significance of these events upon their own locales. Given the time and resource constraints upon this project my own research was restricted to archives throughout the North-West and this therefore offers a potential avenue for future exploration. (*Liverpool Echo*, 27 January 1984, p. 20; *Lancashire Evening Post*, 8 December 1983; *Blackpool Gazette*, 8 December 1983; *Northern Echo*, 21 November 1983, p. 14; *Morning Star*, 1 December 1983.)

⁸⁹¹ *Lancashire Evening Post*, 8 December 1983.

⁸⁹² *Ibid.*

⁸⁹³ *Blackpool Gazette*, 8 December 1983; *Lancashire Evening Post*, 8 December 1983.

England, whereby national newspapers conveyed a series of assumptions about the environmental and radiobiological costs of the nuclear industry. Indeed, Sally Macgill's quantitative study of media reports on Sellafield during this period identified forty-eight separate newspaper and radio bulletins between 31 October and 4 November, which referenced issues of environmental or radiobiological damage.⁸⁹⁴ Taking a more qualitative analysis, I argue that by paying attention to the tone and content of national newspaper articles, we can see a significant shift towards sensationalist anti-nuclear discourse, particularly amongst tabloid articles, which simultaneously tapped into and exacerbated public anxieties towards radiation.

Tabloid articles frequently emphasised what historian Peter Hales has identified as the 'sublime' nature of nuclear technologies, focusing upon their dystopian qualities and depicting them as a subversion of the natural realm.⁸⁹⁵ This produced headlines such as 'Radioactive Waste Washed on Beach', and 'Scandal of the Nuclear Poison,' whilst reports deployed terminology such as "dangerous solvent" and "radioactive waste" to convey the otherworldly nature of the nuclear threat.⁸⁹⁶ One particularly egregious headline appeared in the *Sun* entitled 'Villages of the Damned: Sun Special on Families who Live in the Nuclear Shadow.' This article told of cattle which "suffer from abnormalities," spiders that were "big and strangely coloured" and "deformed geese."⁸⁹⁷ Elsewhere, the *Daily Express* referred to the "horrific picture of evil cancer radiation getting into the sea, the air, the capital, the vegetables and eventually the people."⁸⁹⁸ Somewhat more restrained yet no less fatalistic, the *Daily Mail* adopted the headings 'Horror in the Hoover' and 'Wall to Wall Plutonium' to describe

⁸⁹⁴ Macgill, *Politics of Anxiety*, pp. 18- 23.

⁸⁹⁵ P. Hales, 'The Atomic Sublime', *American Studies*, 32.1 (1991), pp. 5- 31.

⁸⁹⁶ *Sun*, 21 November 1983.

⁸⁹⁷ *Sun*, 1 November 1983.

⁸⁹⁸ *Daily Express*, 2 November 1983, in Macgill, *Politics of Anxiety*, p. 21.

conditions within Seascale.⁸⁹⁹ Other articles concentrated on the dystopian realities of life for people living alongside the plant. One *Daily Mirror* article headed with ‘Breeding of a reign of fear’, explaining that “the fear that something in the air- nameless, unfelt and invisible- might slowly kill us all was once a basic plot of science fiction. Today, for some people, it is a fact of life.”⁹⁰⁰ The tone and content of these reports helped embed dystopian nuclear imaginaries at the national level by sensationalising their effects and presenting them as a major biological and environmental threat to the public.

Whereas tabloid articles focused on the sensationalist and ‘sublime’ aspects of the incidents, broadsheet articles devoted more attention to the scientific debates which surrounded the controversies. Whilst ostensibly objective in their presentation, the tone and literary devices within these passages convey a clear current of nuclear critique, as traditional notions of the natural environment and the family unit were juxtaposed with the threat of radiation. Whilst the *Observer* carried the perfunctory and matter-of-fact headline ‘Children near Windscale Have High Cancer Levels’, it directly correlated this to the effects of Sellafield, referring to the documentary’s “revelations” and “findings”, despite the circumstantial and scientifically unproven nature of its allegations.⁹⁰¹ The *Sunday Times* carried the more objective and open-ended headline ‘Windscale Atoms May Have Given Children Cancer’ and spoke of the programme’s “claims” and “allegations”, although the imagery which accompanied the article depicted a local family holding large quantities of radioactive dust, captioned ‘the Merlin’s: Plutonium in the Vacuum Bag.’⁹⁰² This added a particularly emotive dimension to the article by tying the findings to a specific family, emphasising the threat to the family unit and their

⁸⁹⁹ *Sun*, 1 November 1983; *Daily Mail*, 31 October 1983; MacGill, *Politics of Anxiety*, p. 18.

⁹⁰⁰ *Daily Mirror*, 4 November 1983, p. 2

⁹⁰¹ *Observer*, 30 October 1983; MacGill, *Politics of Anxiety*, p. 17.

⁹⁰² *Sunday Times*, 30 October 1983; MacGill, *Politics of Anxiety*, p. 17.

young children; explaining that “they could not sensibly and rightly take the risk of bringing up two sons in a house so particularly or uniquely exposed to radioactivity as theirs was.”⁹⁰³ Pictorial or textual assumptions about the threat of radiation upon young children became an enduring feature of newspaper reports both during the incident and over the following decade. Historian Natasha Zaretsky has argued that images of young children “have often been used to represent environmental risk” as a powerful cultural and biological symbol of species reproduction.⁹⁰⁴ Tabloid and broadsheet newspapers alike frequently accompanied articles with images of children, often playing in the foreground of the plant’s foreboding and monolithic cooling towers. (See Figs. 7.0 and 8.0) This was also a feature of press releases from Greenpeace, as the visual imagery of young children playing in the shadow of the Windscale piles became a cogent representation of the dystopian realities of nuclear power production. (see Figs. 8.0 and 9.0)



Figs. 7.0 and 8.0: (from left to right): *Daily Express*, 1 November 1983, p. 15; ‘Sellafield reprocessing plant, Cumbria, UK. Children in the nearby village of Seascale, showing proximity to plant’, <<https://media.greenpeace.org/archive/Sellafield-reprocessing-plant--Cumbria--UK--Children-in-the-nearby-village-of-Seascale--showing-proximity-to-plant--27MZIFLXQHA8>> [accessed 3 November 2020].

⁹⁰³ *Guardian*, 3 October 1989.

⁹⁰⁴ Zaretsky, ‘Atomic Nightmares and Biological Citizens’, p. 64.

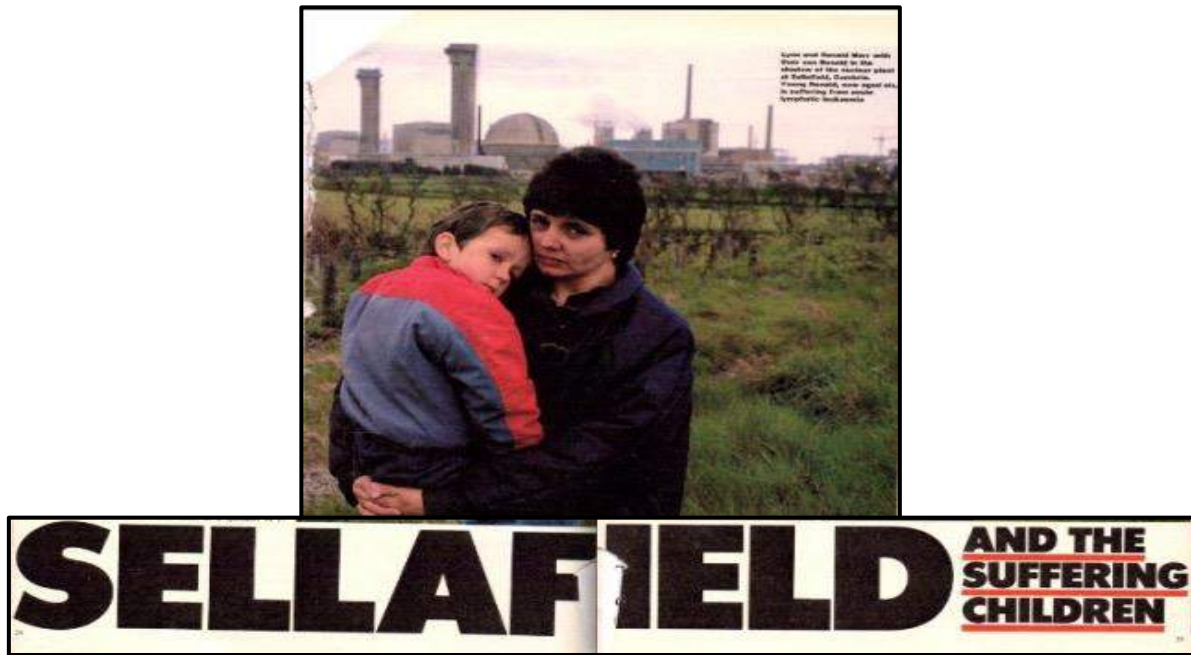


Fig. 9.0: *Observer Magazine*, 29 May 1989.

The *Times* also emphasised the hugely emotive dimensions of childhood leukaemia by accompanying articles with images of local children. Released a few years later following a new scientific hypothesis into the links between cancer and radiation, Fig. 10.0 depicts a young child, innocently playing whilst the surrounding environment is silently contaminating her.



Figs. 10.0 and 11.0: (from left to right) *The Sunday Times*, 30 August 1992, p. 3; *The Times*, 16 February 1990.

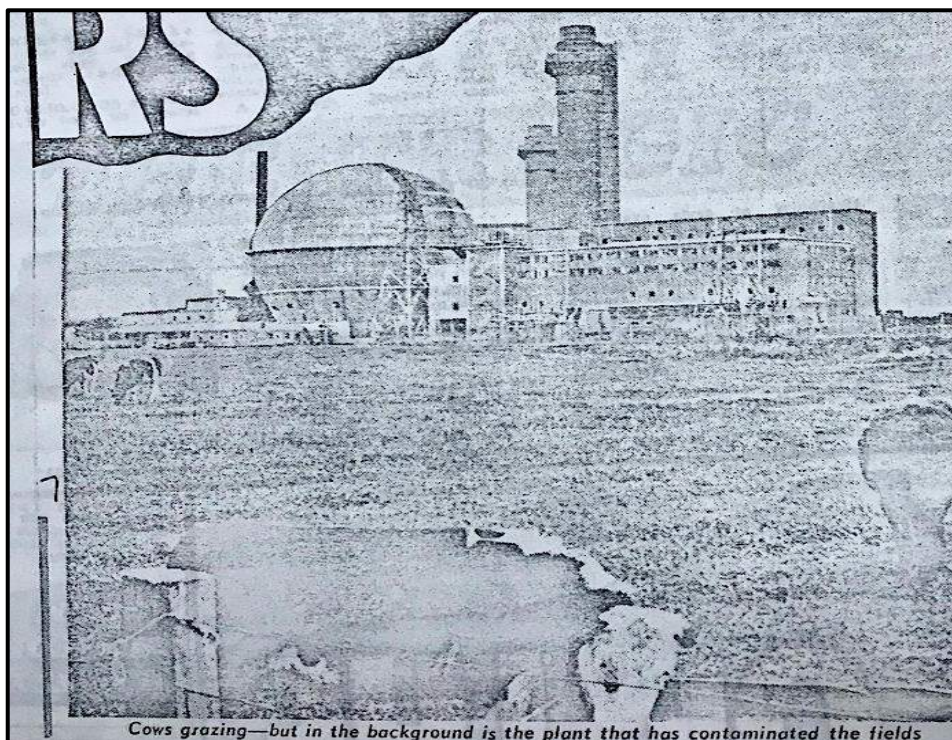
This carries a huge amount of emotional capital, emphasising the juxtaposition between childhood innocence and the omnipotent threat of radiation. Likewise Fig. 11.0 offers a striking image of a little girl smiling at the camera whilst her concerned father places an arm around her shoulder, conveying a powerful set of assumptions about radiation's threat to children and its violation of the natural order. Her innocence and joy contrast with the concern and paternal instinct displayed by her father, further emphasising the horror of radiation which could not be detected by the child but threatened her, and the psychological burden placed upon the family by the unseen spectre of radioactivity. By mobilising fears regarding the destruction of the natural family unit, the tone and imagery pertained within these articles presented nuclear technologies as a physiological deviant, more subtly but no less acutely emphasising the sublime nature of the nuclear threat and its dystopian consequences. This strand of journalism dovetailed with references to the region's traditional agricultural subsistence, through which newspapers made explicit the risk posed not just to local children, but to the wider British public through the consumption of irradiated farm produce. This reinforced the radioactive realities at the heart of the dystopian imaginary, inextricably linking environmental and radiobiological imaginaries and foregrounding human suffering at the heart of the anti-nuclear imaginary.

Both local and national newspaper articles argued that West Cumbrian agricultural and fish produce posed a biological threat to the wider British public, stressing radiation's carcinogenic effects on crops and animals destined for human consumption. The *West Cumberland Times and Star* wrote that "cattle unlucky to be grazing the fields around the plant are subjected to 100 times the normal level of radiation."⁹⁰⁵ This is perhaps somewhat

⁹⁰⁵ *West Cumberland Times and Star*, 26 November 1983, p. 8; *West Cumberland Times and Star*, 5 November 1983, p. 12.

surprising, given the injurious consequences such reporting would have upon local industry. Whereas local media reports following the 1957 fire had been keen to downplay the effects of radiation (see Chapter 4), it is significant that local media responses to the 1983 controversies did not; alluding to a deeper pattern of public concern at the local level, and the embedded nature of dystopian nuclear imaginaries during this period. Similar examples also appeared at the national level. A double page feature within the *Sun* (Fig. 12.0) depicted an image of ostensibly contaminated livestock with the emboldened headline ‘Animals Carrying Danger.’ The accompanying caption alluded to the substantial radiation received by the cattle, referring to “cows grazing- but in the background is the plant that has contaminated the fields.”⁹⁰⁶

Fig. 12.0: Excerpt from *the Sun*, available in National Archive File (AT 31/55).



Indeed, this report caused significant alarm amongst senior government officials. A copy of the article within the National Archives carries a hand-written annotation by the Secretary of State for the Environment, Patrick Jenkin, in which he describes it as “a very disturbing article

⁹⁰⁶ *Sun*, 24 November 1983.

which will cause us a lot of trouble!”⁹⁰⁷ This shows how officials were reacting to the dissemination of dystopian imaginaries, but also to the sort of investigative (and sometimes sensationalist) exposés that were quite common in the early 1980s.⁹⁰⁸ Similar tropes appeared elsewhere. The *Bath and Wiltshire Evening Chronicle* described “sheep presumably destined to be lamb chops browsing in a field so radioactive that it was a danger to anyone who walked there,” whilst another *Sun* article explained that local eggs “had so much radioactivity that if you held them for an hour you would have had a year’s dose.”⁹⁰⁹ These reports helped embed dystopian imaginaries at the national level by inextricably linking the localised effects of the plant with the wider British public through the consumption of irradiated farm produce.

Similar patterns can be identified in reports on local fishing, which similarly emphasised the hazards posed by West Cumbrian fish. Newspaper reports frequently alluded to irradiated fish in the Irish Sea, referring to the “tide of pollution” from Sellafield along the Cumbrian shore.⁹¹⁰ Where *Windscale* showed that fish-eating locals had exceeded the official limit for radiation exposure, newspaper articles emphasised the threat to the public, asserting that “the fish are too radioactive to eat, and high levels of radioactive particles have been found in the livers of local wildlife.”⁹¹¹ Even local newspapers recognised that “fish caught near the Sellafield discharge pipe do have a higher level of radiation than fish taken from areas further

⁹⁰⁷ National Archives, (AT 31/55).

⁹⁰⁸ For further reading, see L. Willnata, and D. Weaver, ‘Public Opinion on Investigative Reporting in the 1990s: Has Anything Changed since the 1980s?’ *Journalism and Mass Communication Quarterly*, 75.3 (1998), pp. 449- 463; D. Underwood, *From Yahweh to Yahoo! The Religious Roots of the Secular Press* (Champaign: University of Illinois Press, 2002).

⁹⁰⁹ *Bath and Wiltshire Evening Chronicle*, 5 November 1983; *Sun*, 24 November 1983.

⁹¹⁰ *Whitehaven News*, 8 December 1983, p. 17.

⁹¹¹ A government report acknowledged that “although it has not yet been picked up by the media... doses to the critical group of the population had actually breached the ICRP-recommended limit for annual exposure.” In reality, this had been stated within the *Windscale* documentary. See, National Archives, , ‘Internal correspondence between William Waldegrave M.P. and advisors’, p. 1, (AT 31/55); *Irish Independent*, 27 May 1988.

away from the plant,” with figures “significantly higher than usual.”⁹¹² Curiously, these local reports often featured a higher level of technical or scientific understanding than national reports, supporting Brian Wynne’s argument that local host communities often hold specialist knowledge of nuclear technologies, and radiation effects.⁹¹³ Whilst BNFL were adamant that local fish were within acceptable levels for public consumption, the two controversies and the subsequent press coverage convinced many people otherwise. Reports spoke of a “fish scare” within the local community, with one article detailing that residents “who purchased fresh fish regularly from the trawlers were so alarmed that they threw away the entire contents of their deep freeze.”⁹¹⁴ These reports inextricably linked Sellafield with the contamination of British food supplies, bringing the issue of nuclear contamination right into people’s homes and onto their dinner plates, further reiterating the nuclear industry’s role as an environmental pollutant.

Oral interviews revealed the long-term impact of these media reports, as locals explained that many local people still refuse to eat locally caught fish. Here, they acknowledged that the negative press coverage “put people off... it put everybody off”, with several residents explaining that that “a lot of people stopped eating sea foods you know, especially the bottom feeding sea foods,” whilst others added, “we don’t eat seafood from round here anymore.”⁹¹⁵ One resident remembered that “we all used to [pick covins] as a kid, but I haven't seen anybody

⁹¹² *West Cumberland Times and Star*, 3 December 1983, p. 19.

⁹¹³ Wynne, Waterton, and Grove-White, (eds.), *Public Perceptions*, p. 35; Wynne, ‘Misunderstood Misunderstandings’, pp. 281- 304.

⁹¹⁴ *Blackpool Gazette*, 8 December 1983; *Whitehaven News*, 8 December 1983, p. 17; See also, McSorley, *Living in the Shadow*, p. 112.

⁹¹⁵ N. Garbutt, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 22 March 2010, p. 25; J. Jones, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 20 August 2010, p. 20; C. McCourt, interview with A. Alexander, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 1 October 2010, p. 14; A. Alexander, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 1 October 2010, p. 15.

do that for a long time now.”⁹¹⁶ One local woman related that “I haven’t eaten local seafood since. Thankfully now we have the supermarkets, and I don’t have to. Ever since then I’ve avoided it because God knows what it’s been swimming in.”⁹¹⁷ Another specified that the media coverage in 1983 convinced him to avoid the beaches altogether, explaining that “I never took my kids to St Bees [a local beach] after that for the whole of their lives.”⁹¹⁸ This attests to the long-term impact of the negative media coverage surrounding the incidents, even at the local level where it may be assumed that locals’ familiarity with the sea and relationships with local fisherman may have precluded a major shift in public attitudes. Here, we can see how the press coverage dovetailed with an undercurrent of public concern substantiated by *Windscale* and the beach incident to embed dystopian nuclear imaginaries at the local level, as many citizens lamented their local environment and the organisms within it as contaminated.

These dystopian imaginaries were perpetuated by the tone of newspaper coverage which carried an overt cultural dimension, stressing the impact upon local fishing communities devastated by the contamination and unable to sell their produce. Whilst such reports arguably perpetuated the plight of local food producers, newspaper articles frequently lamented the impact of the controversy on the local fishing trade, using emotive language to paint a picture of traditional, hard-working fishing communities devastated by the environmental negligence of the nuclear industry. This imbued the dystopian imaginary with a further cultural dimension, depicting nuclear power as a dangerous and dirty modern industrial process which literally

⁹¹⁶ Interviewees explained that the local fishing industry had never recovered after the controversies. They explained that the negative publicity surrounding both incidents “cost us millions”, pointing to the decline in coxin and mussel picking along the coast, which had formerly been a popular local pastime and source of income. (N. Garbutt, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 22 March 2010, p. 25; A. Alexander, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 1 October 2010, p. 14; J. Jones, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 20 August 2010, p. 20.)

⁹¹⁷ Author’s interview with Isobel George, 6 March 2019.

⁹¹⁸ A. Alexander, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 1 October 2010, p. 15.

poisoned traditional, respectable work, dependant on an unpolluted environment. Indeed, these narratives echoed the visual contrast between the local children and the monolithic shadow of the cooling towers depicted earlier, further embedding Sellafield as a social and cultural dystopia, as well as a radiobiological and environmental one.

Between November and December 1983, a series of local and national articles explained that fish sales along the Western coast were rapidly declining, emphasising the deleterious consequences of the controversy upon local communities. The *Whitehaven News* explained that “a number of residents in the village are trawlermen, owning their own boats. Their fish, which was once eagerly sought after on the shore as it was landed, is now considered by many to be contaminated. As a result, there is a likelihood that they will either be put out of business or suffer financial hardship.”⁹¹⁹ This was a point forcibly impressed by Workington M.P., Dale Campbell-Savours, who requested compensation for “fishermen in West Cumbria [who] are having difficulty marketing their fish following recent publicity about the level of radioactivity around Windscale.”⁹²⁰ Whilst his request was refused, the plight of local fishermen became a feature of national newspaper reports. Many of these articles contained comments from struggling fishermen, who had to destroy their unsold hauls or give up fishing altogether.⁹²¹ One fisherman told the *Times* that his customers now avoided locally-sourced

⁹¹⁹ *Whitehaven News*, 8 December 1983, p. 17.

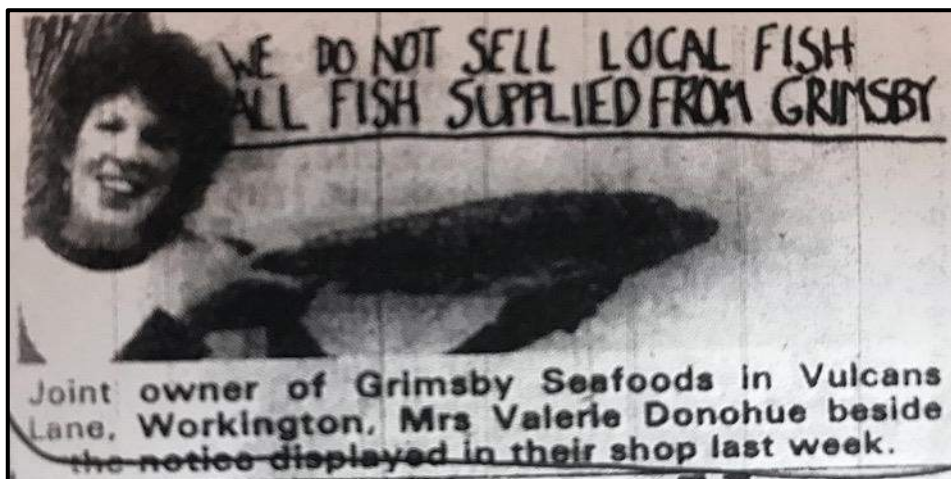
⁹²⁰ Michael Joplin M.P, acting on behalf of MAFF replied that “it is most unlikely that the recent incident involving some temporary contamination of the beach close to the Sellafield pipeline will have had any effect on fish supplies in the area” and as such, “it would not be appropriate for us to pay compensation.” (Hansard, 24 November 1983) <<https://api.parliament.uk/historic-hansard/written-answers/1983/nov/24/windscale-fish-supplies>> [accessed 20 August 2020].

⁹²¹ *Liverpool Daily Post*, 8 December 1983.

fish, explaining mournfully, “I have had seven customers in the last ten days.”⁹²² This formed a pattern throughout Autumn 1983, as the consistent negative press coverage not only presented the dystopian imaginary with a further cultural dimension, but also convinced residents that locally caught fish were not safe.

Public concerns were such that many local establishments refused to buy fish caught off the Cumbrian coast. *The Times* sympathetically depicted the cultural and moral paradox wherein local retailers were forced to denounce their neighbours and boycott local produce, iterating the plight of a local vendor who, having endured three weeks of minimal sales, had displayed a sign saying “no local fish sold here.”⁹²³ A similar article appeared in the *West Cumberland News and Times* (Fig. 13.0), which observed that “the market for locally caught fish is being destroyed and some retailers are putting up signs to tell the public that their fish is not locally caught.”⁹²⁴

Fig. 13.0: *West Cumberland Times & Star*, 3 December 1983, p. 17.



⁹²² *The Times*, 5 December 1983. This bears striking similarities to the response of the Cornish fishing community following the Torrey Canyon oil spill disaster of 1967. Environmental historians Anna Green and Tim Cooper have examined social responses to the disaster, finding that the overwhelming response amongst the local community “was one of intense fear for their livelihoods.” See, A. Green, and T. Cooper, ‘Community and Exclusion: the Torrey Canyon Disaster of 1967’, *Journal of Social History*, 48.4 (2015), p. 900; T. Cooper, and A. Green, ‘The Torrey Canyon Disaster: Everyday Life and the ‘Greening’ of Britain’, *Environmental History*, 22.1 (2016), pp. 101- 126.

⁹²³ *The Times*, 5 December 1983.

⁹²⁴ *West Cumberland Times and Star*, 3 December 1983, p. 17.

The sympathetic tone of these articles appeals to the reader's compassion, painting a picture of a local community financially devastated and internally ruptured by the environmental negligence of the nuclear industry, as proud fishing communities were forced to abandon their livelihoods and local businesses renounced their neighbours' produce in a desperate attempt to retain customers. By emphasising the cultural consequences of marine contamination, these articles simultaneously perpetuated the links between nuclear energy and environmental contagion whilst casting a binary between the might of the nuclear industry and the relative helplessness of the local 'peripheral' community who bore the costs of their malfeasance. This conveyed a powerful set of cultural assumptions about the industry's deleterious consequences upon local people, and its wider threat to the region's existing industries and its traditional way of life; inextricably linking the nuclear industry with a series of imagined dystopian environmental, biological, and social futures.

Through the analysis of newspaper narratives, it is clear that the print media sustained and perpetuated the public's engagement with the controversies at Sellafield throughout the early part of the 1980s. The print media occupied a central role in the co-production of nuclear meaning-making as the extent of regional and national coverage devoted to nuclear issues, coupled with the linguistic, syntactical, and image choices which accompanied them ensured that nuclear power became enveloped within a series of imagined undesirable futures, characterised by issues of environmental and marine contamination and excess cases of childhood leukaemia. This contributed to a hostile climate of opinion towards nuclear technologies at both national and public level, despite the fact that these links remained hypothetical and had not been scientifically proven.

The following section of this chapter explores the epistemological void between the dystopian imaginaries pedalled by the print media and the narrative of public safety advanced by BNFL. This created a specific set of social conditions whereby the local population were dislocated between competing nuclear imaginaries, ultimately responding to this context by producing their own locally specific forms of nuclear knowledge.

5.4 Competing Nuclear Imaginaries

Despite the concerning statistics raised by *Windscale*, the controversial beach incident, and overwhelmingly unfavourable newspaper coverage, BNFL had not broken any laws or exceeded accepted limits for radioactive discharge.⁹²⁵ For this reason, BNFL denied any wrong-doing or culpability in both instances, stating that their atmospheric and marine discharges fell within the limits accepted by the British nuclear industry. Whilst both incidents questioned the validity of these limits, which were significantly higher than anywhere else in the world and had not been amended for over two decades, BNFL were adamant that since they had not breached these limits, neither scenario posed a threat to public health. This created a paradigm whereby BNFL refuted that they had acted improperly, whilst others felt legitimated in their belief that they had discharged far more radiative material than was safe to do so. Furthermore, the lack of scientific consensus meant that little definite ‘evidence’ existed and scientific conclusions were contingent and little more than working hypotheses. This dislocated the public between a series of contested imagined futures, as different groups sought to quantify the degree of risk posed by the plant, variously disputing the validity of the regulatory frameworks adopted by the British nuclear industry and the accuracy of the measurements provided by BNFL.⁹²⁶

The following section will explore how, as Jasanoff argues, “multiple imaginaries can coexist within a society in tension or in a productive dialectical relationship.”⁹²⁷ This thesis has concentrated on the contested nature of nuclear meaning-making, and I will now more fully conceptualise the emergence of two distinct nuclear imaginaries that existed in tension in the early 1980s. The first asserted the dystopian environmental and biological consequences of nuclear technologies, which was reflective of an undesirable future whereby nuclear technologies were responsible for excess cancers amongst the local population and posed a substantive threat to public health. The second was predicated upon the utopian credentials of nuclear power as a safe and controllable means of energy production which represented no danger to the public through adherence to strictly regulated monitoring procedures. Observing the dynamic interplay between these two competing imaginaries at both the local and the national level, the following section will argue that public responses to *Windscale* and the beach incident were the product of these distinct imaginaries, as the public variously contested the biological and environmental significance of both incidents; ultimately producing their own forms of knowledge which were the product of this context.

5.5: Threshold Doses.

Foundational to these debates were conflicting scientific attitudes towards threshold doses; radiation limits deemed ‘safe’ and below which no harm could occur. Whilst threshold

⁹²⁵ It was later found that BNFL had in fact exceeded authorised dose limits for marine discharge, but had covered this up by averaging the discharges out over a three-month period, bringing it back in line with standard limits. For this they were subsequently fined a total of £70,000 by the Crown Prosecution Service, for failing to “minimise the exposure of persons to radiation and failing to keep adequate records.” See, Aubrey, *Thorp*, p. 22.

⁹²⁶ The dichotomy between these two positions was neatly surmised by a senior government minister who conceded that, “although the discharges from Sellafield meet the internationally recommended safety limits, the government fully appreciates the public concern that has arisen following the Yorkshire Television programme and the incident last November involving contamination of the beach.” National Archives, (AT 31/59).

⁹²⁷ Jasanoff, ‘Future Imperfect’, in *Dreamscapes of Modernity*, p. 4.

doses had been discussed within the nuclear industry since its inception, by the early 1980s a growing cadre of British scientists refuted the notion that any limit existed, asserting that any exposure to radiation carried with it a degree of risk.⁹²⁸ Despite this, BNFL stuck rigidly to its belief that dosages had been carefully regulated and therefore it could not be responsible for local cancers. Industry experts claimed that Sellafield emitted one thousandth of the radiation necessary to cause the number of cancers observed, dismissing claims that eating locally sourced fish or visiting local beaches could result in the numbers of leukaemia cases identified by researchers.⁹²⁹ In *Windscale*, a company spokesman argued radiation could not be responsible, unless “virtually all the children at Seascale have been exposed to at least ten, and perhaps a hundred times natural radiation every hour of every day, every day of every year, and every year of their lives” adding that “the activity levels are known and that is just not contemplable.”⁹³⁰ Further company statements refuted the links between Sellafield and cancer, explaining that employee cancer rate was below the national average. Instead spokesmen emphasised alternative risk factors, arguing that “a fortnight’s holiday in polluted London carried a greater health risk than lying for a whole year on the beach near Windscale,” adding that “the relative risk from Windscale was low” and that “there is no risk free life

⁹²⁸ British researchers argued that BNFL should follow the USA and Canada, who had reduced the threshold dose to a fifth of the British level, pointing to the French Cap de la Hague plant which discharged far less radioactivity than Sellafield, despite being involved in much the same processes. Studies had found that the public exposure from Sellafield was “a thousand times what is considered reasonably achievable elsewhere, and up to twelve times the United States’ Environmental Protection Agency regulatory limit for such installations.” Similarly, monitoring of Seascale homes found radiation ten times the maximum limits permitted in the Rocky Flats nuclear-weapons producing region of the US, 2500 times garden soil levels for the rest of the country, and levels of Americium-241 17,000 times higher than the rest of the UK. See, W. Inkret, J. Taschner, and C. Meinhold, ‘A Brief History of Radiation Protection Standards: A Hard Look at the Data,’ *Los Alamos Science*, 23.0 (1995), pp. 116- 123; Hamblin, *Poison in the Well*; *Sun*, 24 November 1983; Aubrey, *Thorp*, p. 25; McSorley, *Living in the Shadow*, p. 110.)

⁹²⁹ *Guardian*, 23 November 1983.

⁹³⁰ Peter Mummery in ‘Windscale: The Nuclear Laundry’, G. McKee, N. Gray, Yorkshire Television: ITV, 1983.

available.”⁹³¹ BNFL’s refusal to engage with Sellafield’s potential role in these statistics polarised public debates between the definitive posture adopted by the industry and the concerns of non-industry experts, who were much less confident in BNFL’s conclusions.

External scientific figures articulated sincere doubts about the validity of BNFL’s claims and the underpinning logic by which they concluded that the local area was safe.⁹³² Recent studies had found that the established logic of dispersal theory was flawed; radiation did not dilute in open water, as had been the justification for discharge levels in the past.⁹³³ It had been found that plutonium concentrated in the layers of silt on the seabed, and was washed up along the shore, dried by the sun and blown inland. A visual representation of this process, produced by the *Observer Magazine*, is shown below, in Fig. 14.0.⁹³⁴

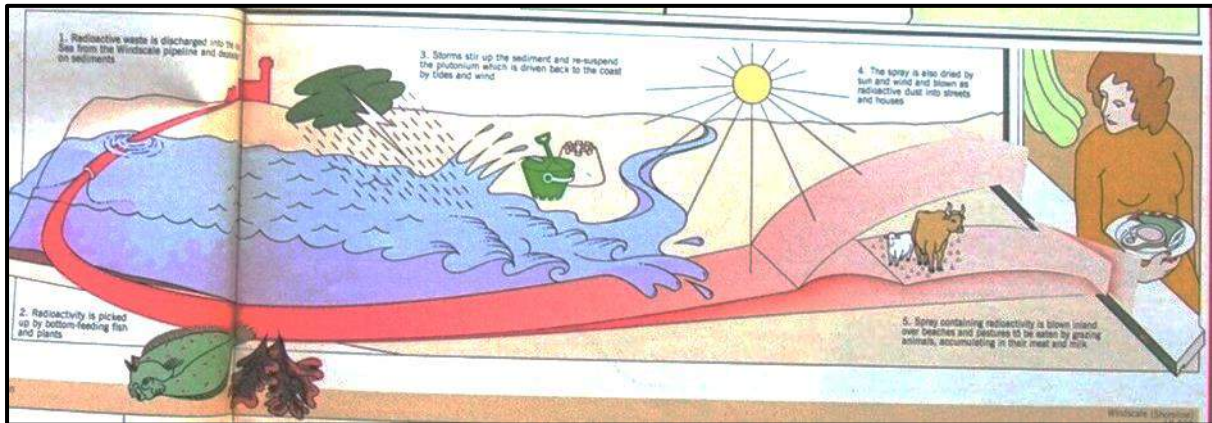
⁹³¹ Whitehaven Archive and Local Studies Centre, ‘Health and Safety Executive Report on Windscale, ‘The Management of Safety’, in ‘Cumbria Area Health Authority: Leukaemia and other cancers in Cumbria’, (NGR 84-89); *Evening News and Star*, 29 November 1983; National Archives, ‘Press briefing for Question Time’, (AT 31/55).

⁹³² This acknowledged that since BNFL’s workforce was substantially below the average age of the population, its statistically below average number of cancer cases proved very little. (McSorley, *Living in the Shadow*, p. 41.)

⁹³³ *West Cumberland Times and Star*, 19 November 1983, p. 12. (This was also the subject of a feature in the *Guardian* on 9 December 1983.)

⁹³⁴ These findings were later the subject of a series of studies, see R. Pentreath, (et al.), ‘The Impact on Public Radiation Exposure of Transuranium Nuclides Discharged in Liquid Wastes from Fuel Element Reprocessing at Sellafield, UK’, in *Radioactive Waste Management* (Vienna: International Atomic Energy Agency, 1983), pp. 315-29; J. Howorth, and A. Eggleton, ‘Studies of Environmental Radioactivity in Cumbria: Part 12. Modelling of the Sea-to-land Transfer of Radionuclides and an Assessment of the Radiological Consequences’, (London: HMSO, 1988); W. McKay, W. Pattenden, and J. Branson, ‘Studies of Environmental Radioactivity in Cumbria: Part 10. Some Radionuclides in Near-shore Seawater 1980-84’, (London: HMSO, 1987); For local media coverage on the preliminary findings of these reports, see *West Cumberland Times and Star*, 19 November 1983, pp. 1, 12ff; *West Cumberland Times and Star*, 26 November 1983, pp. 6- 8; *West Cumberland Times and Star*, 10 December 1983, p. 1.

Fig. 14.0: *Observer Magazine*, 'The Radioactive Sea', 20 May 1984, p. 19.



Indeed, sediments examined near the Sellafield pipeline found twenty-six times more radioactivity than at the Pacific Islands contaminated by US weapons tests during the 1950s, which had been deemed too radioactive to host human life.⁹³⁵ Meanwhile, scientists at Harwell had discovered that “plutonium covered silt and sea spray has caused widespread fallout over a 50 mile section of the Cumbrian coast from St Bees to Barrow, at between 200% and 700% of ‘normal’ levels from weapons fallout...”⁹³⁶ Furthermore, another recent study had shown that the human body was “far more susceptible to radiation than current models supposed,” as new figures suggested that human livers may absorb between ten and one-thousand times the radiation previously suggested.⁹³⁷ This new information rendered the established discharge limits (and BNFL’s defence) obsolete, as it became clear that marine radioactivity behaved very differently than previously thought, and the human body absorbed far more radiation than accommodated for by the established limits. This threw into severe doubt the validity of the

⁹³⁵ Worster, *Nature’s Economy*, p. 340; McSorley, *Living in the Shadow*, p. 108.

⁹³⁶ A subsequent study by the Commission of European Communities, entitled ‘Project Marina’ found that Sellafield was the primary source of annual radiation exposure to European citizens, exceeding the total combined exposure from background radiation, all other nuclear sites, weapons testing, Chernobyl, and stored waste. (National Archives, (AT 31/56); Hamblin, *Poison in the Well*, p. 252.

⁹³⁷ National Archives, ‘PERG, ‘The Windscale Discharges: A Briefing Document on the Implications for Health in Surrounding Communities Part Three: A History of PERG Assessments’, (AT 31/56); For local media coverage on this report, see *West Cumberland Times and Star*, 12 November 1983, p. 12; *West Cumberland Times and Star*, 19 November 1983, p. 12.

limits to which BNFL were supposedly adhering and opened up competing schools of thought between those who, like BNFL, believed the discharges were legitimated by the accepted limits and those who believed these were far too high and no safe threshold existed for radiation.⁹³⁸

Where the experts could not agree on whether Sellafield posed a risk to the public, local attitudes were even more confused, as scientific figures variously asserted that radioactivity could be monitored and controlled to a safe level, and yet deadly toxic in any quantity. BNFL concluded that one could spend 500 hours per year walking through the silt at the nearby Ravensglass Estuary before reaching the maximum permitted exposure. Conversely, a researcher from Manchester University, Dr Phillip Day found radiation figures twenty-five times higher than BNFL, providing a “maximum permitted exposure of twenty hours a year.”⁹³⁹ Likewise, BNFL claimed that a person would have to eat twenty pounds of silt in order to reach annual radiation limits, whilst medical experts such as US Medical Officer Carl Johnson and Dr R. Scott of the Molecular Biology Department at Edinburgh University, explained that less than ten grams could cause cancer.⁹⁴⁰ These inconsistent and incompatible findings did little to assuage the general public who became caught between scientific claim and counterclaim, with local citizens forced to accept plutonium in their homes yet feel comforted by official statements that these findings were somehow “insignificant.”⁹⁴¹ This muddied the waters for citizens hoping for a credible explanation for the high incidence of childhood cancer cases and added to the general sense that nobody knew for certain what exposure could be accurately deemed ‘safe’, and what or who could be believed. Seeking to

⁹³⁸ This reflected the nature of the debate; whereby scientific research could only prove that nuclear power was a dangerous industry or leave the question open. This position was neatly summarised by an article in the *Guardian*, which contended that “it can never be proved that they (nuclear technologies) are not dangerous and thus public doubts [...] can never be entirely set at rest.” *Guardian*, 23 November 1983.

⁹³⁹ *West Cumberland Times and Star*, 5 November 1983, p. 12.

⁹⁴⁰ *West Cumberland Times and Star*, 19 November 1983, p.12.

⁹⁴¹ *Guardian*, 17 November 1983.

rectify this confusion, the government commissioned distinguished medical scientist Sir Douglas Black to chair a report into the cancer clusters surrounding the plant, with the aim of establishing whether or not the observed cancer excess could be accounted for by present, or historical activities at Sellafield.

5.6: The Black Report.

The ‘Black Report’ was a lengthy investigation throughout 1984, headed up by some of the UK’s top physicians and nuclear experts. It was commissioned at the behest of Prime Minister Margaret Thatcher, who had become sufficiently concerned about the allegations aired in *Windscale*, and the subsequent negative media coverage to personally intervene in the matter.⁹⁴² The inquiry was designed to “consider the evidence concerning the alleged cluster in the neighbourhood of Sellafield, and its causation, [and] to determine the need for any further research and make recommendations.”⁹⁴³ Despite its clear remit, the inquiry failed to provide conclusive evidence to substantiate or nullify the links between Sellafield and local cancers. The subsequent ‘Black Report’, published in the Summer of 1984 found that since “doubts remain [...] the hypothesis of a connexion between the proximity of the nuclear plant and the excessive leukaemia rate cannot be fully eliminated.”⁹⁴⁴ Even Sir Douglas Black emphasised the uncertain nature of his findings. When asked about the overall cause for the cancer excess, he told reporters, “quite honestly, we don’t know and nobody

⁹⁴² Macgill, *Politics of Anxiety*, p. 20.

⁹⁴³ It has been suggested by Sally Macgill that the Black Report was little more than a political response to the panic invoked by the ‘nuclear laundry’ documentary and as such was designed to placate public opinion in the immediate aftermath of broadcast rather than offer a long-term solution to the issues it raised. (Macgill, *Politics of Anxiety*, p. 127; Hansard, 2 November 1983. <<https://api.parliament.uk/historic-hansard/written-answers/1983/nov/02/sellafield-radioactive-material>> [accessed 3 January 2020])

⁹⁴⁴ D. Black, *Investigation of the Possible Increased Incidence of Cancer in West Cumbria: Report of the Independent Advisory Group*, (London: HMSO, 1984); See also, M. Dousset, and H. Jammet, ‘Cases of Leukaemia in the Sellafield Area: The “Sir Douglas Black” Report,’ *General Nuclear Review*, 5.0 (1984), pp. 460- 466.

does.”⁹⁴⁵ The report’s failure to identify a specific factor, or series of factors which could adequately account for the cancer statistics created an epistemological vacuum in which the government effectively ceded control over the content of nuclear meaning-making by admitting it did not know whether the industry was responsible for the cancer cases or not. By tacitly acknowledging the possible links between radiation and cancer yet failing to identify an over-arching cause, the ‘Black Report’ failed to provide the public with any clear findings, leaving them socially dislocated between competing nuclear narratives.⁹⁴⁶

Studies on toxic contamination have found that affected communities often become “trapped” between differing interpretations of risk which heighten “concern, anxiety, and frustration” by providing “confusing, inadequate or contradictory information about the pollution.”⁹⁴⁷ Developing these insights, I will show how the inability of scientific experts to reach anything resembling consensus had a series of profound social effects, particularly in the local context where residents had to mediate between competing nuclear imaginaries when constructing lay understandings of nuclear risk. The following pages will examine the dynamic interplay between these competing imaginaries at the localised level, arguing that citizens

⁹⁴⁵ Whilst his official report recognised that the cancers could not be accounted for by the recorded levels of radiation, this acknowledged that the cancers were either: down to chance- a conclusion unlikely to satisfy concerned locals and statistically calculated as being one in one million; the result of inaccurate figures provided by BNFL; or the product of flawed threshold doses- each of which had been suggested by the *Windscale* documentary several months earlier. (National Archives, (JA 367/53); *Evening News and Star*, 7 September 1984; *Evening Mail*, 7 September 1984; MacGill, *Politics of Anxiety*, p. 45.)

⁹⁴⁶ In his book *Slow Violence*, Robert Nixon has argued that poor and socially ‘peripheral’ communities are often “abandoned to sporadic science at best and usually no science at all.” In this approximation, the local West Cumbrian community, whilst afforded the status of a government inquiry, were left without any definitive or harmonious scientific consensus on which to base their responses. (Nixon, *Slow Violence*, p. 15.)

⁹⁴⁷ S. Couch, ‘Environmental Contamination, Community Transformation and the Centralia Mine Fire’, in J. Mitchell, (ed.), *The Long Road to Recovery: Community Response to Industrial Disaster* (New York: The United Nations University, 1996); Barnes, Baxter, Litva (et al), ‘The Social and Psychological Impact of the Chemical Contamination Incident in Weston Village, UK’, p. 2230; A. Baum, J. Singer, and C. Baum, ‘Stress and the Environment’, *Journal of Social Issues*, 37.0 (1981), pp. 4- 35; D. Unger, A. Wandersman, and W. Hallman, ‘Living Near a Hazardous Waste Facility: Coping with Individual and Family Distress’, *American Journal of Orthopsychiatry*, 62.1 (1992), pp. 55- 70.

responded to this context by forging their own forms of nuclear meaning-making and lay knowledge. This echoes the findings of scholars examining incidents of nuclear contamination in multiple national contexts.⁹⁴⁸ Writing about the disaster at Three Mile Island in the US, historian Natasha Zaretsky has shown that residents became “caught between two contending claims - those of Met Ed executives who insisted that no one had been harmed, and those of nuclear industry critics.”⁹⁴⁹ This section of the chapter will show how, faced with similar claims over competing nuclear knowledge, local residents “attempted to chart a path between these two opposing interpretations”, by constructing their own independent forms of nuclear meaning-making.⁹⁵⁰

Local citizens constructed their own attitudes about the risk posed by Sellafield by leaning upon their own experiences and understandings, aligning these with various social imaginaries. Ultimately, these conclusions can be understood as both the product of their experiences and the contested social conditions in which they were made. This develops the work of environmental geographer Karen Parkhill, who has argued that citizens conceive of risk through their “experiences of living in close proximity to socio-technical and environmental hazards” and STS scholar Brian Wynne, who has argued that “definitions of risk are fundamentally open to social negotiation.”⁹⁵¹ Both Wynne and Parkhill have shown that public definitions of risk are both simultaneously real and constructed as citizens engage with social representations of potential risk factors such as nuclear technologies, alongside their

⁹⁴⁸ See Zaretsky, ‘Atomic Nightmares and Biological Citizens’; O. Kuchinskaya, ‘Articulating the Signs of Danger: Lay Experiences of Post-Chernobyl Radiation Risks and Effects’, *Public Understanding of Science*, 20.3 (2011), pp. 405– 421; T. Davies, ‘A Visual Geography of Chernobyl: Double Exposure’, *International Labour and Working-Class History*, 84.1 (2013), pp. 116- 139.

⁹⁴⁹ Zaretsky, ‘Atomic Nightmares and Biological Citizens’, p. 66.

⁹⁵⁰ *Ibid.*

⁹⁵¹ K. Parkhill, D. Venables, and P. Simmonds, ‘From the Familiar to the Extraordinary: Local Residents’ Perceptions of Risk When Living With Nuclear Power in the UK’, *Transactions of the Institute of British Geographers*, 35.1 (2010), p. 40.

experiences of these technologies themselves.⁹⁵² Put simply, social attitudes towards nuclear technologies are simultaneously the product of the local public's experience of these technologies, and competing cultural representations of them.

Together with Claire Waterton and Eric Grove-White, Brian Wynne has argued that attitudes about environmental risks “[cannot] be divorced from wider social-contextual experiences and judgements.”⁹⁵³ Elsewhere, J. Richard Eiser, Joop van der Plicht and Russell Spears have argued that “the feeling of danger and threat is a subjective judgement based on evidence”, both attained through direct experience and that which is available in the public domain.⁹⁵⁴ This has been examined in greater detail in a study by Judith Petts et al., who found that lay publics rationalise risk by “draw[ing] upon multiple information sources and understanding” such as “personal experience [and] grounded knowledge.” The public construct risk knowledge by marrying their local knowledge and experience with “diverse and divergent arguments” often found within the public arena.⁹⁵⁵ This builds upon psychologist Phil Brown's notion of “popular epistemology,” as “the process by which laypersons gather scientific data and other information” and “direct” and “marshal” this knowledge through social representations of particular risks.⁹⁵⁶ Petts argued that local people used their own experiences and understandings to interpret competing social conceptions of risk from diverse sources such as the media, public institutions, official bodies, and government. This suggests that the public were not “passive absorbers” of media or official information, but rather collected and absorbed

⁹⁵² Wynne, Waterton, and Grove-White, (eds.), *Public Perceptions*, p. 22; Parkhill, Venables, and Simmons, ‘From the Familiar to the Extraordinary’, p. 40.

⁹⁵³ Wynne, Waterton, and Grove-White, (eds.), *Public Perceptions*, p. 52.

⁹⁵⁴ Eiser, van der Plicht, Spears, *Nuclear Neighbourhoods*, p. 169.

⁹⁵⁵ J. Petts, (et al.), *Social Amplification of Risk: The Media and the Public, Contract Research Report 329/2001* (Sudbury: HSE Books, 2001), pp. i, ix-x.

⁹⁵⁶ P. Brown, ‘Popular Epidemiology and Toxic Waste Contamination: Lay and Professional Ways of Knowing,’ *Journal of Health and Social Behaviour*, 33.0 (1992), pp. 267– 81.

social information that aligned with their experiential understandings and existing world-view.⁹⁵⁷ Engaging with this reading, we can see how local people forged attitudes towards Sellafield by aligning their experiential understandings of nuclear technologies with coherent social representations of them, in so doing producing new forms of nuclear meaning-making which were simultaneously produced by, amplified, or attenuated particular nuclear imaginaries. This moves us towards a more nuanced reading of the way in which socio-technical imaginaries of nuclear technologies influence public perception at the localised level, as citizens align their experiences with particular nuclear imaginaries to produce their own lay interpretations and nuclear meaning-making. This also explains how citizens at the localised level, even within a community as small and relatively insular as West Cumbria, can hold a series of complex, layered, and often opposing attitudes towards nuclear technologies.

Local opinion was divided amongst people who believed the excess of cancers was caused by Sellafield, those who refuted these links entirely, and those who engaged with both sides of the debate, simultaneously acknowledging the potential risk posed by the industry but unconvinced by the purported links to cancer. As Brian Wynne and environmental sociologist Sally Macgill have argued, the West Cumbrian public possess a complex set of contradictory and seemingly incoherent attitudes towards Sellafield.⁹⁵⁸ Where these studies have identified the conflicting range of social attitudes, I will attempt to unravel the social processes behind their creation, offering the sociotechnical imaginary as a theoretical device around which to think through the complex, multi-layered, and nuanced nature of public responses to nuclear controversy. Whereas these inconsistencies could be interpreted as an example of lay people's

⁹⁵⁷ Petts, (et al.), *Social Amplification of Risk*, pp. i, ix-x.

⁹⁵⁸ Wynne, Waterton, and Grove-White, *Public Perceptions*, p. 43; MacGill, *Politics of Anxiety*, p. 13; A. Blowers, and P. Leroy, 'Power, Politics and Environmental Inequality: A Theoretical and Empirical Analysis of the Process of 'Peripheralisation'', *Environmental Politics*, 3.2 (1994), p. 205.

lack of expertise and indeed ‘fickleness’ towards nuclear technologies, this chapter argues precisely the opposite; that these apparent inconsistencies are the product of local citizens’ attempts to respond to, and reconcile competing social representations of a potential environmental hazard within their own experiential world-view.⁹⁵⁹ Acknowledging that these responses are the product of fluid, and contested sociotechnical imaginaries more accurately historicises and rationalises the complexity of these positions, recognising that “in the real world people have to reconcile or adapt to living with contradictions which are not necessarily within their control to iron out.”⁹⁶⁰ Acknowledging that these responses were a product of the contested social conditions in which they were made, we can see how local citizens produced their own forms of nuclear knowledge by mediating between competing social representations of nuclear technologies and their own experiences of them. In this regard, the industry’s historical impunity convinced many local people that not only were BNFL hiding the truth from them, but that these incidents were evidence of Sellafield’s major threat to public health.

5.7: Trustworthiness of BNFL.

The following section will argue that many local citizens responded to the controversy through their experiences of being misled by the nuclear industry through the 1957 fire, the recent leaks from buildings ‘B38’ and ‘701’ in 1976, and the pollution of the river Calder in 1977. These memories and past experiences left the local population with little confidence in BNFL’s trustworthiness, foreclosing a dystopian future whereby the present controversy represented a significant threat to public health despite the assurances provided by BNFL. Brian Wynne’s work in this area has found that lay people’s knowledge of nuclear issues is

⁹⁵⁹ Wynne, ‘Misunderstood Misunderstandings’, pp. 299f.

⁹⁶⁰ *Ibid.*

often forged through a set of institutional ‘trust’ relations between the public and official institutions, such as BNFL.⁹⁶¹ Likewise, Xiang Fang’s more recent study of local responses to nuclear power in China argued that people draw upon their “everyday life experiences” when forming opinions about nuclear technologies.⁹⁶² Marrying these two insights, we can see how local citizens responded to the controversy by framing debates about nuclear safety through their historical experiences of being misled by official nuclear institutions, and their lack of trust in BNFL. In this context, Sellafield’s history of high atmospheric and marine contamination, coupled with its chequered legacy of public misinformation formed a major strand of the dystopian nuclear imaginary.

Newspaper reports, oral history interviews, internal industry, and government documentation indicate that many locals believed they were again being misled by BNFL and that Sellafield posed a significant threat to the public. Public distrust therefore formed a key strand of the dystopian imaginary, and was a feature of local newspaper reports and letters from residents, which carried titles like “Halt Flow of Nuclear Waste Immediately”; “BNFL Conceals Truth!” and demanded the industry “stop jeopardizing the lives of the people!”⁹⁶³ Reports criticized BNFL’s “deceptive propaganda” and complained that “their record of keeping the public adequately informed leaves much to be desired.”⁹⁶⁴ Indeed, disillusioned by yet another incident, one writer went so far as to publish an open letter to an anti-nuclear group, imploring them to send him a copy of their application form so he could join.⁹⁶⁵ One article in the *West Cumberland Times and Star* referenced the industry’s legacy of misinformation,

⁹⁶¹ *Ibid.*

⁹⁶² X. Fang, ‘Local People’s Understanding of Risk from Civil Nuclear Power in the Chinese Context’, *Public Understanding of Science*, 23.3 (2014), pp. 283- 294.

⁹⁶³ *West Cumberland Times and Star*, 19 November 1983, p. 12.

⁹⁶⁴ *West Cumberland Times and Star*, 24 December 1983, p. 10.

⁹⁶⁵ *West Cumberland Times and Star*, 26 November 1983, p. 8; *West Cumberland Times and Star*, 5 November 1983, p. 12.

asking “is it surprising that the public are concerned about the health hazards of operations at Windscale and Sellafield?”, whilst another queried “in what other areas is the company working in the dark?”⁹⁶⁶ Here, Greenpeace’s role in uncovering and reporting the beach discharge incident ahead of BNFL contributed to public scepticism, as the incident was viewed as yet another attempt to conceal a public hazard.⁹⁶⁷ This recent incident, coupled with the industry’s historical reticence to communicate truthfully with the local public led many people to believe that this was not an isolated incident, and that high-level contamination incidents had occurred in the past but gone unreported to the local public.

A substantial proportion of the local population viewed the beach incident as evidential proof that the industry regularly conducted illegal and unsafe releases. This was a view shared by senior government officials at the Department of the Environment, who privately admitted that “I do not believe the incident would have come to light without Greenpeace.”⁹⁶⁸ Sellafield’s Senior Press Secretary, Harold Bolter, later admitted that “I got the distinct impression that there had been similar discharges of solvent and crud in the past, but the strong tides and heavy swell of the Irish Sea could normally be relied upon to carry the material away from the shore and disperse it.”⁹⁶⁹ Even Windscale Works Manager, John Donahue, admitted that “I can’t give a 100% guarantee that there hasn’t been such material on the beach

⁹⁶⁶ *West Cumberland Times and Star*, 24 December 1983, p. 10; *West Cumberland Times and Star*, 12 November 1983, p. 12.

⁹⁶⁷ Here, Greenpeace were particularly vocal about the industry’s legacy of misleading the public. During an interview following the screening of the *Windscale*, Director of Greenpeace UK Peter Wilkinson explained that, “I simply don’t believe them, that’s the simple answer. They said that dumping radioactive waste at sea was safe, the international community said that wasn’t the case and it was stopped. They were wrong over the Windscale fire, they said that it created no damage whatsoever- in fact it created over 30 thyroid cancers. They were wrong over the toxicity of plutonium and the fact is that people aren’t daft. People know if you have a cancer inducing agent and you are discharging it into the sea and it’s coming back to the land then it’s going to cause problems.” Peter Wilkinson in ‘Windscale: The Nuclear Laundry’, G. McKee, N. Gray, Yorkshire Television: ITV, 1983.

⁹⁶⁸ National Archives, ‘William Waldegrave to Secretary of State,’ 12 December, 1983, (AT 31/56).

⁹⁶⁹ Bolter, *Inside Sellafield*, p. 100.

previously.”⁹⁷⁰ Greenpeace challenged BNFL to “tell us how often this has happened in the past”, demanding “how many beaches have been contaminated without public knowledge?”⁹⁷¹ Similarly, the local anti-nuclear organization ‘Barrow Action Group’ emphasized their concerns that “similar slicks may have come ashore in the past” and not been reported.⁹⁷²

These concerns were shared by local citizens, who strongly doubted that the release was an isolated incident. One resident explained that “I don’t think it’s the first time it’s happened and that’s what worries me” and that “similar incidents have been covered up.”⁹⁷³ Local woman Dorothy Bateman explained that “we seemed to learn of all the accidents from the TV. They probably didn’t tell us as they would see it as “frightening the natives, I don’t believe anything they say now.”⁹⁷⁴ Another admitted that “it’s happened once and you don’t know when it will happen again- they don’t always tell you.”⁹⁷⁵ This contributed to a popularly held belief that BNFL regularly released unauthorized and unsafe levels of radioactivity, a perception that was repeated throughout the oral interviews. Residents revealed that illegal discharges “would be done at the dead of night” describing how workers were told to “just you know, get on with the job sort-of-thing.”⁹⁷⁶ One man who worked on the sea tanks explained that, “there used to be a saying down there, ‘you can shove a lot of stuff out on a big tide and a black night!’”⁹⁷⁷ Another noted that “this isn’t just due to one incident. Ten years ago, anything to get rid of went out to sea.”⁹⁷⁸ In these examples, we can see how locals interpreted the beach incident through the lens of the industry’s past misdemeanours, constructing their

⁹⁷⁰ *Whitehaven News*, 10 May 1984.

⁹⁷¹ *Daily Telegraph*, 21 November 1983.

⁹⁷² *Daily Star*, 1 December 1983, p. 12.

⁹⁷³ Macgill, *Politics of Anxiety*, pp. 184f.

⁹⁷⁴ McSorely, *Living in the Shadow*, p. 166.

⁹⁷⁵ Macgill, *Politics of Anxiety*, p. 193.

⁹⁷⁶ E. Robson, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 19 March 2010, p. 9.

⁹⁷⁷ D. Head, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 25 January 2010, p. 24.

⁹⁷⁸ Macgill, *Politics of Anxiety*, p. 184.

own forms of nuclear knowledge wherein large quantities of radioactive material were regularly discharged into the ocean and omitted from the official figures.

Responding to these claims, BNFL insisted that the beach release was an isolated incident, and that the radioactivity released “represented no hazard to the public.”⁹⁷⁹ Despite these assertions, many local people rejected BNFL’s claims, constructing their own understandings of the event from first-hand reports of local men who had been on shift during the incident. Whilst BNFL referred to the release of “a small slick of solvent” and “categorically denied” that it posed an environmental hazard to the public, locals pointed to the claims of process workers who explained that the discharge was far greater than official figures suggested. Initial BNFL press releases explained that 500 curies of radioactivity had been released, totalling “just over twice the permitted daily emission rate,” of which, “a significant proportion of the curies were recovered.”⁹⁸⁰ Despite this, workers on shift during the incident explained that the amount of material discharged was 7500 curies, over twenty-times the permitted daily limit, of which none had been recovered.⁹⁸¹ This explanation was accepted by many local people, who referenced the major clean-up operation (depicted in Figs. 15.0 and

⁹⁷⁹ This statement emphasised that “the danger to the public from this isolated incident is extremely small and can be eliminated by the advice that has been given to people on a 10-mile stretch of coast not to use the beaches unnecessarily for the time being or handle objects washed up by the sea.” Then Press Secretary at Sellafield, Harold Bolter later admitted that he took “no pride” in these statements, which were “inaccurate and far too reassuring.” (National Archives, ‘Correspondence between C.E. Henderson and Mr Shaw’, 7 December 1983, (AT 31/56); Bolter, *Inside Sellafield*, pp. 101f.)

⁹⁸⁰ *Sun*, 21 November 1983; Bolter, *Inside Sellafield*, p. 101; National Archives, ‘H. Bolter, to Mr P Chan (Atomic Energy Division, Department of Energy) and officials from BNFL, NII, and Dept of Environment’, 19 November 1983, (AT 31/55); National Archives, ‘Correspondence between C.E. Henderson and Mr Shaw’, 7 December 1983, (AT 31/56).

⁹⁸¹ A worker admitted that “no-one knew what to do with it, so it was pushed down the line out to sea.” This was later confirmed by government officials, who concluded that BNFL’s measurements were inconsistent with the findings of the DoE. (*Sun*, 21 November 1983; *Sun*, 24 November 1983; National Archives, ‘Secretary of State, Meeting with Peter Walker,’ 14 December 1983, (AT 31/59); Bolter, *Inside Sellafield*, p. 101; National Archives, ‘Correspondence between Allan G. Duncan and Secretary of State’, 6 January 1984, (AT 31/59); McSorely, *Living in the Shadow*, p. 62.

16.0) as proof that the radioactivity discharged was not only in excess of official figures, but posed a direct threat to public health.⁹⁸²

Figs. 15.0 and 16.0: (from left to right): <<http://www.lakestay.co.uk/hot.htm>> [accessed 3 April 2020]; 'Sellafield Nuclear Plant', Alamy Image, ref: G45X5K.



Writing in the *West Cumberland Times and Star*, one resident expressed that “any credibility BNFL might have once had has been blown sky-high with men and boats contaminated, and beaches closed. If, as BNFL have said, there is no danger, then why close the beach?”⁹⁸³ Another explained that “I don’t know what they shove out, but it must be too high or people wouldn’t be going on about it.”⁹⁸⁴ In this way, the decontamination procedures and the closing of the beach further embedded the dystopian imaginary, providing a visual symbol of nuclear power’s dystopian environmental and radiobiological consequences. Drawing upon Rosanna Farbøl’s argument that Danish ruin towns “embedded a sociotechnical imaginary that emphasised resilience, survival and regeneration,” we can see how the visual symbolism of the clean-up operation, coupled with the physical closure of local beaches

⁹⁸² *Sun*, 21 November 1983; Bolter, *Inside Sellafield*, p. 101; National Archives, ‘H. Bolter, to Mr P Chan (Atomic Energy Division, Department of Energy) and officials from BNFL, NII, and Dept of Environment’, 19 November 1983, (AT 31/55).

⁹⁸³ *West Cumberland Times and Star*, 26 November 1983, p. 8.

⁹⁸⁴ Macgill, *Politics of Anxiety*, p. 181.

simultaneously emphasised BNFL's duplicity, the environmental threat posed by nuclear contamination, and the wider links to public health, at once consolidating and embedding these strands of the dystopian imaginary.⁹⁸⁵

Expressing a marked disregard for BNFL's assurances, local citizens attached more credibility to information provided by trusted local individuals, as BNFL's claims of a minor incident were at odds with evidence provided within the community and their experiences of beach closure and official decontamination procedures. Exploring responses to Torrey Canyon, historians Anna Green and Tim Cooper have argued that environmental disasters increase locals' inclusivity and dependency on local, 'insider' social networks.⁹⁸⁶ In this context, citizens derived their understandings from their experiences of being misled by the industry and testimony from trusted social actors such as local neighbours and increasingly, the environmental group Greenpeace, who had first made them aware of the beach incident. This attests to a wider cultural shift, whereby local people increasingly engaged with the dystopian nuclear imaginaries propagated by Greenpeace and recognized the important role they played in regulating a hazardous and otherwise unscrupulous industry.

Whilst local attitudes towards Greenpeace were understandably mixed, with some resenting their efforts as little more than "dangerous publicity stunts" which had a negative effect on the public perception of the area, locals increasingly acknowledged the important role they played in regulating the nuclear industry and restricting the amount of radioactivity discharged by BNFL.⁹⁸⁷ The local public chose to support the activities of Greenpeace,

⁹⁸⁵ R. Farbøl, 'Ruins of Resilience', p. 22f.

⁹⁸⁶ Green, 'Community and Exclusion', pp. 899- 909; Cooper, and Green, 'The Torrey Canyon Disaster', pp. 101- 126.

⁹⁸⁷ C. McCourt, 'Sellafield Stories: Oral History Project', interviewed by J. Lister, 17 September 2010, p. 15.

constructing an imagined future whereby their involvement (however meddlesome or inconvenient) was more desirable than the dystopian consequences of allowing BNFL to operate unregulated. Numerous interviewees conveyed their (sometimes begrudging) admiration for Greenpeace, admitting that “while we may not agree with tactics... if that’s caused things to be modified and procedures put in place then... well and good.”⁹⁸⁸ Residents commented that “Greenpeace has opened the eyes of people round here”, with one man admitting, “I had a sneaking admiration for people like Greenpeace. They had balls.”⁹⁸⁹ Others expressed their respect for the group, recognising that “what they did to us in 1983 was a wake-up call, it was undoubtedly the right thing to do.”⁹⁹⁰ A local farmer explained that he felt reassured with Greenpeace monitoring BNFL. He explained that “there you’ve got a lot of people are watching them, which is a good thing.”⁹⁹¹ Local support for Greenpeace was acknowledged by a senior BNFL official, who later admitted that “the public was becoming increasingly dissatisfied” with BNFL’s management of the plant, and “by maintaining a high profile for its direct action while attacking the inadequacy of government controls, Greenpeace came to be regarded as the true regular of Sellafield by many people, even in Cumbria.”⁹⁹² This reflects a significant social change whereby Greenpeace became the regulatory actor so that society could ‘trust’ BNFL.⁹⁹³ The significance of this fundamental shift lay in the legitimisation of Greenpeace in a “public interest watchdog role over the nuclear industry”, as local citizens increasingly saw BNFL as a threat to public health and their wellbeing.⁹⁹⁴

⁹⁸⁸ *Guardian*, 23 November 1983; M. Kipling, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 7 January 2010, p. 20.

⁹⁸⁹ E. Robson, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 19 March 2010, p. 15.

⁹⁹⁰ N. Garbutt, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 22 March 2010, p. 18; See also Macgill, *Politics of Anxiety*, p. 189.

⁹⁹¹ Wynne, Waterton, and Grove-White, *Public Perceptions*, p. 34.

⁹⁹² Bolter, *Inside Sellafield*, p.185.

⁹⁹³ Wynne, Waterton, and Grove-White, *Public Perceptions*, p. 34.

⁹⁹⁴ *Ibid.*

Analysing this shift from a sociological perspective, we can see that this represents a “fundamentally different model of society compared to that assumed in orthodox accounts of risk regulation.”⁹⁹⁵ Within traditional societal models, the centres of authority are assumed to be government departments such as the Departments for the Environment and Energy, or formal institutions such as the Ministry for Agriculture, Fisheries and Foods or the National Radiological Protection Board.⁹⁹⁶ Here, we see these relationships break down and the place of government replaced by informal groups such as Greenpeace who assumed the regulatory role in the eyes of the public, delineating a wider lack of public trust in BNFL and the government’s ability to ensure public safety. Residents explained that “among the general public there’s been a lack of confidence, not only in BNFL, but in DoE and NRPB [as well].”⁹⁹⁷ Others claimed, “I trust Greenpeace more than anybody else – if it was there they’d say so. There’s too many backhanders to sweep the truth under the carpet.”⁹⁹⁸ This was a common perception, as locals explained that “I don’t trust the NRPB as watchdogs... Greenpeace are better”, whilst others stated “Greenpeace do a good job... I’d sooner listen to their view than BNFL.”⁹⁹⁹ Here, local citizens produced independent accounts of risk regulation, drawing upon their experiences of being misled by the nuclear industry and their lack of trust in official government institutions to emphasise Greenpeace’s vital role in regulating the nuclear industry and assuring public safety.

However, a significant body of local opinion looked to external groups such as Greenpeace and the national media with distain, rejecting the purported links between nuclear power and cancer as the product of media embellishment and scare-mongering. Whilst a cohort

⁹⁹⁵ *Ibid.*

⁹⁹⁶ *Ibid.*

⁹⁹⁷ Macgill, *Politics of Anxiety*, p. 187.

⁹⁹⁸ *Ibid.*, p. 190.

⁹⁹⁹ *Ibid.*, pp. 184f.

of locals celebrated Greenpeace's role in holding BNFL accountable and regulating its activities, numerous citizens argued that they had provided an unwelcome level of national media coverage, which had sensationalised the controversy.¹⁰⁰⁰ This echoes the findings of environmental geographers Jamie Baxter and Daniel Lee, who observed that residents living near a hazardous facility viewed outsiders' negative views of the facility and the town as a greater threat than the facility itself.¹⁰⁰¹ The tone and content of national media reports was a particular source of frustration for local people, who argued that the media was largely culpable for the levels of uncertainty within the region and criticized its role in generating public anxiety.¹⁰⁰² Citizens resisted the dystopian imaginaries cultivated by national media outlets, explaining that "it was like being 'the village of the damned'" and emphasising the negative social effects this had wrought upon the local population.¹⁰⁰³ Interviewees recalled that "people in the village felt very resentful of the media for trying to blame this cluster on Sellafield because there was no doubt that people were trying to find something to fling on to Sellafield."¹⁰⁰⁴ They explained that "the national press was being awful" and going round looking for dramatic stories that would tarnish the plant's reputation.¹⁰⁰⁵ One resident complained that "most people know someone who has been approached for comments only to find later that what they've said has been doctored enough to be interpreted in a different way."¹⁰⁰⁶ Another woman recounted being interviewed by a reporter from the *Guardian* who turned her words into a polemic against Sellafield. Where she had emphasised that her three children were healthy and stressed her desire to see more scientific studies of local cancers, he

¹⁰⁰⁰ MacGill, *Politics of Anxiety*, p. 22.

¹⁰⁰¹ J. Baxter, and D. Lee, 'Understanding Expressed Low Concern and Latent Concern Near a Hazardous Waste Treatment Facility', *Journal of Risk Research*, 7.7-8 (2004), p. 725.

¹⁰⁰² MacGill, *Politics of Anxiety*, p. 22.

¹⁰⁰³ Rushworth, *Atom Kids*, p. 270.

¹⁰⁰⁴ J. Hall, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 27 May 2010, p. 25.

¹⁰⁰⁵ R. Stafford, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 8 July 2010, p. 28.

¹⁰⁰⁶ Macgill, *Politics of Anxiety*, p. 194.

had written down that her husband had suffered from a radiation overdose and that she was anxious for future generations.¹⁰⁰⁷ This typifies the type of media reporting which caused resentment amongst locals who resisted dystopian nuclear imaginaries as the product of distortion and exaggeration by the national media.

Local newspaper articles published letters from local people with titles such as ‘Beware Sensationalism’, with local commentators complaining about the effects of press speculation upon public opinion, arguing that these reports “are biased towards panic of the public, or sensational journalism.”¹⁰⁰⁸ A similar article diagnosed a case of “Sellafield syndrome”, arguing that the effects of the national media had produced a sustained case of “nuclear neurosis” amongst the public, whereby “everything from cancer to the inability of some children to read well is being blamed on Windscale.”¹⁰⁰⁹ The medical and psychological language mobilised here reflects local opinion that locals were the victims of a form of mass hysteria and moral panic, devoid of substance and exacerbated by the national media. Residents explained that there was nothing to fear from Sellafield, bitterly recalling that “it was all sensationalised by the bloody media.”¹⁰¹⁰ In this context, sections of the local population displayed a marked lack of engagement with the controversy, constructing their own forms of nuclear knowledge which refuted the links between Sellafield and cancer cases as little more than media sensationalism.

In many cases, citizens exhibited an awareness and identification with both sides of the debate, holding seemingly incoherent attitudes towards Sellafield as both a potential

¹⁰⁰⁷ J. Hall, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 1 June 2010, p. 28.

¹⁰⁰⁸ *West Cumberland Times and Star*, 19 November 1988, p. 12.

¹⁰⁰⁹ *Evening News and Star*, 29 November 1983.

¹⁰¹⁰ P. Gordon-Duff-Pennington, ‘Sellafield Stories: Oral History Project’, interviewed by J. Lister, 21 January 2011, p. 16.

radiobiological risk, whilst rejecting the causal links between the plant and the cancer excess.¹⁰¹¹ In this context, local people performed their own understanding of radiation debates, mobilising their knowledge and experience of the local environment to produce an array of alternative explanations for the cancer excess. Some expressed alternative environmental risk factors, such as chemical and sewage discharge; others explained that whilst they did not believe local cancers were radiation induced, they refused or felt unable to dismiss the links entirely. Here, citizens responded to competing imagined nuclear futures by drawing upon their experiences and understandings of local health patterns, changes and continuities in the local environment, and alternative risk factors to produce their own forms of nuclear meaning-making.

A feature of local responses was the number of people who held independent hypotheses about the cancer cases, as citizens drew upon their own experiences and understandings to make sense of the controversy. Some identified the number of old people in the surrounding area as proof that the plant was not dangerous, answering questions about the plant's safety by explaining that "there are a lot of old people in Bootle."¹⁰¹² Others used the apparent lack of cancer in their family to refute the purported links between Sellafield and cancer, explaining that if a link existed they would either have developed cancer themselves or known someone who had. One resident explained, "I know of no-one who has cancer", whilst others responded directly to the claims of the *Windscale* documentary, stating that "I don't know of one case of cancer in my generation or amongst my school friends" and "all my school friends are ok."¹⁰¹³ In some cases, they mobilised experiences of the 1957 fire to validate their

¹⁰¹¹ Brian Wynne has argued that confusion, ambivalence, and inconsistencies in structures of understanding often "coexist in the same persons and communities", producing multiple, "not necessarily coherent" attitudes amongst social groups. (Wynne, 'Misunderstood Misunderstandings,' p. 299)

¹⁰¹² Macgill, *Politics of Anxiety*, p. 181.

¹⁰¹³ *Ibid.*, pp. 181- 184.

attitudes, explaining that they had not seen any ill effects of the incident amongst their own family. Two women both referenced the good health of their husbands as proof of the industry's safety, explaining that "my husband was a baby in a pram actually out on it in '57 and he's okay" and "my husband's mother was pregnant with him during the '57 fire and he's grown up to be healthy so I don't worry."¹⁰¹⁴ For these women, the lack (or latency) of any radiobiological symptoms from this event legitimated their belief that the present controversy did not represent a threat to public health. Of note, however, is that one of these women caveated her beliefs, explaining that "perhaps if you ever did develop cancer you would turn and look at BNFL."¹⁰¹⁵ This admission betrays the latent and lurking fear amongst many people that Sellafield had the capacity to induce health problems in the future, and that any articulation of the plant's safety had to be framed by the acknowledgement that cancer links could not be fully repudiated.

The temerity of local people to draw permanent conclusions indicates some level of lingering concern amongst local people, or at the very least an ongoing recognition that the plant *could* be an environmental risk and public health hazard.¹⁰¹⁶ For many, the number of unusual health defects observed amongst the population provided some measure of circumstantial evidence that linked the plant with the region's poor pattern of public health. In her study of Belarusian responses to Chernobyl, Olga Kuchinskaya observed that lay people often inferred risk by drawing potential links between unexplained health defects and an

¹⁰¹⁴ *Ibid.*, pp. 181, 188.

¹⁰¹⁵ *Ibid.*, p. 188.

¹⁰¹⁶ This was observed in the number of people who caveated their personal beliefs by emphasising their lack of expertise on the matter. Locals were often at pains to stress the contingent nature of their conclusions, foregrounding some level of scepticism and a reluctance to offer a finite opinion on the debate by admitting "I'm not a scientist": "I'm not a medical expert": "I don't know whether it's true or not." (P. McLean, 'Sellafield Stories: Oral History Project', interviewed by J. Lister, 11 February 2010, p. 10; D. Wooley, 'Sellafield Stories: Oral History Project', interviewed by J. Lister, 6 August 2010, p. 26; P. Gordon-Duff-Pennington, 'Sellafield Stories: Oral History Project', interviewed by J. Lister, 21 January 2011, p. 22.)

environmental hazard (in this case, Chernobyl). She explained that “collecting anecdotal data and observing the prevalence and character of particular health problems serve[d] as the foundation for articulating radiation health effects.”¹⁰¹⁷ This also echoes Karen Parkhill’s study of community responses to the Bradwell nuclear plant in Essex, where she found that “any illness whose cause could not be immediately identified was also a source of [public] unease” for residents concerned about the nuclear industry’s potentially harmful effects upon public health.¹⁰¹⁸ Similar patterns were observed in West Cumbria, where local citizens drew links between Sellafield and the number of peculiar viruses common to the local area.

Residents explained that the local area endured a poor record of public health, with citizens regularly suffering from a number of peculiar illnesses and viruses. A local nurse explained that “here we get the same silly virus every couple of months... I think it affects the cerebral fluid from the shoulders down... that puzzles me.”¹⁰¹⁹ Referencing the alleged links to the plant, locals observed that “there are things in this area that do seem to be a lot higher than other areas. It obviously does....you just think, well is it to do with that?”¹⁰²⁰ For many, the current controversies framed these health phenomena and placed them in a new light. One resident explained that “we do get an awful lot of viruses around here [...] I used to think that there was nothing to worry about but now I do.”¹⁰²¹ Another local asked the damning question, “why are there so many people with odd cancers around here?”¹⁰²² These observations, whilst not proof of the industry’s effect on public health, allude to a delicate and ever-present concern amongst the local public that the plant may be in some way linked to the strange health defects

¹⁰¹⁷ Kuchinskaya, ‘Articulating the Signs of Danger’, p. 417.

¹⁰¹⁸ Parkhill, Venables, and Simmons, ‘From the Familiar to the Extraordinary’, p. 51.

¹⁰¹⁹ Macgill, *Politics of Anxiety*, p. 183.

¹⁰²⁰ Wynne, Waterton, and Grove-White, *Public Perceptions*, p. 33.

¹⁰²¹ Macgill, *Politics of Anxiety*, p. 187.

¹⁰²² *Ibid.*, p. 196.

experienced by the population. These examples also speak to the significance of individual experience in shaping people's attitudes, revealing how local citizens relied upon their experiences of the world around them, constructing their own forms of nuclear knowledge by evaluating these experiences within the context of competing social imaginaries.

The role of experience in the production of nuclear knowledge is particularly evident in the myriad of explanations offered by the local population for the cancer excesses. Whilst local residents often acknowledged the potential environmental risk posed by the nuclear industry, they frequently emphasised alternative risk factors to account for the local cancer statistics. Geoffrey Barnes' study of a chemical contamination incident in the Cheshire village of Weston in 2000 found that incidents of one type of pollution often lead to people engaging with other, similar types of hazard. Barnes explained that residents exposed to chemical contaminants became "more conscious of other pollution incidents" in the surrounding area.¹⁰²³ A similar process can be observed in West Cumbria, where citizens used their experiential knowledge of the local environment to subsume the threat of radioactive discharge within a wider history of marine pollution from industrial processes. One suggestion was that the cancer figures were unrelated to Sellafield and the product of marine discharges by the local chemical plant, Marchon. When questioned about the environmental effects of Sellafield, a former local diver expressed his belief that "Marchon probably did more harm."¹⁰²⁴ His experiences diving off the Cumbrian coast led him to believe that the chemical industry represented a greater environmental hazard. In this belief he interpreted the absence of marine and aquatic life in the vicinity of the Marchon works as proof of the chemical industry's environmental threat. He explained, "I've dived off the Marchon site and the rocks were barren- there was nothing... I

¹⁰²³ Barnes, Baxter, Litva (et al), 'The Social and Psychological Impact of the Chemical Contamination Incident in Weston Village, UK', pp. 2227- 2241.

¹⁰²⁴ P. McLean, 'Sellafield Stories: Oral History Project', interviewed by J. Lister, 11 February 2010, p. 13.

put that down to whatever they were discharging, chemical-wise [...] Whereas off the Sellafield site there is plenty of stuff growing on the pipe, all the way out and on the end of the pipe [...] there's plenty of fish life and sea life out there."¹⁰²⁵ Other residents expressed similar attitudes, explaining that "Marchon was a big public hazard", whilst another commented "Marchon put an awful lot of stuff into the sea [and] killed an awful lot of seaweed... I wouldn't ever totally trust Marchon either."¹⁰²⁶ Another interviewee explained that she would not eat local fish or swim in the sea, not because of the nuclear industry, but because of the chemical works.¹⁰²⁷ Experiential knowledge of the chemical industry and marine eco-system produced a locally specific belief that the environmental risk posed by the chemical industry represented a far greater hazard to public health than Sellafield. One resident articulated his view that "I'm sure the chemical industry as a whole causes more ill health and deaths than Sellafield, but no-one seems to worry about that."¹⁰²⁸ His view was that radioactive material was not particularly exceptional or dangerous, in marked juxtaposition to the dystopian imaginary. Others were defensive of Sellafield, complaining that "maybe more questions should be asked as to what chemical factories discharge", arguing that "we don't know what other companies around the world are putting into the sea."¹⁰²⁹ These both carry a subtle recognition that Sellafield carries with it a degree of environmental risk, yet interestingly frames this risk within the context of other risks deemed more threatening. This has similarities with the work of STS historian Davide Orsini, who has argued that everyday people produce locally specific knowledge about radiation by interpreting changes or continuities in their own environment.

¹⁰²⁵ *Ibid.*, p. 10.

¹⁰²⁶ M. Kipling, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 7 January 2010, pp. 29, 32; E. Greenslade, 'Sellafield Stories: Oral History Project', interviewed by G. Wilkinson, 27 January 2010, p. 23.

¹⁰²⁷ M. Kipling, 'Sellafield Stories: Oral History Project', interviewed by C. McCourt, 7 January 2010, p. 29.

¹⁰²⁸ Macgill, *Politics of Anxiety*, p. 192.

¹⁰²⁹ *Ibid.*, p. 193.

Orsini has shown that public attitudes are not simply random or the product of conspiracy theories, but rather local residents “formulated hypotheses about the presence or absence or radio-contamination on the basis of evidence they gained through daily observations [and interactions with] the surrounding environment...”¹⁰³⁰ He explains that local residents “interpreted material changes and continuities” in the local environment and drew conclusions on the basis of their own understanding.¹⁰³¹ Lacking credible explanations for the cancer excesses or clear expert interpretations of nuclear risk, local residents constructed their own forms of nuclear knowledge, inferring radiobiological risk “by observing their surroundings to see whether radiation effects, as imagined through abstractions of its achievable consequences, were or were not evident.”¹⁰³² In this way, citizens responded to the lack of information available to them by constructing ideas and understandings that made sense to them and could be superimposed upon existing patterns of experience and understanding. In this instance, taking the presence and abundance of marine life at the end of the Sellafield discharge pipeline as evidence of its environmental safety; contrasting this with the barren and infertile conditions near the Marchon chemical plant, to infer the relative environmental risk from the chemical works was therefore much greater than from Sellafield and consequently, more likely to be responsible for local cancers.

Whilst the environmental observations of local citizens like Peter McLean led him to believe that Sellafield was safe, other residents like local fisherman David Todd, found environmental signs that the plant was responsible for changes in the local eco-system, inferring the presence of radiobiological risk to the public from these observations. David

¹⁰³⁰ D. Orsini, ‘Signs of Risk: Materiality, History, and Meaning in Cold War Controversies over Nuclear Contamination,’ *Comparative Studies in Society and History*, 62.3 (2020), p. 536.

¹⁰³¹ *Ibid.*

¹⁰³² *Ibid.*

recalled his experiences of catching local fish with severe deformities. He explained that “many local people have seen fish which have got abnormalities on the surface [and] wort-like growths over their bodies... the fishermen have a name for them, ‘Windscale fish’, and throw them straight back into the water.” He explained, “I’m not a fish expert, but if these marks had happened on a human being I’d be suspecting that this person had a form of skin cancer.”¹⁰³³ Fishermen like David drew upon their observations and understandings of environmental patterns to infer environmental and radiobiological risk, as the presence of deformed and mutated fish served as an indicator of the plant’s threat to the environment and public health. Similar observations were made by local bird-watchers, who noted the declining local population of nesting gulls as indicative of the area’s dangerous levels of radiation. Locals noted that the number of Oystercatchers, Ringed Plover, Shelduck, and Red-Breasted Mergansers had declined over the past decade, with the numbers of Nesting Gulls shrinking alarmingly. Whereas, in 1975 the number of nesting gulls was estimated at 12,000, local enthusiasts and ornithologists noted that, by 1981 numbers were down to 2213. In his study of gull population in Ravenglass, Neil Anderson writes that “concern about these declines was expressed in the local and national press, mainly because of the possible link with radionuclide pollution from Sellafield.”¹⁰³⁴ Furthermore, in 1985, the birds, famous for returning to their birthplace for annual breeding, took flight and never returned to the area again. Locals attributed this to “excessive radiation in the birds’ food and their general environment.”¹⁰³⁵ Indeed, writing in 1992, author Douglas Botting observed that “in 1985 the birds decided that the level of radioactive pollution from nearby Sellafield had reached unacceptable levels, and

¹⁰³³ McSorely, *Living in the Shadow*, p. 180.

¹⁰³⁴ N. Anderson, ‘Investigations into the Causes of the Decline of the Black-Headed Gull (*Larus Ridibundus*) Colony at Ravenglass, Cumbria’, PhD Thesis, University of Durham, 1990 <<http://etheses.dur.ac.uk/6218/>> [accessed 2 November 2020], p. 3.

¹⁰³⁵ M. Wildart, ‘Disappearing Trick: Birds and Nuclear Waste’, accessed at <<https://mariannewildart.wordpress.com/2015/12/29/disappearing-trick-birds-and-nuclear-waste/>> [accessed 26 August 2019].

the huge colony of black-headed gull and the four species of breeding tern all departed.”¹⁰³⁶ Further proof came from one local enthusiast, who decided to test this hypothesis and examined eggs taken from local nesting areas, finding severe genetic deformities which were consistent with excess exposure to radiation.¹⁰³⁷ These environmental signs were taken locally as evidence of nuclear contamination, as residents leaned upon their own experiences and lay interpretations of radiation effects and changes in the local environment to infer the radiobiological risk posed by Sellafield not only to local eco-systems, but also to the local public.

Meanwhile, other residents drew contrasting conclusions, refuting the risk posed by the plant by interpreting continuities in the local environment as proof of the relative absence of risk. One resident explained his belief that Sellafield carried no discernible risk by pointing to the health of the local trees and fauna. He contended that “we have lichen on the trees, that to me is a sign of clean air.”¹⁰³⁸ Others pointed to the lack of visual threat in the local environment, explaining that “it’s still far healthier than a smoky city- I’d prefer to bring children up here than there.”¹⁰³⁹ Another resident explained that the relative risk of living near Sellafield was far lower than living in an industrial area. He compared the “fresh air here [with] the industrial areas like Runcorn where the smell is terrible, even with the windows shut.”¹⁰⁴⁰ Here, residents inferred the lack of environmental risk from Sellafield by juxtaposing the thick, acrid nature of urban pollution with the lack of visual environmental evidence for radioactive pollutants.¹⁰⁴¹

¹⁰³⁶ D. Botting, *Wild Britain: A Traveller's and Naturalist's Handbook* (London: Ebury Press, 1992), pp. 87f.

¹⁰³⁷ McSorely, *Living in the Shadow*, p. 105.

¹⁰³⁸ Macgill, *Politics of Anxiety*, p. 183.

¹⁰³⁹ *Ibid.*, 182.

¹⁰⁴⁰ *Ibid.*, p. 192.

¹⁰⁴¹ For further reading on the invisibility of radiation and its psychosocial effects, see Kuchinskaya, ‘Articulating the Signs of Danger’; Davies, ‘A Visual Geography of Chernobyl’; Zaretsky, ‘Atomic Nightmares’; G. Hecht, ‘The Work of Invisibility: Radiation Hazards and Occupational Health in South African Uranium Production’, *International Labor and Working-Class History*, 81.0 (2012), pp. 94– 113.

This recognised that, whilst the plant may carry some degree of risk, this threat was minimal compared to other environmental hazards; an attitude epitomised by one resident who responded to a question about Sellafield's safety, stating that "there's a risk in anything- it's the degree of risk that needs to be assessed."¹⁰⁴² This engagement with alternative environmental risk factors which could account for the excess cancers was a persistent feature of local attitudes, as citizens emphasised a number of other plausible explanations.

Local people produced an array of interpretations which variously attributed the cancers to the chemical industry, an existing local precedent dating back to the 1900s, and the local sewage system. Indeed, one resident acknowledged that it was almost impossible to know what to believe, owing to the number of different opinions.¹⁰⁴³ Many older residents refuted that the cancers had anything to do with the plant at all, emphasising the region's historically above-average incidence of cancers. People explained that the region had suffered from a higher-than-average number of cancer cases since the beginning of the Twentieth Century, describing that "the leukaemia business goes back as far as 1911 in this area!"¹⁰⁴⁴ Others pointed to similar clusters elsewhere in Britain, in both the North-East and Milton Keynes.¹⁰⁴⁵ One man added that "I think there was a similar cluster around Teesside- and that ain't nuclear!"¹⁰⁴⁶ Citizens made sense of the current controversy by mobilising their experiential knowledge and memories of the area before the plant was constructed, concluding that the modern cancer

¹⁰⁴² *Ibid.*, p. 188.

¹⁰⁴³ He explained that "there were all sorts of things flying round about that at the time", as local people offered a myriad of interpretations. (P. McLean, 'Sellafield Stories: Oral History Project', interviewed by J. Lister, 11 February 2010, p. 28.)

¹⁰⁴⁴ P. Gordon-Duff-Pennington, 'Sellafield Stories: Oral History Project', interviewed by J. Lister, 21 January 2011, p. 22.

¹⁰⁴⁵ Rushworth, *Atom Kids*, p. 272.

¹⁰⁴⁶ *Ibid.*, p. 271.

clusters had a historical precedent which pre-dated the nuclear industry, and therefore the excess cancers must be unrelated to Sellafield.

Adopting a similar line, others attributed the cancer cases to the historical practice of marine sewage discharge. One resident explained that “someone put out a report not long ago which said it could be due to the sewage system. The pipes are made of asbestos so it could be to do with the effluent pumped out. I don’t believe it’s radiation, so I’d like to believe in other causes.”¹⁰⁴⁷ Others explained that long-before Sellafield began operating “there used to be a thing called Seascale bug” explaining that “the kids would all get this sickness and diarrhoea” after playing on the beach. The cancer cases became seen as an extension of this pre-existing phenomenon, as the historical role of the sea in making people ill formalised local attitudes that “I reckon it [the cancer cluster] was from the beach” as residents understood that the cancers were the result of “some disease vector in the poorly managed wastewater system.”¹⁰⁴⁸ These examples attest to the way in which the local population responded to the content of competing nuclear imaginaries by leaning upon their experiences and understandings of the local environment, constructing their own subversive strands of knowledge which simultaneously drew upon, amplified, or attenuated imaginaries of nuclear safety, and environmental and radiobiological hazard.

Conclusion.

Using sociotechnical imaginaries as a frame for analysis, this chapter has pointed to the significance of both documentary film and the beach contamination incident from 1983 in

¹⁰⁴⁷ Macgill, *Politics of Anxiety*, p. 187.

¹⁰⁴⁸ Rushworth, *Atom Kids*, p. 271; J. Hall, ‘Sellafield Stories: Oral History Project’, interviewed by C. McCourt, 27 May 2010, p. 28.

shaping public attitudes towards nuclear technologies, but also of the role that Sellafield (and the surrounding community) played as a product and producer of nuclear culture. I have shown how events at Sellafield contributed to a broader current of anti-nuclear culture during the early years of the 1980s, exploring how the imaginary of nuclear utopianism was challenged and subverted at the national level, as resistant groups within the media, the public, and the environmental movement forged dystopian nuclear imaginaries of environmental and radiobiological hazard and embedded these within British nuclear culture. Furthermore, this chapter has also examined responses to this process at the localized level, arguing that the friction between these competing imaginaries produced a set of social conditions which dislocated the local public between competing claims over nuclear knowledge. Here, we see the emergence of multiple imaginaries upon multiple scales. This reveals the inherent mobility of the STIM life-cycle model, echoing recent suggestions that these phases might be more accurately thought of as ‘processes’, which may develop chronologically or simultaneously.¹⁰⁴⁹ The emergence of multiple nuclear imaginaries also suggests that the concept of the socio-technical imaginary may be better thought of in the plural; particularly with regard to nuclear STIMs, echoing the claims of nuclear historians such as Jeff Hughes who have called for a more thorough investigation of the plurality of British experiences to the nuclear condition.¹⁰⁵⁰ STIM offers a useful conceptual framework to historicise the spectrum of British experiences of nuclearisation, showing how citizens responded to nuclear imaginaries by relying upon their own experiential understandings of the nuclear industry and radiation, alongside their innate knowledge of the local environment. This leads us towards an understanding of local people as

¹⁰⁴⁹ M. Cronqvist, R. Farbøl, and C. Sylvest, ‘New Directions in Civil Defence History: A Framework for Analysis’, in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*, p. 4.

¹⁰⁵⁰ J. Hughes, ‘What is Nuclear Culture? Understanding Uranium 235’, *British Society for the History of Science*, 45.4 (2012), pp. 495- 518.

agents of social change, who produced their own forms of locally specific nuclear knowledge which simultaneously drew upon, amplified, or attenuated particular nuclear imaginaries.

6: Conclusions.

Reflecting upon Sellafield's position within everyday life in West Cumbria, former teacher Isobel George explained that, "well, you don't think about it really... if it weren't here, well I'm not sure if the area would have survived. It's part of who we are now. On the one hand it's been a great provider of jobs and money for people, but you know, you've got this outstandingly beautiful part of the world and then this whacking great nuclear power plant in the middle of it- it's part of the scenery... although I'd really rather it wasn't."¹⁰⁵¹ This interpretation neatly surmises the nuanced and complicated position that Sellafield holds within everyday social life in West Cumbria, as both a powerful institution which has brought positive changes to the local area, and a domineering material and social structure which has fundamentally altered the local landscape, patterns of local life, regional identity, and the rural character of the region. Tracing the evolution of socio-cultural attitudes towards nuclear technologies between 1945 and 1992, this project poses several interesting questions for localised studies of nuclear culture, particularly those pertaining to individual sites. This asks fundamental questions about how specific sites reflect, produce, and alter the public's attitudes towards nuclear technologies; the geographic scope of these effects; and how these attitudes fed back into and shaped wider regional and national responses.

Using Sellafield as a case study, this project has pointed to the role of material sites as an arbiter of nuclear culture- a physical, social, and cultural structure which is capable of reflecting, shaping, and being shaped by (in short, co-producing) public attitudes towards nuclear technologies. This is particularly true in the localised context where these sites interact

¹⁰⁵¹ Author's interview with Isobel George, 6 March 2019.

with and colour the everyday life of local people, whose experiences and interactions with the site help shape their attitudes towards nuclear technologies.

Sellafield also played a fundamental role in shaping social responses to nuclear technologies at both the local and national scale, as representations of the plant helped structure and embed particular imagined nuclear futures within society, whilst in other cases, they helped new resistant imaginaries originate and become embedded into everyday life. Sitting across methodological approaches within the field of nuclear culture and the STS concept of STIM, this echoes recent work which has called for a more thorough appreciation of the localised variants of nuclear *cultures*, and how these contexts informed national responses to nuclear technologies.¹⁰⁵² This points to the dynamic interplay between the local and national contexts in the production of nuclear culture, as the imagined visions of state were understood, resisted, and extended in rural contexts where the physical and social infrastructure of the nuclear industry was mainly located. It also dovetails with the findings of an upcoming edited collection which considers the role of sociotechnical imaginaries in structuring responses to civil defence in Western Europe, alongside a wider trend of STS literature which showcases the presence and agency of sociotechnical imaginaries within everyday life.¹⁰⁵³

¹⁰⁵² See, Laucht, and Johnes, 'Resist and Survive: Welsh Protests', pp. 226-245; Wall, 'Nuclear Prospects', pp. 246- 273; Atashroo, 'Weaponising Peace', pp. 170- 186; Hughes, 'What is British Nuclear Culture?', pp. 495- 518.

¹⁰⁵³ See, Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*; Kalmbach, Marklund, and Åberg, 'Crisis and Technological Futures', pp. 272- 281; Schiølin, 'Revolutionary Dreams', pp. 542- 566; Lawless, 'Assembling Airspace', pp. 680- 704; Smallman, "Nothing to do with the Science", pp. 589- 608; Levidow, and Raman, 'Sociotechnical Imaginaries of Low-Carbon Waste-Energy Futures', pp. 609- 641; Sovacool, (et al.), 'Imagining Sustainable Energy and Mobility Transitions', pp. 642- 679; Lawrence, 'Heralds of Global Transparency', pp. 508- 541; Robinson, 'Scientific Imaginaries and Science Diplomacy', pp. 1- 21; Orsini, 'Signs of Risk', pp. 520- 550; Sismondo, 'Sociotechnical Imaginaries: An Accidental Themed Issue', pp. 505ff.

Exploring the case study of Sellafield, this thesis has shown that specific nuclear sites became “enmeshed in performing and producing diverse visions of the collective good”, embedding, institutionally stabilising, and publicly performing specific nuclear futures.¹⁰⁵⁴ It has also demonstrated that ordinary people exercised a degree of agency over the embeddedness of these futures. Jonathan Hogg has argued that nuclear imaginaries were “strengthened and made durable once [they] became intertwined with localised contexts [...] and individuals working within them.”¹⁰⁵⁵ Developing this claim, this project has demonstrated that local contexts and individuals also possess the power to disrupt and challenge these imaginaries, embedding their own resistant imaginaries which simultaneously espoused an alternative imagined future to the one propagated by the state. This demonstrates the centrality of ordinary people, localised contexts, and rural ‘peripheral’ communities in the production and performance of nuclear culture. Furthermore, it also demonstrates that these sites (and individuals working and living within them) can resist and challenge dominant imaginaries of sociotechnical progress, disrupting the flow of power from the urban core to the rural periphery. This points towards the immense power of ordinary people as agents of social change, capable of substantiating, challenging, and re-defining ‘top-down’ narratives of sociotechnical progress.

Together, the nuclear culture and STS strands of this project have combined to demonstrate the plurality of cultural responses to the nuclear age, the presence and power of sociotechnical imaginaries to shape and inform these responses, and the agency of ordinary (and often socially peripheral) individuals and communities to resist, challenge, and redefine dominant cultural assumptions about nuclear technologies and their place within British

¹⁰⁵⁴ Jasanoff, ‘Future Imperfect’, p. 15.

¹⁰⁵⁵ Hogg, ‘Normalising Nuclear War’, in Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*, p. 9.

society. This understanding has radical implications for our understanding of British nuclear culture, eschewing the urban bias within the historiography and calling for a more thorough appreciation of the complexities of the British nuclear story. In particular, this recognises the need for a greater degree of scholarly engagement with the remote (and predominantly rural) nuclear sites in which the infrastructure of the nuclear programme was located, and their wider role in shaping cultural responses to nuclear technologies at a range of geographic scales.

The sociotechnical imaginary emerges as an key investigative and exploratory tool which helps to do this, identifying the diverse range of nuclear *cultures* which make up the history of British responses to nuclearisation, the sociotechnical processes behind their creation, and also how these cultural expressions and representations of nuclear sites sat alongside and co-produced broader social attitudes towards nuclear technologies, society, and the state.¹⁰⁵⁶ By engaging with the imaginary as an intellectual plane capable of diverse cultural work, this has stepped away from traditional empirical studies of the field, demonstrating the significance of the imagination as a social agent which structured public responses to nuclear technologies. The concept of the imaginary helps reveal not only the historical arc of social responses throughout the second half of the twentieth century, but also the sociotechnical processes behind their creation. This has pointed to shifting social attitudes not as the product of indiscernible forces or random events, but as part of an evolutionary process through which nuclear ideas originated, became embedded within society, and were subject to resistance and redefinition by sections of society. This has provided a nuanced understanding of the role of nuclear technologies in everyday life throughout the second half of the twentieth century, demonstrating how nuclear science embedded itself and became embedded in “social practices,

¹⁰⁵⁶ See, Cronqvist, Farbøl, and Sylvest, (eds.), *Cold War Civil Defence in Western Europe*.

identities, norms, conventions, discourses, instruments and institutions- in short, in all the building blocks of what we term the social.”¹⁰⁵⁷

Despite the enormous utility of the STIM concept as a vehicle for analysis, it is not without its limitations. At once a major strength and an inherent weakness is the life-cycle model, which attempts to structure the evolution and trajectory of imaginaries as they originate, become embedded, resisted, and extended within society. Compartmentalising the life-cycle of STIMs into these distinct phases provides a neat, linear pattern which distorts these phases into a binary, deterministic pattern. Whilst the findings of this study loosely correspond to these phases, it is an oversimplification to suggest that each phase followed the other sequentially. Rather, these phases overlapped, intersected, and in many cases competed directly with one another, as social agents wrestled for control over nuclear meaning-making. This aligns with the findings of recent research which has suggested that these ‘phases’ may be more accurately thought of as ‘processes’, a framework exploratory and spacious in nature; something to think with(in) rather than a theory or concept to be mechanically applied. With this distinction, the life-cycle model offers a “heuristically useful structure for analysing the operation and life-cycle of nuclear imaginaries”, attentive to the ways in which they overlap and compete with one another.¹⁰⁵⁸ This refinement provides a well-rounded interpretation which is attentive to the complexities of social responses to nuclear technologies.

The second key limitation with the STIM framework is the concept’s loose handling of structure and agency. Jasanoff’s original formulation argued that imagined futures “originate in the visions of single individuals or small collectives”, rising to the status of an imaginary

¹⁰⁵⁷ Jasanoff, *States of Knowledge*, p. 3.

¹⁰⁵⁸ Cronqvist, Farbøl, and Sylvest, (eds.), ‘Introduction,’ in Cronqvist, Farbøl, and Sylvest, *Cold War Civil Defence in Western Europe*, p. 11.

when “the originator’s vanguard vision comes to be communally adopted.”¹⁰⁵⁹ This understood imaginaries as “collectively held, institutionally stabilised, and publicly performed visions of desirable [or undesirable] futures.”¹⁰⁶⁰ This understanding places too much emphasis on the collective and performative aspects of imaginaries. By prioritising deeds and actions, this indirectly reduces the power of the imaginary as an intellectual plane capable of performing social work. This fails to account for the power of ordinary people to resist, challenge, and embed imaginaries in subtle ways that are elusive and less visible to the external observer. As we have seen, localised communities such as farmers often internalised their resistance, embedding dystopian imaginaries which were rarely articulated or performed outside their social group. This raises questions about the distinctions Jasanoff identifies as characterising an imaginary.

When we analyse imaginaries at the localised level, the “collectively held, institutionally stabilised, and publicly performed” criteria becomes more elusive.¹⁰⁶¹ How many people are required for an imaginary to be “collectively held?”... Who are the institutions who can “stabilise” them?... What does it mean to “publicly perform” an imaginary? These distinctions, particularly when considered in small social groups, such as the community local to West Cumbria, become unclear. For instance, can the radiobiological concerns of a handful of scientists, such as Frank Leslie, Marjorie Higham, and Piya Guneratne be considered an imaginary? Do they constitute a collective? Furthermore, the criteria of becoming “institutionally stabilised” does not account for the domineering power structures of the UKAEA/BNFL within the local community which hamstrung local people from being able to voice a clear, coherent opposition to the plant. If an imaginary needs to be “institutionally

¹⁰⁵⁹ Jasanoff, ‘Future Imperfect’, in Jasanoff, and Kim, (eds.), *Dreamscapes of Modernity*, p. 4.

¹⁰⁶⁰ *Ibid.*, p. 4.

¹⁰⁶¹ *Ibid.*, p. 4.

stabilised” in order to become an imaginary, then the industry’s stage-management of local politics and ostensibly democratic groups such as the Local Liaison Committee (LLC) means that only UKAEA/BNFL can originate and disseminate nuclear imaginaries. This understanding conflicts with the findings of this thesis, which has emphasised the agency of ordinary people in originating and embedding their own resistant imaginaries which resist hegemonic orderings of sociotechnical power. This is something of a weakness within the STIM concept, which has only been partially addressed within the STS literature. Whilst Jasanoff and Kim have moved away from their original nation-centric approach to STIMs, this thesis has shown that imaginaries can operate on a smaller geographical scale, pointing to their power and complex cultural agency within an intensely localised context. This understanding sits alongside and corroborates the previous call for more studies of localised nuclear cultures and a mutual engagement between scholars of nuclear history and STS, which promises not only to broaden the field of nuclear culture, but also develop the ways in which we think about sociotechnical systems, the spatial and temporal flow of imaginaries, and the agency of ordinary people within this process.

These conclusions have been informed by the oral histories and everyday experiences of local citizens, which lie at the heart of this project. Applying an interdisciplinary approach, this thesis has offered up a new conceptual framework which synthesised oral histories alongside existing archival documentation and newspaper narratives. This has provided both a nuanced insight into the range of social attitudes towards nuclear technologies, but also sketched out the contours of everyday life living alongside Britain’s first nuclear plant. Acting as “subversive strands of knowledge” these histories contrast with official nuclear narratives,

providing a missing piece of Britain's nuclear history and offering new interpretations of the nuclear age.¹⁰⁶²

Despite efforts to the contrary, the project was hampered by archival restrictions and the disruption of the COVID-19 pandemic, which prevented access to key archival series and restricted the number of interviews which could be conducted. Future research within the ES and AB series of files in the National Archives could offer fascinating insights into the socio-cultural history of Sellafield and its wider role within British nuclear culture. Likewise, analysis of the contents of the Nuclear Archive in Wick (when accessible), could also provide a deeper insight into these areas. The loss of these two archival repositories forced me to engage more readily with the archival materials within the Whitehaven Local Studies and Archive Centre, which are due to be consolidated and reduced in size in the near future.

The temporary restrictions over access to the National Archives therefore inadvertently provided a timely opportunity to analyse, preserve, and protect some of these records pending their disposal. Furthermore, this placed a greater emphasis on the oral history component of my research and the analysis of newspaper articles; indirectly realigning my research efforts with the study's overall focus upon the everyday histories of the people who built, worked at, and lived alongside the world's first commercial nuclear power plant. These sources have provided a new, rich, and layered insight into the range of British social responses to nuclear technologies, attentive to the ways in which nuclear science embedded itself and became embedded in "social practices, identities, norms, conventions, discourses, instruments and institutions" at both local and national scales.¹⁰⁶³ Ultimately, this has cast a new perspective

¹⁰⁶² Davies, 'A Visual Geography of Chernobyl', p. 127.

¹⁰⁶³ Jasanoff, *States of Knowledge*, p. 3.

upon the ways in which culture interacts with science and technology in the production of sociotechnical systems, and the respective roles of the state and citizenry in the co-production of post-war 'nuclear' society.

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