Defending Technocracy? Communicating with the Public about Nuclear Energy: Historical Perspectives

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Abstract

This thesis examines the communication strategy of the UK nuclear industry between 1975 to 1990. By refocusing the histories of this long-standing and contentious industry, I change our understanding of how the publicly funded nuclear industry saw and negotiated with, the UK publics. It makes new arguments about how nuclear science was communicated in post-war Britain and explores the inner workings of one of the best-funded industrial science communication projects during the period.

The sixth report on nuclear power from the Royal Commission on Environmental Pollution intensified opposition to nuclear power and pushed the industry to reimagine how it communicated with the public. I argue that this required the industry to not just present data that showed that nuclear power was safe but to actively demonstrate it. Using previously unexplored primary material, I show that while the focus of the industry's efforts was at public inquiries, it was through demonstrations, lectures, and the development of visitor centres where the industry used new communication methods for making not just a scientific argument for nuclear power, but an emotional one as well.

Nevertheless, while the industry embarked on these new public relation ventures, it also maintained an extensive lobbying effort within the UK parliament, to ensure it maintained its legitimacy to exist. This lobbying effort spilt into its wider public relations effort as key industry figures such as Lord Walter Marshall and Sir John Hill created a hierarchy of communication, whereby decision-makers and influential people, such as parliamentarians and journalists were the focus of its communication strategy. While populations around nuclear sites also received additional attention in comparison to the wider public.

The conclusion of this thesis reflects on what this untold history means for how we understand how the UK government and public bodies communicate science and how we view the relationship between government, parliament, and industry.

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and BNFL, something the academic community previously thought was lost. I would also like to thank Sarah McEvoy and JD Hill for their hard work as part of the CDP consortium, their help was crucial during the AB security review and the COVID-19 pandemic. Finally, the UKRI for its additional financial support during the pandemic, without it, I would not have been able to finish without extreme financial and mental concern.

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List of Abbreviations

AGR – Advanced Gas-Cooled Reactor

APPG – All Party Parliamentary Groups

AWRE – Atomic Weapons Research Establishment

BESIS – British Election Studies Information System

BL – British Library

BNFL – British Nuclear Fuels Limited

BSA – British Social Attitudes Survey

CAC – Churchill Archives Centre

CEGB – Central Electricity Generating Board

COI – Central Office of Information

CND – Campaign for Nuclear Disarmament

ECOROPA - European Network for Ecological Reflection and Action

EEC – European Economic Community

EURATOM – European Atomic Energy Community

ESI – Electricity Supply Industry

FBR – Fast Breeder Reactor

FOE – Friends of the Earth

FOI – Freedom of Information request

FUW – Farmers Union for Wales

GLEEP - Graphite Low Energy Experimental Pile

GW – Gigawatts

HSE – Health and Safety Executive

IAEA – International Atomic Energy Agency

IET – Institute for Engineering and Technology

LSE – London School of Economics

LWR – Light Water Reactor

MAFF – Ministry for Agriculture, Fisheries and Food

MP – Member of the UK Parliament

MW – Megawatts

NFU – National Farmers Union

NII – Nuclear Installations Inspectorate

NRC – Nuclear Regulatory Commission

NNC – National Nuclear Corporation

NPC – Nuclear Power Corporation

NRPB – National Radiological Protection Board

OECD – Organisation for Economic Cooperation and Development

PRA – Probability Risk Assessments

PWR – Pressurised Water Reactor

RBMK – High-Power Reactor (Chernobyl design)

SSEB – South of Scotland Electricity Board

SGHWR – Steam Generating Heavy Water Reactor

THORP – Thermal Oxide-Fuels Reprocessing Plant

TMI – Three Mile Island

TNA – The UK National Archives

UKAEA – United Kingdom Atomic Energy Authority

UN – United Nations

WANO – World Association of Nuclear Operators

Chapter One: Introduction - Defending Technocracy?

> In my political life I have never known such a well-organised scientific, industrial and technical lobby as the nuclear power lobby.
>
> Tony Benn, Secretary of State for Energy 1975-1979.[1]

This thesis explores the communication strategies of the UK nuclear industry between 1975 and 1990. Since it emerged into the public eye in the 1940s, the British nuclear establishment had worked hard to manage its public image and retain public trust. The early nuclear power programme was promoted as a triumph of British ingenuity and a powerful symbol of modernity, of a nation looking to the future and a new 'Elizabethan Age'. This image was cemented by the presence of the young Queen Elizabeth II at the official opening of Calder Hall reactor in 1956. But less than a year later, a fire in one of the Windscale reactors threatened the future of the whole enterprise and forced the United Kingdom Atomic Energy Authority (UKAEA), the body responsible for the programme, to reassess how it engaged with the public.

Since then, the UKAEA, its successor bodies, nationalised industries and trade unions have sought to retain public support in the face of opposition that had grown particularly vocal since the 1970s and as economic arguments for the programme became increasingly difficult to sustain. To do this they utilised new and existing techniques for what is now known as science communication, from public talks and leaflets, exhibitions and visitors' centres, information films and videos, to the spectacular nuclear train crash that was broadcast live to the nation in 1984.

These activities are well-documented in the UK National Archives, but except for the response to the 1957 fire at Windscale and some of the parliamentary lobbying in the 1960s and 1970s, have received little attention from historians or other scholars.[2] Instead,

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[1] HC parliamentary debate, 2nd December 1977, Vol. 940, col 972.
At this point in his ministerial career, Tony Benn views on nuclear power moved towards being sceptical of its potential.

[2] For response to Windscale fire see, L. Arnold, *Windscale 1957: Anatomy of a Nuclear Accident,* third edition, (Basingstoke: Palgrave Macmillan, 2007). For parliamentary lobbying see, T. Hall, *Nuclear Politics: The History of Nuclear Power in Britain* (Harmondsworth: Penguin Books, 1986); J. A. Camilleri, *The State and Nuclear Power: Conflict and Control in the Western World* (Brighton:

scholarly attention has concentrated on the opponents of nuclear power, whose activities and protest strategies have been portrayed in nuanced detail and placed in an international context.[3] Whilst the eclectic nature of protest groups and the many different perspectives that they encompassed has been stressed, the industry, by contrast, has been portrayed in simplistic and homogenous terms. This thesis will fill this gap by showing the nuance in arguments presented by government departments and state agencies that supported the development of nuclear power, and publicly promoted and defended a commitment to the industry from the early 1970s. It will explore how organisations formulated their external communications strategies, collaborated with, and challenged each other and the wider industry, and how these strategies changed in response to developments and incidents within the industry and the changing socio-economic and political landscape. Through this I not only balance the historiography, I will also show the nature of the nuclear industry as they created a hierarchy of communication. This hierarchy of communication refers to the priorities that the industry placed on communicating certain information to, with government ministers being at the top, then politicians with those around nuclear power plants being particularly important, then journalists and other such public figures and opinion formers, then populations around nuclear sites and then at the bottom of the hierarchy is the general public not near nuclear sites. This hierarchy takes shape in many forms, sometimes in meant the content of the message was different depending on who you were, or whether you were spoken directly to in lectures or demonstrations, it could also mean how you were communicated to as well.

In comparison to their objectors, in the year following the statement from Tony Benn, UKAEA's accounts showed that their gross expenditure had risen to £126.7 million and by 1980, gross expenditure totalled £281.1 million.[4] The accounts do not show how much money was spent on public relations, but the 1978 annual report states

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Wheatsheaf Books Ltd, 1984); R. Williams, *The Nuclear Power Decisions: British Policies, 1953-78* (London: Croom Helm Ltd, 1980).

[3] Examples include, B. Wynne, *Rationality and Ritual: Participation and Exclusion in Nuclear Decision-Making*; I. Welsh, *Mobilising Modernity: The Nuclear Moment* (London: Routledge, 2000); 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), 15-32; R. Taylor, *Against the Bomb: The British Peace Movement 1958-1965* (Oxford: Clarendon Press, 1988); L. S. Wittner, *The Struggle Against the Bomb: Resisting the Bomb: A History of the World Nuclear Disarmament Movement, 1954-70 vol. 2* (Stanford University Press, 1998); P. Byrne, *Against the Bomb: the British Peace Movement 1958-1965* (London: Croom Helm, 1988).

[4] UKAEA, *UKAEA: Annual Report 1978/79* (London: HMSO, 1978), 15; UKAEA, *UKAEA: Annual Report 1980/1981* (London: HMSO, 1980), 14.
Accounting for the high inflation of this period, this is a rise of £111.6 million.

that they put on several exhibitions at the Fast Breeder Reactor (FBR) at Dounreay that attracted 'some 20,000 people' during the summer months, and another 36,000 at an exhibition at the Birmingham National Exhibition Centre. They also published 676 articles in scientific journals, 100 unclassified reports and twelve books, not including regular press releases and media appearances by UKAEA officials.[5] The Central Electricity Generating Board (CEGB) also spent £4 million in 1984 on staging a train crash as a public demonstration of the integrity of nuclear fuel flasks.[6] In 1982, the Electricity Council reported it had distributed 294,000 pamphlets and booklets with such titles as *Nuclear Power and the Public Good*, as well as 124,700 pro-nuclear car stickers and 38,500 badges.[7] The industry's public relations effort was still as, if not more extensive than it had been in the first years of its existence. In comparison to earlier efforts, the Atom Train exhibition during its 1947-1948 journey attracted 146,000 visitors and sold 46,000 copies of its accompanying catalogue.[8] The display model of Britain's first atomic pile, Graphite Low Energy Experimental Pile (GLEEP), received 8,000 visitors at an exhibition at Windscale in 1949, and the Science Museum, which has held several exhibitions on nuclear science, including GLEEP and on 'Atomic Energy and Uranium,' attracted roughly one-million visitors a year during the 1960s.[9]

Opposition to nuclear power and weapons, according to Ian Welsh intensified during the period, making this an important focus to explore.[10] Because of this, the industry had to rethink how it communicated with the public and be consistent in its messaging. Opposition to nuclear power, as part of the growing environmental movement, included Greenpeace who had only been established in the UK in 1977 and

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[5] UKAEA, *UKAEA: Annual Report 1978/79*, 15.

[6] For more on this train crash see, T. Lean & S. Horrocks, 'Good Nuclear Neighbours: the British electricity industry and the communication of nuclear power to the public, 1950s-1980s'. *JCOM*, 16, 3, (2017); H. M. Collins, 'Public Experiments and Displays of Virtuosity: The Core-Set Revisited.' *Social Studies of Science*, 18, 4, (1988), 725-748.
Due to the lack of accessible CEGB archive providing numbers on how many worked in this department is difficult. From Peter Veys interview for the British Library he does state that the UKAEA lacked the resources that the CEGB had. See P. Vey, interview by T. Lean, British Library (BL) Sounds, track 8 C1495/51.

[7] Museum of Science and Industry, YA 1989.338/386/1-2. 'Letter from P.A Maybury to A. Plumpton 1982.'

[8] C. Laucht, 'Atoms for the people: The Atomic Scientists' Assoication, the British state and nuclear education in the Atom Train exhibition, 1947-1948'. *British Journal History of Science*, 45, 4, (2012), 591-608

[9] A. Boyle, '"Banishing the atom pile bogy": Exhibiting Britain's first nuclear reactor'. *Centaurus*, 61, 1-2, (2019), 14-32, 24; Jean-Baptiste Gouyon, 'Making science at home: visual displays of space science and nuclear physics at the Science Museum and on television in postwar Britain'. *History and Technology*, 30, 1-2, (2014), 37-60, 38.

[10] I. Welsh, *Mobilising Modernity*.

whose membership peaked at 311,914 in 1991. Friends of the Earth (FOE), whose UK branch was founded in 1971, was made up of 'about 150 local groups with a decentralist and anti-elitist ideology.'[11] As well as the Campaign for Nuclear Disarmament (CND), founded in 1957, which were revitalised in their opposition to nuclear weapons and by association nuclear energy after deteriorating relations between the USA and USSR raised concerns that the spectre of nuclear war was hanging over the globe again.[12] However, while the industry was facing a reinvigorated anti-nuclear movement it also faced several challenges posed as a result of the geopolitical tensions rising from the Cold War and domestic challenges posed from establishment bodies. Domestically, the Royal Commission on Environmental Pollution (1976), sixth report on nuclear power raised a direct challenge to the industry and its plans, questioning whether the plans to deal with nuclear waste were sufficient and whether an FBR was appropriate. Furthermore, leaks at Windscale, now known as Sellafield, had brought the industry into dispute.[13] Industrial action in the coal industry in the 1970s had threatened the supply of electricity and the global oil crisis in the early 1970s influenced pressures to increase nuclear power as a share of the energy mix.[14] Furthermore, rising Cold War tensions raised anxieties at the prospects of nuclear war breaking out, and the association of civil nuclear power with nuclear weapons put it in the crosshairs of anti-nuclear campaigners. The period in question also saw two major accidents that had significant ramifications for the fortunes of the industry. The first, at Three Mile Island (TMI) in Pennsylvania, United States 1979, and the second in Ukraine, then part of the Soviet Union, at Chernobyl in 1986. This set of pressures and constraints make this period worthy of study. The opposing forces of the need to ensure a reliable supply of electricity and concerns over the safety of nuclear power and anxieties over nuclear war, show us what challenges the industry faced, and why despite these, the governments of both political parties wished to push ahead with the nuclear programme. Together these made the challenges the industry faced more visible and the focus of intensified public debate.

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[11] By 1980 FOE had 250 branches and 17,000 registered supporters as seen in D. Sandbrook, *State of Emergency: The Way We Were: Britain 1970-1974* (London: Penguin Books, 2011), 212.
[12] S. Eden, 'Greenpeace'. *New Political Economy*, 8,4, (2004), 595-610; B. Wynne, *Rationality and Ritual:* 118; M. Phythian, 'CND's Cold War'. *Contemporary British History*, 15, 3, (2001), 133-156, 150.
[13] B. Wynne, *Rationality and Ritual*, 104-105.
[14] See D. Helm, *Energy, the State and the Market: British Energy Policy since 1979* (Oxford: Oxford University Press, 2003), 89-107.

However, to distil this response into just talking about a strategy oversimplifies the complexity of how the industry sought to plan how it communicated with the public. When this thesis talks about strategy, it does not mean that there was always a completely coherent plan or plans that the industry created and then saw to fruition. Primarily because many of the nuclear industry officials came from similar backgrounds and shared assumptions on how to proceed with communicating to the public. Sometimes, as with public inquiries this was broadly the case. However, events like nuclear accidents often saw ad hoc responses that were based upon the often-sparse information that was coming through. Furthermore, as these events happened, they had dramatic impacts on shaping the wider strategy. Therefore, it would be more accurate to describe the strategy as a thinly veiled coherent one. One that relied on institutional practices and close collaboration to work rather than anything that was extensively planned.

Literature Review

This literature review, broken down into four sections, will set out the relevant historiographical framework.[15] The first section will show how UK nuclear historiography is heavily weighted towards the examination of the UK nuclear weapons programme or the activities of anti-nuclear activists. The second section will look at the fear of the nuclear, either through so-called nuclear anxiety, or a fear of radiation and the interactions of peoples, states, and organisations with it. The third section looks at the literature on nuclear accidents, particularly those focusing on Chernobyl and TMI. This will provide some grounding to how nuclear industries and states around the world reacted to these technological disasters. The final section will look at the literature on science and government communication as well as Britain as a technocratic state. This section will primarily show how the current literature has tended to focus on other areas, outside of this thesis, and that the nuclear industry or indeed the government, has not been seen as a communicator of science. However, as this thesis will show, it was an important and well-resourced communicator of science and was invested in these activities to retain public trust.

[15] I have made a conscious decision to use gender-neutral pronouns when referring to academics in order to avoid mis-gendering. However, for the historical figures in this thesis where it is obvious that they saw themselves as a particular gender or no gender, I will refer to them by their appropriate pronouns.

Official nuclear history and nuclear opponents

In their monograph on public relations and nuclear weapons, Daniel Salisbury stated that when it comes to nuclear history the British case 'has a fairly high historian to warhead ratio.'[16] The same cannot be said with regard to civil nuclear power stations where the ratio is much lower and potentially even outnumbers the number of active historians researching the UK civil nuclear industry. Beyond the exceptionally controversial nature of nuclear weapons compared to the more prosaic study of civil nuclear power, this imbalance is unsurprising. After all, the UK civil nuclear programme was born out of the desire to build and maintain a nuclear deterrent and opposition to nuclear power in large part stemmed from opposition to nuclear weapons.[17] Nevertheless, the focus on nuclear weapons and opposition to them has led to several significant gaps in the historiography and the microcosm of public relations and nuclear history is a particularly good example of this gap.

Margaret Gowing's official history of the early nuclear programme noted that secrecy 'dominated policy-making' and the approach to providing information which was 'to conceal information and avoid publicity at all costs.'[18] Matthew Jones's more recent official history of the UK's strategic deterrent concurred that in the earlier years British nuclear policy was 'shrouded in high levels of secrecy.'[19] In their account of British government secrecy, Christopher Moran stated that in the UK 'atomic matters were effectively 'born secret': that is, utterly taboo from the moment of their inception, and strictly no-go areas for journalists.'[20] Salisbury furthered this historiography by clarifying that while secrecy was a prominent feature of the UK's nuclear history this would, in terms of the availability of documents, change over time. By 1980, the British government started to publicly make the case for nuclear weapons, trying to present its decisions to MPs, journalists, defence academics and the general public.[21] This thesis

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[16] D. Salisbury, *Secrecy, Public Relations and the British Nuclear Debate: How the UK Government Learned to Talk about the Bomb, 1970-83* (London: Routledge, 2020), 4.
[17] For more on the history of the UKs nuclear weapons programme see, F. Barnaby & D. Holdstock, *The British Nuclear Weapons Programme, 1952-2002*, (Abingdon: Routledge, 2003); J. Baylis & K. Stoddart, *The British Nuclear Experience: The Roles of Beliefs, Culture and Identity* (Oxford: Oxford University Press, 2014); L. Arnold, *Britain and the H-Bomb* (Palgrave, 2001).
[18] M. Gowing, *Independence and Deterrence, Vol.2: Policy Execution* (London: Macmillan Press, 1974),116 & 126.
[19] M. Jones, *The Official History of the UK Strategic Nuclear Deterrent, Volume 1: From the V-Bomber Era to the Arrival of Polaris, 1945-1964* (London: Routledge, 2017), 14.
[20] C. Moran, *Classified: Secrecy and the Modern State in Britain* (Cambridge: Cambridge University Press, 2012), 101.
[21] D. Salisbury, *Secrecy, Public Relations and the British Nuclear Debate*, 3.

makes a similar argument in that the nuclear industry sought to become more open to parliament, the media, and to the general public through its demonstrations, lectures, and visitor centres during this period.

There have been numerous accounts of the campaigning efforts made by the nuclear industry's opponents. In *Ritual and Rationality*, Brian Wynne recounts his experiences at the Windscale inquiry and how the inquiry should be 'seen in the perspective of the whole development, past and future, of UK decision-making and the world politics of nuclear energy.'[22] Concluding that the Windscale inquiry 'was a ceremonial of collective self-delusion, with the judiciary left to plug the authority gap between the belief in objective control and the reality of interconnected but ad hoc historical developments.'[23] Ian Welsh has shown there was opposition to the building of nuclear power stations and public concerns about their safety from the beginnings of the industry. In particular, opposition to nuclear power based on so-called NIMBYISM or "not in my back yard."[24] Welsh also claimed that the utterances from the industry were impersonal assurances offered by men in grey suits, that was part of a uniform adopted by industry representatives at public meetings. They claimed that 'as a genre, this style of dress was completely unexceptional within the industry but in public forums, its signature was one which evoked suspicion.'[25] Along with Welsh and Wynne, Wolfgang Rüdig has been one of the most prominent analysts of the British anti-nuclear movement, making a significant contribution to the literature examining movement success in varying scenarios. Rüdig has described the impact of the British anti-nuclear movement as 'negligible' compared to those of 'other countries' or 'the British peace movement.'[26]

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[22] B. Wynne, *Rationality and ritual, l*95.
[23] Ibid, 188.
[24] I. Welsh, 'Nuclear Nation Local Reaction'. *The Journal of Regional and Local Studies,* 9-10, (1989), 1-28; I. Welsh, 'The NIMBY Syndrome'.
[25] I. Welsh, *Mobilising Modernity: The Nuclear Moment* (London: Routledge, 2000), 185.
[26] W. Rüdig, 'Maintaining a Low Profile: The Anti-nuclear Movement and the British State'. In H. Flam (ed.) S*tates and Anti-Nuclear Movements*, (Edinburgh: Edinburgh University Press, 1994), 70-100, 70. See also; W. Rüdig, 'Capitalism and Nuclear Power: A Reassessment'. *Capital and Class*, 7, 2, (1983), 117-156; W. Rüdig, *Anti-nuclear Movements: A World survey of opposition to nuclear energy*, (Harlow: Longman, 1990). See also, R. Taylor, *Against the Bomb: The British Peace Movement, 1958-1965* (Oxford: OUP, 1988). There is also a substantial literature on the role of women in anti-nuclear campaigns, see, A. Pettitt, *Walking to Greenham: How the Peace-Camp Began and the Cold War Ended*, (Honno, 2006); A. Young, *Femininity in Dissent* (London, 1990).

A noticeable section of the literature regarding nuclear energy, and opposition to it, in the UK, is viewed through the lens of public inquiries.[27] This thesis will use the case studies of the inquiries into whether a Thermal Oxide Reprocessing Plant (THORP) should be built at Windscale (June 1977-October 1977), whether a Pressurised Water Reactor (PWR) should be built at Sizewell (January 1981-March 1985), and whether a second PWR should be built at Hinkley Point (October 1988-March 1989). The THORP inquiry has received considerable academic attention. Crispin Aubrey's book provides a short but comprehensive account of the difficulties faced by British Nuclear Fuels Limited (BNFL) when it came to THORP. Aubrey analyses the arguments for and against THORP in their conclusion.[28] Other academics have also supported Wynne's claims of rituality and used public inquiries to show how advocates of civil nuclear power used the rules governing the inquiry arena to maintain their monopoly over 'nuclear knowledge'.[29] A regular claim is that the costs involved to take part in nuclear inquiries, due to how long they lasted, made them inaccessible to wide sections of the public and opposition voices.[30] This thesis does not dispute these findings but there is a lacuna that needs filling to tell a more complete story to unveil new findings on the long term case made by the industry across these different inquiries, how it changed over time and how they put their case forward and how they fitted within the wider parliamentary conventions that the industry had to go through in order to gain the democratic legitimacy to exist and expand.

Nuclear culture and anxiety

A significant departure in recent historiography is the growing emphasis by scholars such as Jonathan Hogg and Christoph Laucht on exploring 'British nuclear culture', moving

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[27] As seen with, B. Wynne, *Rationality and ritual*; I. Welsh, 'The NIMBY Syndrome'. For a perspective on the politics of the Sizewell B inquiry see, R. Baker, 'The Politics of Energy: The Layfield Report on "Sizewell B"'. *The Political Quarterly* 59, 1, (1988), 91-96.

[28] These four arguments are that THORP will produce useful by-products that can be used in existing reactors. That THORP was the best way to handle waste. The third argument is the safety record of the UK nuclear industry. The fourth argument is that THORP will create jobs and wealth for the local and national economy.
C. Aubrey, *THORP: The Whitehall Nightmare* (Oxford: Jon Carpenter Publishing, 1993), 78-82.

[29] E. Rough, 'Policy Learning through Public Inquiries? The Case of UK Nuclear Energy Policy 1955-61'. *Government and Policy*, 29, 1, (2011) 24-45, 41.

[30] See also, R. Davies, 'The Sizewell B Nuclear Inquiry: An Analysis of Public Participation in Decision making about Nuclear Power'. *Science, Technology, & Human Values*, 9, 3 (1984), 21-32**;** R. Davies, 'The Effectiveness of the Sizewell B Public Inquiry in Facilitating Communication about the Risks of Nuclear Power'. *Science, Technology, & Human Values*, 12, 3/4, (1987), 102-110; A. M. Garry, *The Windscale Inquiry: The Public Inquiry System on Trial.* Thesis submitted to the University of Manchester October 1988.

away from the 'official narrative' of nuclear high politics.[31] This recent approach involves examining the varying responses of 'everyday people' to different nuclear technologies through concentrating on more 'unofficial narratives', thus furthering Jeff Hughes's argument that such is the phrase's pluralism, hybridity and openness to geographical particularisms that it should be recognised instead as 'British nuclear cultures.'[32] This thesis does not directly contribute to this shift as it investigates the response from the UK government and notionally independent regulatory bodies. However, this is still worthy of study. First, while I am examining official narratives, it is an unexplored narrative that will tell us more about how the UK government and public bodies viewed the public through how they communicated with them and how the industry reacted to technological disasters such as TMI and Chernobyl. This, in turn, can inform us about how policy was formed and its successes and failures. Second, the justification for doing this is that while British nuclear historiography has tended to focus on the military programme, those works that have looked at the civil nuclear industry almost exclusively focused on opposing the civil programme. However, within these works, there is a lack of quantitative data in their study of British nuclear culture and anxiety that could tell us something more about the broader position of British public opinion during this period.

Fear of the nuclear, often characterised as nuclear anxiety, can lead to increased opposition to nuclear power.[33] Opposition to nuclear power around the globe grew in the 1970s, with violent protests in both France and West Germany, caused in part by the rise of the environmental movement.[34] The UK did not follow this pattern, instead, most of

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[31] Key works include a 2012 special edition of the *British Journal for the History of Science* J. Hogg & C. Laucht, 'Introduction: British nuclear culture', *British Journal for the History of Science*, 45, 4 (2012), 479-493; J. Hogg, *British Nuclear Culture: Official and Unofficial Narratives in the long Twentieth Century* (2016).

[32] J. Hughes, 'What Is British Nuclear Culture? Understanding Uranium 235'. *British Journal for the History of Science*, 45, 4, (2012), 495-518.
Everyday people is a loaded term and not one I will use during the rest of this thesis. Publics will be a more appropriate term to recognise the complex and diverse nature of "the public". For more see C. Langhamer, 'Who the hell are ordinary people?' Ordinariness as a category of historical analysis'. *Transactions of the Royal Historical Society*, 28, (2018), 175-195.

[33] Hecht has written on how whether something is 'nuclear' or not is not simply defined. Nuclearity 'is a technopolitical spectrum that shifts in time and space.' G. Hecht 'Nuclear Ontologies'. *Constellations*, 13, 3, (2006), 320-331, 321.

[34] See A. Mignon Kirchhof & Jan-Henrik Meyer, 'Global Protest against Nuclear Power. Transfer and Transnational Exchange in the 1970s and 1980s'. *Historical Social Research*, 39, 1, (2014), 165-190, 177.
Kirchhof and Meyer identify other reasons for the rise in protests: The 1968 student movement thus influenced the anti-nuclear protest, forms of protest and ideology and new and more controversial

the protests involved non-violent resistance and civil disobedience and were directed at nuclear weapons, particularly at the first blockade of RAF Greenham Common in September 1981, after the government approved the storage of cruise missiles there. Spencer Weart, whose research focused on the United States, but whose conclusions can be applied to other national settings, characterises this anxiety as 'nuclear fear,' but could also be termed using the more common phrase 'nuclear anxiety'.[35] Weart claimed that nuclear fear was one of the many forces behind the rise of the environmental movement, but he also argued it had a special place in the reasoning behind the movement stating: 'it raised emotions earlier and on a more visceral level than any other issue.'[36] This fear or anxiety tends to focus on nuclear weapons rather than nuclear power but Weart details how the fears existed for both and overlapped with one another. William Knoblauch has also looked into how nuclear anxiety was tempered or normalised through entertainment, such as video games and fictional literature.[37] Academics such as James Stafford have also analysed polling data to identify the extent and evaluate the basis of nuclear anxiety. Stafford argues that there was a strengthening in support for pro-nuclear parties in the UK during the years that Labour made unilateral disarmament an issue.[38] However, all of the academic analysis to date has focused on polling on issues of nuclear weapons and war. In Chapter Two, I analyse a wide selection of polling data on both nuclear weapons and power, which will help contextualise public opinion during the period this thesis investigates and also show the benefit of integrating polling data with qualitative research by creating a more rounded understanding of the state of public opinion towards nuclear.

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scientific evidence of the dangers of low-level radiation emerged around 1970, notably in the United States.

[35] S. R. Weart, *The Rise of Nuclear Fear* (Cambridge: Harvard University Press, 2012).

[36] Ibid, 194.

[37] See W. Knoblauch, 'The Pixilated Apocalypse: Video Games and Nuclear Fears, 1980-2012', M. Blouin, M. Shipley, J. Taylor, M. Blouin & M. Shipley, (eds.) *The Silence of Fallout: Nuclear Criticism in a Post-Cold War World*, (Cambridge: Cambridge Scholars Publishing, 2013), 122-142; J. Williams, *Depictions of Destructions: Post-Cold War Literary Representations of Storytelling and Survival in Nuclear Era* , M. Blouin, M. Shipley, J. Taylor, M. Blouin & M. Shipley, (eds.) *The Silence of Fallout: Nuclear Criticism in a Post-Cold War World*, 143-165.

[38] J. Stafford, ''Stay at Home': The Politics of Nuclear Civil Defence, 1968-83,' *Twentieth Century British History* 23, 3 (2012), 383-407.
See also, Tom W. Smith, 'A Report: Nuclear Anxiety'. *Public Opinion Quarterly*, 52, 4, (1988), 557-575; D. Yankelovich, & J. Doble, 'The public mood: Nuclear weapons and the U.S.S.R.' *Foreign Affairs* 63 (1986), 33-46; M. D. Newcomb, 'Nuclear attitudes and reactions: Associations with depression, drug use, and quality of life.' *Journal of Personality and Social Psychology* 50, (1986), 906-920; D. Mayton & M. C. Delamater, 'Indirect assessment of concern about nuclear war.' *Psychological Reports* 59, (1986), 709-710; B. M. Kramer, M. S. B. Kalick, & M. A. Milburn, 'Attitudes toward nuclear weapons and nuclear war: 1945-1982.' *Journal of Social Issues* 39, (1983), 7-24.

Weart also expanded our understanding of the "culture" surrounding nuclear technologies, writing on the fear of nuclear as both a persuasive tool to make people act to avert a crisis or defend oneself against one.[39] Weart argued that when both anti and pro-nuclear groups used nuclear imagery, they underestimated how powerful a force they were deploying. Mentions of secrets, control and security were less likely to reassure the public than to remind them of their most intimate problems. 'Nuclear fear was like a Chinese finger-trap: the harder people tried to pull out of it, the tighter it gripped them.'[40] Weart's monograph helps us to provide context to the industry's image problem. What my thesis does is to show how the industry sought to overcome this image problem through the normalisation of radiation by domesticating nuclear power so that it might be seen like other commonplace industries like the coal, oil, or gas industries.

Normalisation, banalisation, or domestication?

The argument that the industry attempted to normalise itself is not a new one. Gabrielle Hecht problematises 'exceptionalist' narratives about the nuclear and underlines the changing ontologies of nuclear things. Hecht warned against taking at face value the discourses about the exceptional or banal characteristics of nuclear technologies. Yet, Hecht also analysed 'nuclearity' as an unstable and contested technopolitical category. For example, while uranium ore was made a banal mineral, by designating it as non-nuclear, to make its circulation as a commodity easier, it was also made an exceptional nuclear object, enabling the states in which the mines were located to gain access to the Board of the IAEA.[41] Sonja Schmid furthers this by drawing on Hecht's notion of 'nuclearity' and Foucault's notion of 'normalization' to explore from a Science and Technology Studies perspective the different approaches to nuclear technologies by what they call the 'security community', diplomats and policymakers concerned with nuclear weapons; as well as the 'safety community', scientists, engineers, and private companies involved in nuclear power. Schmid argued that while the risks of nuclear technologies are usually made exceptional by the 'security community,' they are routinely normalized by the 'safety community', in the senses both of being considered familiar and controllable, but also of being quantified and regulated to the point of including the

[39] S. R. Weart, *The Rise of Nuclear Fear*, 62.
[40] Ibid, 69.
[41] G. Hecht, *Being nuclear: Africans and the global uranium trade* (Cambridge: MIT Press, 2012). See also; G. Hecht, 'Nuclear ontologies'; G. Hecht, 'The power of nuclear things'. *Technology and Culture*, 51, 1, (2010), 1-30. For more on technopolitics and nuclear power see, G. Hecht, *Radiance of France: Nuclear Power and National Identity after World War II* (Cambridge: MIT Press, 2009).

management of catastrophes as part of the standard operations of the industry. According to Schmid, the artificial separation between these two communities of experts, with their different ontologies and practices, is in turn normalised, with the dangerous result of obscuring the shared technological materiality of nuclear weapons and nuclear reactors.[42]

A special edition of the journal *Centaurus* also covered the attempts around the globe to normalise the nuclear industry, though it uses the term 'banalisation' instead to argue the view that the displays and other communicative techniques used trivialised the dangers that nuclear technologies can present.[43] However, I will not be using the terminology they have used for two crucial reasons. First, this thesis explores what language the nuclear industry used, and they did not use the term banalisation to describe their work - they described it as normalising or relativizing. Second, banalisation is overtly a critical term, due to the context that it is used in and is often referenced alongside Hannah Arendt's, *A Report on the Banality of Evil*.[44] It is not the purpose of this thesis to weigh in on the nuclear debate, but rather to balance the historiography to uncover a new story by illustrating how the industry attempted to communicate with the public and analysing what this can tell us about how the government and industry viewed the public. Instead, I will use the word domesticate to describe the actions of the industry. When I use the word domesticate, I am arguing that the industry believed it was relativizing the risks of radiation to objects, places and activities that were far more common to our everyday experiences. Whether this was the radiation given off by the smoking of a cigarette, radiation contained within a personal garden, or on a Cornish beach, as opposed to radiation on the beaches outside Sellafield.

Nuclear accidents and risk

Scholars have also argued that governments and nuclear industries attempted to limit the public visibility of radiation. Ulrich Beck discusses the role of experts and democratic decision making in the process of identifying hazards and in how societies organise themselves to deal with risks. Identifying these hazards requires us to "connect the dots" but scientists and other "experts" play a disproportionately significant role in that process,

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[42] S. D. Schmid, 'A new "nuclear normalcy"?'. *Journal of International Political Theory*, 15, 3, (2019), 297-315.
[43] See; J. Sastre-Juan & J. Valentines-Álvarez, 'Fun and fear: The banalization of nuclear technologies through display'. *Centaurus*, 61, 1-2, (2019), 2-13. This thesis will not adopt the weighted term banal to describe what the industry is doing, rather I will use the term domesticate.
[44] H. Arendt, *Eichmann in Jerusalem: A Report on the Banality of Evil* (Viking Press, 1963).

from establishing the fact of exposure to evaluating health effects. According to Beck, risks not recognized scientifically 'do not exist legally, medically, technologically, or socially, and they are thus not prevented, treated or compensated for.'[45] Beck also argued that laypeople, even when directly exposed to risks, can be 'culturally blind' to them. Perhaps if radioactivity made us itch, one could make sense of it more easily. Without such natural perceptibility or some 'culturally manufactured perceptibility,' simply judging for ourselves, without relying on experts, has become impossible.[46] Olga Kuchinskaya furthers this argument in *The Politics of Invisibility*, suggesting that 'limiting public visibility of Chernobyl radiation prevents the construction of links between radiation and its health effects, which can, in turn, be described as the 'social construction of ignorance.'[47] This thesis builds on these arguments through studying the UK's response to Chernobyl, where I will argue that the government's actions drew attention away from the health implications of the disaster by introducing restrictions on the movement of sheep and a compensation policy to alleviate the economic impacts of this policy.

The nuclear accidents at TMI (1979) and Chernobyl (1986), have had far-ranging and long-term impacts on how the industry around the globe and academics have viewed nuclear energy.[48] This put the industry on the defensive as it had been forced to change how it communicated the mitigation of the risks of nuclear power. What is risk, and the differences between objective and subjective risk, will play an important part in the analysis of this thesis.[49] Defining objective risk, as opposed to subjective risk, is not straightforward but objective risk can be defined as an accurate and reasonably complete characterization of a risk that can be made by only stating objective facts about the physical world, while the subjectivist view of risk treats risk as the outcome of social processes, and claim that 'risks are social constructs', not features of objective reality.[50] The assessment of risk from this perspective is purely subjective, but this does not make risk any less real. This has led to some scholars arguing that laypeople tend to

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[45] U. Beck, *Risk Society: Towards a New Modernity* (London: Sage, 1992), 71.
[46] U. Beck, *Ecological Politics in an Age of Risk* (Cambridge: Polity Press, 1995), 185.
[47] O. Kuchinskaya, *The Politics of Invisibility: Public Knowledge about Radiation Health Effects after Chernobyl* (MIT Press, 2014), 2; see also, R. Proctor & L. L. Schiebinger, *Agnotology: The Making and Unmaking of Ignorance* (Stanford: Stanford University Press, 2008).
[48] For brief overviews of nuclear accidents since its inception see, J. Mahaffey, *Atomic Accidents: A history of nuclear meltdowns and disasters* (London: Pegasus Books, 2014).
[49] U. Beck, *Risk Society*.
[50] S. O. Hansson, 'Risk: objective or subjective, facts or values'. *Journal of Risk Research*, 13, 2, (2010), 231-238, 232 & 233.

underestimate the risks associated with activities where they feel in control.[51] This was the view that the industry took as well but they tended to argue against subjective risk being taken into account when doing risk analysis.

I would argue that there is no such thing as "objective" risk.[52] The category is one constructed by engineers and scientists to bolster the claim that their subjectivity carries more weight than other subjectivities.[53] Charles Perrow has also critiqued the industry's view of risk by focusing on the almost statistical inevitability of there being an accident at a nuclear power station.[54] The book published in 1984, was vindicated when the Chernobyl nuclear disaster occurred. More than anything this significantly reinforced the image of the 'arrogant expert', who is almost happy when a nuclear accident occurs or almost occurs because it means they can add new safety devices to prove its new-found reliability or prove that such safety precautions are working.[55] This leads me to ask what role did the claim of objectivity have in the communication strategy and did this change after accidents like TMI and Chernobyl?

Walker's account of TMI provides us with an analysis of the response from the United States government and industry. Most significant, however, was Walker's argument that TMI accident had a paradoxical effect on the nuclear power industry's fortunes. While it proved to objectors that such an accident was inevitable, it also proved to the advocates that even in the event of such an accident the defence-in-depth strategy would mitigate and even contain the radiation that escapes from a reactor. Although, as Walker pointed out, this was not before the popularisation of images of men in white coats standing around and scratching their heads because they did not know what to do.[56] Walker does discuss in detail the recommendations made by the Nuclear Regulatory

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[51] M. A. McGuire, G. B. Neighbour & R. Price, 'Should Subjective Risk be taken into Account in the Design Process for Graphite Disposal,' in G. B. Neighbour (ed.) *Securing the Safe Performance of Graphite Reactor Cores* (London: Royal Society of Chemistry, 2010), 229-252, 230.

[52] This is not a new argument and has been made by several academics in multiple disciplines. However, Robert Stalling's argument that 'risk and safety are not objective conditions' is particularly pertinent to this thesis. See R. A. Stalling, 'Construction of risk.' *Social Problems*, 37, 1, (1990), 80-95, 80.

[53] This applies to opponents of nuclear power as well.

[54] C. Perrow, *Normal Accidents: Living with High-Risk Technologies* (Princeton: Princeton University Press, 1984), 3.

[55] C. Perrow, *Normal Accidents*, 54.
See also, J. Parr, 'A Working Knowledge of the Insensible? Radiation Protection in Nuclear Generating Stations, 1962-1992'. *Comparative Studies in Society and History* 58, 4, (2006), 820-851; C. Perin, Shouldering Risks: The Culture of Control in the Nuclear Power Industry (Princeton: Princeton University Press, 2005); F. Zonabend, The Nuclear Peninsula, J. A. Underwood, trans. (Cambridge: Cambridge University Press, 1993).

[56] J. S. Walker, *Three Mile Island: A Nuclear Crisis in Historical Perspective* (Los Angeles: University of California Press, 2004), 241.

Commission (NRC), no one has yet to include a detailed analysis focused on how this impacted the communication strategy for the UK.[57] For this thesis, the aim is to see what lessons the UK industry learnt from the TMI accident and then what lessons, if any, were learnt from Chernobyl.[58] How did preconceptions over the origin of the accident impact how were initial messages formed, and how did they impact the fortunes of nuclear power in the long term?

Academics have also looked at the impacts of nuclear power and nuclear accidents through local and regional case studies. This includes the impact of Chernobyl on sheep farmers in Cumbria and North Wales. Brian Wynne's article on sheep farming in Cumbria points out the over-centralised approach that scientists took to providing advice to farmers after the Chernobyl accident deposited large amounts of radiation on grazing grounds.[59] Sean Martin also made a recent intervention on the politicisation of Chernobyl in a Welsh context. This provided a useful insight into the debates arising from civil nuclear power in Wales after Chernobyl.[60] This included whether to stop the expansion of nuclear power in North Wales or to immediately close down the nuclear power plants at Wylfa and Trawsfynydd. Françoise Zonabend's *The Nuclear Peninsula* also provides a detailed insight into the community living around the nuclear fuel reprocessing plant la Hague on the western tip of the Cotentin Peninsula in Normandy. Their work shows how locals used humour to downplay the risks of living near the plant. Zonabend also shows how locals relativize risk to everyday jobs and items, 'easy like working in a dairy' or that a reactor is 'like a pressure cooker.'[61] However, Zonabend concludes that nuclear waste generates so much anxiety and mistrust that 'it becomes

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[57] B. Wynne, *Rationality and ritual*, 89; I. Welsh, *Mobilising Modernity*, 197; S. Rabbitt Roff, 'Living with rattlesnakes: Chernobyl and Dounreay'. *Medicine, Conflict and Survival*, 16, 2, (2000), 216-230. The most expansive analysis to date of the UKs response to TMI can be seen in R. Davies, 'The Sizewell B Nuclear Inquiry'. 21-32.

[58] Sonya Schmid argues that anti-Soviet perception of Western nations meant that they did not learn from the accident. See S. D. Schmid, *Producing Power: The Pre-Chernobyl History of the Soviet Nuclear Industry*, (Cambridge: MIT Press, 2015), 157.
For more on Chernobyl see Z. A. Medvedev, *The legacy of Chernobyl* (London: Norton, 1999); A. Petryna, *Life Exposed: Biological Citizens after Chernobyl* (Princeton: Princeton University Press, 2013); T. Kasperski, 'Children, nation and reactors: Imagining and promoting nuclear power in contemporary Ukraine'. *Centaurus*, 61, 1-2, (2019), 51-69. K. Brown, *Plutopia: Nuclear families, atomic cities, and the great Soviet and American plutonium disasters* (Oxford: Oxford University Press, 2012); K. Brown, *Manual for Survival* (London: Allen Lane, 2019).

[59] B. Wynne, 'Sheep farming after Chernobyl: A Case Study in Communicating Scientific Information'. *Environment* 31, 2, (1989), 11-15/33-39, 15. See also H. Collins & T. Pinch, *The Golem at Large: What You Should Know about Technology* (Cambridge: Cambridge University Press, 2002), 113-125.

[60] S. Martin & M. E. Wiliam, 'Politicising Chernobyl: Wales and Nuclear Power During the 1980s.' *Transactions of the Royal Historical Society* 29, (2019), 273-292.

[61] F. Zonabend, *Nuclear Peninsula*, 23 & 93.

marked with the seal of blemish and is seen as posing a threat to the social order. A threat that due to nuclear waste's longevity, cannot be removed.[62] Zonabend's work raises the question as to how did the UK industry communicate with local communities around nuclear sites, were they a target audience? Do we see a replication of the domestication of the industry to everyday jobs and items?

History of science communication

The literature on the history of science communication forms part of the analytical framework for this thesis. Yet, as this thesis demonstrates, the industry was not just communicating science, it was also communicating and advocating government policy. Therefore, while the history of science communications provides the foundation for how this thesis will analyse the primary evidence, it is not enough; the literature on government communication will be used to supplement the analytical framework.

Jane Gregory and Steve Miller have noted that while the public has been inclined to trust scientists, they can be often confused by the claims they offer to them.[63] This is particularly important when thinking about the debates over the public understanding of science that sprung up in the 1980s. David Knight recalls the scientific debates while looking back to the long nineteenth century to see how both the methods for communicating knowledge and the sciences themselves were transformed between the French Revolution and the end of World War One, to show the comparisons between debates then and debates now. For instance, Knight uses the example of Mary Shelley's *Frankenstein*, as a novel on the use of science to create unnatural, monstrous, and unethical creations, to show how it has been used as a name for nuclear energy, which 'makes a powerful point instantly.'[64]

Analysing how scientific messages were presented, either as written text or visually form a significant part of the analysis of this thesis. Nicholas Russell discusses how messages are written, suggesting that the lexicon of academic scientific journals has become harder to read for the average citizen than in the past, suggesting that such

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[62] F. Zonabend, *Nuclear Peninsula*, 126-128.
[63] J. Gregory & S. Miller, *Science in Public: Communication, Culture, and Credibility* (Cambridge: Perseus Publishing, 1998).
[64] D. Knight, *Public Understanding of Science: A History of Communicating Scientific Ideas*, (Abingdon: Routledge, 2006), 193. For emotional arguments for, rather than against, science through spectacle see also M. Hewitt, 'Science as Spectacle: Popular Scientific Culture in Saint John, New Brunswick, 1830-1850.' *Acadiensis*, 18, 1, (1988), 91-119.

journals in the 1930s were no more difficult to read than a newspaper.[65] However, while Russell has argued that science has become more difficult to read Charlotte Sleigh has argued that science had become a commodity to be bought and sold to audiences of different backgrounds and education, calling it a 'mass commodity in its own right.'[66] These works show us how the communication of science has been about providing authority to further a particular person, or groups commercial or political interests. They also help to inform my thinking by showing the cultural connotations and how this has created an emotional argument against nuclear power. Did the nuclear industry attempt to put forward its own emotional argument, and if so, how did they do this? Furthermore, this literature also raises questions regarding trust in nuclear scientists and whether, historically, institutional attachment to the nuclear industry impacted whether scientists were seen as trustworthy or not? In this thesis, we shall see how the industry targeted most of its efforts towards those within the locality of the nuclear plants and those who were in influential positions. Furthermore, what these readings have led me to ask is whether messaging changes depending on what audience the industry is communicating to? Answering this question will help to provide a nuanced view of how established institutions such as the industry communicate science.

Exhibitions, news stories, and films

While they are not framed as works of science communication, the communication of things nuclear such as exhibitions, both in the UK and internationally have also been covered by a variety of authors.[67] Sophie Forgan shows how underlying the early presentation of atomic science was the notion of the 'intelligent layman,' that aimed at providing non-experts with the basic 'objective' information on atomic energy so that they could reach their own informed decisions on the subject.[68] Christoph Laucht took a different approach to exhibitions and argued that the 1947-1948 Atom Train exhibition marked an important moment within post-war British nuclear culture. Where nuclear

[65] N. Russell, *Communicating Science: Professional, Popular, Literary* (Cambridge: Cambridge University Press, 2010), 19.
[66] C. Sleigh, 'Communicating science', in I. R. Morus, ed, *The Oxford Illustrated History of Science*. (Oxford: Oxford University Press, 2017), 378-409.
[67] Examples include, J-B, Gouyon, 'Making science at home: visual displays of space science and nuclear physics at the Science Museum and on television in postwar Britain'; H. Trischler & R. Bud 'Public technology: nuclear energy in Europe'. *History and Technology*, 34, 3-4, (2018), 187-212; C. Laucht, 'Atoms for the people'; A. Boyle, 'Banishing the atom pile bogy'; A. Molella, 'Exhibiting atomic culture: The view from Oak Ridge'. *History and Technology*, 19, 2 (2003), 211-226.
[68] S. Forgan, 'Atoms in wonderland'. *History and Technology*, 19, (2003), 177-196.

scientists shared aspects of their knowledge with the British public while clashing with the interests of the emerging British national security state in the early Cold War.[69] Whilst Alison Boyle argues that exhibition organisers for the display model of Britain's first atomic pile, adopted a variety of banalizing and obscuring tactics to promote 'the benign atom,' agreeing with Laucht that this was done while maintaining secrecy over the wider atomic programme.[70] These articles provide us with an insight into how UKAEA and other government officials saw the public and how they should be communicated to. However, there is a significant time gap in the historiography going only as far late 1950s, and there is a significant lacuna in the research on how organisations such as the CEGB and BNFL used exhibitions, if they did at all.

Authors such as Susanna Hornig noted that risk stories in the mass media are typically judged by scientists 'on how well they contribute to public education designed to eradicate wrong thinking.'[71] The industry aimed to use the information they distributed to diffuse public anxiety and opposition generated in the UK. Others have looked at the problematic assumptions made about the media and the public understanding of science. This includes the term mass media, which suggests it is a homogenous entity. However, it is not, it has many different views, angles, purposes, and formats at play.[72] Rosemarie Waldner argues that science does not hold a special place within newspapers and that people are more interested in sex and crime stories than they are in science and the environment.[73] This is important for this thesis as it uses a significant amount of newspaper coverage of relevant events. Understanding that just because something is in a newspaper does not mean it will receive equal attention from readers is important when evaluating what impact a news story might have on public opinion.

In their book, *Films of Fact*, Tim Boon has also argued that at the source of all the debates are questions of authority: of scientists and factual representation. They

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[69] C. Laucht, 'Atoms for the people'. 591.
See also C. Jolivette (ed), *British Art in the Nuclear Age* (Routledge: Abingdon, 2016), for more on how British art fit into British nuclear culture.
[70] A. Boyle, 'Banishing the atom pile bogy'. 14.
See also, J-B, Gouyon. See, 'Making science at home: visual displays of space science and nuclear physics at the Science Museum and on television in postwar Britain'.
[71] S. Hornig, 'Reading risk: public response to print media accounts of technological risk'. *Public understanding of Science*, 2, 2 (1997), 95-109, 96.
[72] A. Hansen, 'Reporting science: problematic assumptions in the debate about media and public understanding of science', in K. Ackrill (ed.) *The Role of the Media in Science Communication* (London: The Ciba Foundation, 1993), 175-187, 175.
[73] R. Walder, 'The role of newspapers', in K. Ackrill (ed.) *The Role of the Media in Science Communication* (London: The Ciba Foundation, 1993), 89-96, 91.

argued that there was no chance of understanding the *conundrum*, in relations between scientists and the public, if we do not understand how we came to have the genres that have come to characterise television science.[74] Boon suggested four ways in which science can be represented: as opening our eyes to nature; as a source of transformative technologies; as a route to human equality; and as a philosophical approach to the world.[75] Boon argued that debates on the public understanding of science started and continue to be a trend toward broadcasting for 'scientific literacy.'[76]

The literature points to different modes of communication, in these examples, we can see that science communication is seen to be TV, film, exhibitions, displays, lectures and pamphlets. This shows us how the means of gaining authority to further one's interests have changed over time and from this arises the question, what different modes did the industry adopt? What was their purpose and how did they fit into the wider communication strategy? It also raises the question of whether the industry communicates different messages to different audiences, it also requires us to ask what methods the industry used to reach these audiences? As will be evident from the following subsection of this literature review the nuclear industry has yet to be seen as a communicator of science. Even though when we examine the literature on science communication and the public understanding of science, along with the primary evidence base for this project I will provide a nuanced view that we should also see the communication of science by publicly funded bodies and government as government communication as well.

Technocrats, government, and government communication

The historical trajectory of the UK as a technocratic state originates within declinist literature, where the dominant view during the 1960s was that the UK suffered an avoidable economic in the decline twentieth century because it had an anti-modern ruling elite, who were hostile to state intervention in industry.[77] However, other historians including David Edgerton and Jon Agar have since shown that the UK was not lagging in science and technology in the immediate post-war period.[78] Instead, it was a scientific

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[74] T. Boon, *Films of Fact: A History of Science in Documentary Films and Television* (London: Wallflower, 2007), ix.
[75] Ibid, 2.
[76] Ibid, 191.
[77] For notable version of this argument, see E. Hobsbawm, *Industry and Empire: from 1750 to the present day* (London: Penguin Books, 1969).
[78] D. Edgerton, *Science, technology and the British industrial 'decline' 1870-1970* (Cambridge: Cambridge University Press, 1996); J. Agar, *The Government Machine: A revolutionary history of the computer* (Cambridge: MIT Press 2003).

and technological leader of Western Europe; that the UK government did not reject technocracy, but was filled with experts and engineers, and was not hostile to modernity. This shift in the historiography reversed the trend that underplayed the importance of state technocrats, such as Sir John Hill and Lord Walter Marshall, but also showed the importance of scientific and technical knowledge across the breadth of the technical branches of the civil service.[79] Other authors such as Peter Hennessy have focused exclusively on generalist administrators, but they also have shown how the civil service in wartime maintained a list of scientific and technically qualified personnel from across industry and academia through the Central Register. This list was managed by the Ministry of Labour and National Service and contained the names of scientists across a range of specialisms.[80]

Roger Williams argued that the role of ministers was limited, stressing the importance of 'technological momentum.' He also argues that the public nuclear debate of the mid-seventies could be viewed as having facilitated the discharge of two distinctively different functions. First, a controlled debate bringing in Parliament and with good availability of information and adequate opportunities for involvement. Second, a public debate which was also a 'genuine means, in circumstances involving at least some uncertainty, of getting all relevant questions identified if not answered, and of testing BNFL's case.'[81] While, Joseph Camilleri argued that the Windscale inquiry provided 'the best opportunity yet for public involvement', but that there were limits to what the state can do to accommodate the demands or grievances of anti-nuclear groups.[82] However, Duncan Burn, an economic historian, had previously suggested the nuclear industry had a monopoly on ministerial advice which allowed it to survive despite economic concerns. Meaning a public debate on nuclear power was not truly possible, as not all relevant information was given to decision-makers. Tony Hall later agreed with Burn saying that understanding the party politics of nuclear power was irrelevant because of the monopoly

[79] 'Defiant modernism' has implications for the argument of this thesis in that it is proposes that nationalistic arguments were made in support of projects like nuclear power. The argument that the UK turned to industrial ventures like nuclear power in a search for glory, as to compensate for its loss in imperial stature and the ascent of the US. For the first use of the concept within the academic literature, see R. Bud, 'Penicillin and the new Elizabethans', *British Journal of the History of Science*, 31 (1998), 305-333. Echoing conclusions already reached about the direction of 'white heat', the claim was this 'defiant modernism' waned in the mid-1960s, when it came clear that the UK could not compete with the US. J. Sumner, 'Defiance to Compliance: visions of the computer in postwar Britain', *History and Technology*, 30 (2014), 309-333.
[80] P. Hennessey, *Whitehall* (London: Secker & Walburg, 1989), 121.
[81] R. Williams, *The Nuclear Power Decisions*, 313 & 320.
[82] J. A. Camilleri, *The State and Nuclear Power*, 124.

of ministerial advice, asking the question whether ministers, 'were they prisoners of the atomic establishment?'[83] While the authors differ in the degree to which they believe the industry monopolised ministerial advice they all agree that the nuclear industry was an exceptionally strong lobbying force. But none go into detail as to why the industry held this monopoly or how they used it.

Simon Taylor's recent history of nuclear power in Britain still used the accounts of Roger Williams and Duncan Burn despite their being respectively published in 1980 and 1967. Taylor argued that 'the Conservatives were, in this period, instinctively pro-nuclear, partly because they were anti-coal.' Furthermore, that Margaret Thatcher saw nuclear power as being crucial to the fight against climate change as seen by her speech to the UN in 1989.[84] Nuclear power in the Thatcher years remains understudied. Dieter Helm's monograph, *Energy, the State, and the Market: British Energy Policy since 1979*, is the most in-depth study of the energy sector during and after the years of privatisation. It uses history to explain the challenges faced by the industry and why they have struggled to meet these challenges head-on. The central argument is that the industry was solving yesterday's problems and that it was unable to see the issues facing the sector in front of them.[85] However, this book was written without access to official sources, whereas this thesis had at least some access. More recent research by Jon Agar on science policy under Thatcher, uses the opening of the FBR and the accident at Chernobyl as case studies into how Thatcher approached science policy and reacted to technological and scientific events.[86] Previous research covered the fact that ageing nuclear experts volunteered to sacrifice themselves in the event of a nuclear disaster.[87] Both of these studies provide readers with an insight into how both the people within the industry viewed their work as important, and were willing to exchange physical jeopardy to secure its continuation. These works provide the policy context to the period in question and where the nuclear industry fitted within that.

As is seen by the literature on atomic exhibitions, the industry is not seen as being a science communicator. However, the British state believed it to be an important

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[83] T. Hall, *Nuclear Politics*, 12.
[84] S. Taylor, *The Fall and Rise of Nuclear Power* (Cambridge: UIT Cambridge, 2016), 22 & 28.
[85] D. Helm, *Energy, the State, and the Market*, 407.
[86] J. Agar, *Science Policy Under Thatcher* (London: UCL Press, 2019). For more on UK response to Chernobyl see also S. Martin & M. E. William, 'Politicising Chernobyl'. 273-292.
[87] J. Agar, 'Sacrificial Experts? Science, Senescence and Saving the British Nuclear Project.' *History of Science*, 51, 1, (2013). 63-84.

facilitator of the communication of science, hence the vast resources committed to it, and it needed to do so to retain public trust. However, not all the communicating that the industry and government did was purely science communication. It was also government communication. Brendan Maartens examines the emergence of the Central Office of Information (COI) under Clement Attlee.[88] The COI was intended to spread impartial and supposed non-controversial 'facts' about government policy, however, Conservatives feared that the COI was a rebrand of its predecessor, the Ministry of Information, and would be used as a propaganda tool for the party in power. Maarten concludes that despite Conservatives opposition to the COI, they did not alter it once they came to power and it remained as part of the state apparatus, reflecting a 'growing belief within the political establishment that governments should play a leading role in publicising their affairs.'[89] Scholars have also argued that communication about potential government policies is prone to accusations of merely being a form of government propaganda whereby politicians use the state apparatus, normally considered to be non-partisan, to promote a particular politician or party policy.[90] In this thesis, we see how Chernobyl was politicised by the Thatcher government to critique the Soviet state and socialism as a whole. However, the literature on government communication is limited. In the case of the COI, the historiography does not develop much further beyond the early 1950s. Furthermore, the literature does not currently do is to make this connection between science and government communication.

Virginia Berridge has looked at government policy surrounding multiple health crises including AIDS in the 1980s and 1990s. Arguing that politicians while appearing to be doing something about 'the crisis' also distanced themselves from what they saw as morally suspect people and behaviours.[91] Likewise, Jon Agar shows how Margaret Thatcher intervened only occasionally, and how her responses were often moralistic in tone. For instance, a survey was stopped because it was thought to offend and intrude into

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[88] For more on the formation of the COI see M. Grant, 'Towards a Central Office of Information: Continuity and Change in British Government Information Policy, 1939-51.' *Journal of Contemporary History,* 34, 1, (1999), 49-67.
[89] B. Maartens, 'From Propaganda to 'Information': Reforming Government Communications in Britain.' *Contemporary British History,* 30, 4, (2016), 542-562, 556.
[90] See, D. Gelders & O. Ihlen, 'Government communication about potential policies: Public relations, propaganda or both?' *Public Relations Review,* 36, (2010), 59-62; K. Sanders, 'The strategic shift of UK government communication,' in K. Sanders (ed.) *Government Communication: Cases and Challenges* (Bloomsbury Publishing, 2013), 69-85.
[91] V. Berridge, *AIDS in the UK: The Making of Policy, 1981-1994* (Oxford: Oxford University Press), 123-154.

people's private lives.[92] However, while the literature has examined government communication and policy of health issues the examination of government communication on matters of industry and technological disasters has not received the same coverage.

The literature on the British civil nuclear industry has not seen it as a communicator of science. Indeed, literature examining the formation and communication of government policy has also not considered the state as a communicator of science. This does open up further questions on how the British state communicated not just nuclear science, but science in general, who it saw as responsible for doing this and what importance it placed on the communication of both nuclear policy and science. Furthermore, what was the influence of civil servants on nuclear policy and how did they seek to influence the public debate? What impact does this overlapping between science and government communication have on public trust?

Primary research questions

From this literature review, I have formulated the key research question: How did different branches of the British state communicate with the public about nuclear energy, and how and why did this change over time? To answer this, I must also ask: How did the sector plan and respond to hypothetical and actual nuclear accidents domestically and overseas, particularly TMI and Chernobyl? In what ways did the reinvigoration of nuclear opposition and anxiety affect communication strategies and lead to both collaboration and confrontation? How did state organisations collaborate with each other and the wider industry, including private companies, trade unions and political parties, to build and sustain trust? How did advocates of nuclear energy respond to challenges from within government, notably the Royal Commission on Environmental Pollution (1976)? Addressing these questions will shed light on a range of broader issues around the role of experts in communicating complex scientific and technological subjects, how policymakers conceptualised the public, the emergence of new techniques in science communication.

[92] J. Agar, *Science Policy Under Thatcher*, 122.

Sources

The quote below from Sir Fife Clarke, the Director-General for the COI between 1954 to 1971, not only further shows us why this thesis is worthy of study, but also with a foundation for how I will approach this research project.

> The information services of the British Government are based on two principles. The first is that public policy and public relations cannot be separated… The second principle is that a dividing line is drawn between press and public relations work – liaison with newspapers and broadcasting – and the deliberate production of material, paid for out of public funds, in order to give information direct to the public.[93]

The quote can be broken down into three points. First, to not just look at public relations as a separate entity, but to see it within the context of government policy towards nuclear energy during the period. Second, to view different audiences relevant to the communication effort, in addition to the public and the press mentioned in the quotation, parliamentarians were a crucial third audience relevant to this thesis. Finally, it encapsulates the kind of material that I have used to address my research questions, whether it be newspapers, press notices, television interviews, parliamentary debates, or internal memorandums. Furthermore, regarding the 'second principle' of information services, Clarke is referring to the difference between the day-to-day responding of press inquiries and the longer-term planning of publications for public consumption. This hints again that when we talk about a communication strategy, we can think of it both in terms of a long-term thought-out coherent strategy, albeit a thinly veiled one. While also recognising the need to respond to events and crises which forces shifts in how the industry responds and communicates to the public. It also further highlights the hierarchy of communication where communicating to the press on a daily basis is a priority for government communications due to the press's role as an intermediary between the public and the government.

[93] Sir Fife Clarke, *The Central Office of Information* (London: George Allen & Unwin LtD, 1970), 11.

This thesis seeks to rebalance the historiographical trajectory of the UK nuclear debate, shifting away from exploring the narratives of opponents to nuclear towards an in-depth understanding of how government and publicly funded institutions wielded the resources they had. In addition, it enables insights into how external discussions and events shaped approaches to public presentation. For this reason, a lot of my sources are generated by the industry bodies themselves and by the state. The National Archives in London represents the primary source base for this thesis. Primarily, the archival material of the UKAEA (AB), Department for Energy (EG) and of predecessor bodies such as the Ministry for Power (POWE), which shed new light on Britain's nuclear power policy. I have also looked at the papers from the Health and Safety Executive (HS) and the Department of the Environment (AT), the Welsh Office (BD), and the Ministry for Agriculture, Fisheries and Food (MAFF). These departments have either had considerable contact with UKAEA and CEGB like the Health and Safety Executive and the Department of the Environment, while MAFF and the Welsh Office were at the forefront of the governments' response to radioactive disposition after Chernobyl. Files from the Prime Minister's Office (PREM) and Cabinet Office (CAB) complement other official sources where appropriate to fill in gaps in the archival record.

Official sources from the National Archives have been complemented with material from seven other archival collections. This includes the personal files of the former chair of the UKAEA, 1967-1983, and BNFL, 1971-1983, Sir John Hill, and former deputy chair, 1979-1981, chair of the UKAEA, 1981-1983, and then the chair of the CEGB, 1983-1989, Lord Walter Marshall, which are located at the Churchill Archives Centre (CAC). Papers from the former chair of the CEGB, 1977-1982, Glyn England are at the Institute for Engineering and Technology (IET). These collections include the personal correspondence between senior officials of the industry throughout the period in question. They also include lectures given by the senior officials, as well as collections of newspaper cuttings curated by the electricity council. They show at the highest levels how industry officials thought they should plan out and implement its communication strategy. This has been further complemented using the Electricity Council papers at the Museum of Science and Industry (MUSI), which included council minute papers that discuss issues on public opinion. Finally, the papers of third-party individuals David Fishlock from the *Financial Times,* and Conservative MP Keith Best and Liberal MP Paddy Ashdown have also been used to see how they engaged with the industry and vice

versa. David Fishlock was of particular interest to the industry and could be considered as holding the closest relationship with it. His papers provide insights into how the industry communicated with journalists. The papers of Keith Best and Paddy Ashdown, who held opposing views on nuclear power, provide this thesis with knowledge of how the industry communicated with MPs who held different opinions. Best's constituency of Ynys Môn also contained Wylfa nuclear power station, so will aid in answering questions over how the industry communicated with the communities around or close to nuclear sites. Officials from Sellafield have also provided me access to archival information, including public relations material from the site. In analysing this material, I have been sensitive to their possible motivations in being willing to provide it. Did they want to make a good impression on me so that I write about the industry in a favourable light? Possibly. The project was developed to explore what had happened, and so I sought sources that enabled me to look at what the industry did rather than to follow what opponents of nuclear power were doing and the industry's responses to them.

I have also utilised official publications from the UKAEA and CEGB as they were intended to be read by the audiences they wanted to communicate to. Interviews with former industry officials, particularly those done for the British Library National Life Stories project, 'An Oral History of the Electricity Supply Industry in the UK'.[94] As well as digitised newspapers, radio and TV recordings; these provide further sources of information and insights into what Daniel Salisbury calls the 'casual mechanisms' that form public relations.[95]

The majority of the sources available have been internal memos or correspondence between officials from different divisions within departments or between different organisations. This is the evidence base for this thesis, showing the internal thinking of organisations such as the CEGB and UKAEA on how they thought they developed policy and strategy for communicating with the public, but also how they viewed the public they were communicating to. There are also booklets, reports, and briefs where the industry responded to claims made by anti-nuclear groups. These allow me to focus on particularly contentious moments, such as the possibility of accidents, the efficacy of industry demonstrations, or the risks of radiation exposure. The final core

[94] For more information on and the methodology of National Life Stories see, BL, *National Life Stories: A History* (BL, 2018).
[95] D. Salisbury, *Secrecy, Public Relations and the British Nuclear Debate*, 7.

grouping of internal documentation I have used is industry and government press releases. The reason I have used these, rather than just use what the media was saying, is that not every press release was covered, and even amongst those that are they are not covered equally. More importantly, the press releases tell us what the industry actually wanted to communicate. Furthermore, although I have and will use the word "industry" as a homogenous organisation as a stylistic choice, it is not homogenous, it is heterogeneous, as it is made up of different organisations with different purposes. Therefore, not only do these press releases from different organisations tell us something about how they saw their role in communicating with the public, but also whether they took different approaches.

There are implications for relying heavily on internal, state-owned elements of the industry and government sources of information, the nature of the sources has implications for the analysis. Competing narratives over the benefits of nuclear power mean that what one side believes to be important does not always correlate to what the other side sees as important. Often, the industry and anti-nuclear groups would be talking past each other, as well as at each other. The extensive historiography that explores anti-nuclear activities allowed me to identify areas of contestation and focus parts of my research around these areas that have allowed me to narrow down the scope of my research. However, just as Steven Shapin and Simon Schaffer demonstrated, I also have recovered forgotten arguments that would be missed out if I focused only on moments of contention.[96] Such an approach produces great source material, for it is during these forgotten arguments that otherwise hidden justifications and ideological commitments come into the open.

Most of the evidence this thesis uses is qualitative rather than quantitative. However, polling data, some of which was commissioned by the nuclear industry, will be used. I will use both event-driven and routine long standing polling. Using both allows me to see the immediate reaction from the public after events like nuclear accidents, like Chernobyl, and public inquiries, such as Sizewell B. Longstanding polling allows us to see trends over the period that places events like Chernobyl within the broader view of public opinion. The polling data covers a broad view of public opinion over the period on several topics. Including whether these were anxieties over nuclear war, whether the

[96] S. Shapin & S. Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the experimental life* (New Jersey: Princeton University Press, 1985), 6-7.

public preferred coal or nuclear as a means to generate electricity, or whether they thought that the nuclear power industry was beneficial to the UK. By analysing this quantitative material, it allows me to show the fluidity of public opinion and show that it is not appropriate to assign generalised terms when describing public opinion towards nuclear power. It also highlights the extent and variety of the challenges facing the industry, and how they compared to concerns the public had on other issues.

Half-way through my research the Nuclear Decommissioning Authority, the government department that legally owns the AB collection, recalled the entire collection at the behest of the Ministry of Defence in collaboration with the Atomic Weapons Establishment (AWE), who wanted to conduct a security review of the entire AB and the AWE collection (ES), which are held at The National Archives. This provided an immense challenge for my research. For several months there were no answers as to whether or when the collection would be reopened. When assurances were given that much of the collection would be returned for public viewing, no time scale was given and obviously, not all files would be returned. This meant that I had to rely on Freedom of Information requests (FOIs) to try and regain access to these files.[97] However, these FOIs took time to complete and so an extensive amount of the AB collection that I had planned to see has remained unavailable. This has forced me to change how I progressed with my research, and it limited what I could look at due to time constraints. This includes not being able to make the UKAEA the central authority this thesis analyses and it limited what I could analyse in terms of the nuclear industry's interactions with the media with case studies like the Black Inquiry (1984) into radioactive discharges and the prevalence of leukaemia. While the lack of clarity and transparency only served to reinforce the views of the industry's critics, because this thesis is not concerned with whether nuclear power is good or bad it did not overtly alter my analysis to be hostile or positive towards nuclear power.

This has also forced me to rely more heavily on the other sources of information mentioned and has created two methodological challenges. The first is routine for all historians and that was the need to tie together what are the personal actions of individuals, into the wider organisations that they moved within and collaborated with. At present there is no central CEGB archive, therefore, claiming the actions of one

[97] For more on the issue of FOIs and archival research see, Special Branch Files project http://specialbranchfiles.uk/

individual as being representative of the entire organisation might not be justified without further evidence to support it. The second, which again is not unique to this study, is the limitations on what case studies I can use to thread together a comprehensive and coherent history. To mitigate this methodological challenge, I have chosen several case studies throughout the period that were not impacted by the closure. These include the public inquiries whose files sit outside the AB collection, including responses to nuclear accidents, particularly Chernobyl, but also the response to Welsh sheep farmers uses files in the BD series. In addition, the personal efforts of Sir John Hill and Lord Walter Marshall to use examples of them communicating with the public to see how they fit into the wider patterns that emerged while researching. My conclusions reflect the material available to me and there remains much scope for future work.

The closure, along with the impact of the COVID-19 pandemic on access to archival material, has led to a greater reliance on digital sources including newspapers from Gale Primary Sources and ProQuest Historical Newspapers. Newspapers play a dual role in this thesis and for the industry. The first and most relevant to this thesis is as a medium the industry used to disseminate press statements to varying sections of the public. However, their other role is as a source of critical comment against the industry, this is usually within certain publications, such as *The Guardian*, but critical pieces can be found in other, usually supportive publications, such as *The Economist* and *The Financial Times*. Newspapers can also allow us to take a longer-term view of the narrative across this period. What was being talked about, who was involved and what they were saying.

The role of newspapers in communicating science has been covered by several academics. Adrian Bingham explores the potential uses and challenges of using digitised newspapers.[98] Digital searching enables newspaper content to be explored far more rigorously and sensitively. 'It is far easier, for example, to find out when a subject was first discussed in the press, or when a term was coined.'[99] Bingham reminds researchers that we must be aware of the way that research may be distorted by the availability of certain titles and the absence of others.[100] There are also other substantial methodological issues, especially regarding keyword searching, which is the tool that most people use

[98] A. Bingham, 'The Digitization of Newspaper Archives: Opportunities and Challenges for Historians'. *Twentieth Century British History*, 21, 2, (2010), 225-231, 225.
[99] Ibid, 228.
[100] Ibid, 229.

when working with digital archives. Keyword searching can be very effective if used properly, but it is also in some ways a rather blunt instrument. The absence of a word does not necessarily mean that a subject is not discussed, it may merely indicate that alternative terminology has been used.[101] To mitigate these issues I have chosen to include a wide range of publications from the national press in this thesis. This includes *The Guardian, The Times, The Financial Times, The Daily Mail, The Daily Mirror, The Daily Telegraph*, as the primary body of newspapers I use to track nuclear industry press releases and articles written by industry officials. These newspapers also cover a wide range of the political spectrum ensuring I can encapsulate a wider range of voices within the pages of these papers. *The Economist, New Scientist* and *Nature* have also been used in places as supplementary evidence.

One of the reasons why I have selected these papers in particular, except for *The Daily Mirror* and *The Daily Telegraph*, is that these were publications that were collated every day by the Electricity Council into booklets for senior officials within the Electricity Council and the CEGB. These were the papers that the industry was interested in, they contained the audiences that they either wanted to communicate to or wanted to know what they were saying, such as parliamentarians, trade unions and anti-nuclear activists. Tom Lean and Sally Horrocks have commented on the use of newspapers to study the communication strategy of the nuclear industry:

> The coverage of the industry in the media has generally been dismissed as part of an 'official' narrative, and as symptomatic of its failure to go beyond the deficit model of public understanding of science, but scholars have said little about the other ways that it used to engage with ordinary people.[102]

They suggested that this might have arisen from having to interpret the industry's activities without access to its internal debates or information about how these activities were understood and managed by insiders. However, by piecing together what has been

[101] A. Bingham, 'The Digitization of Newspaper Archives: Opportunities and Challenges for Historians'. 230.
[102] T. Lean & S. Horrocks, 'Good Nuclear Neighbours', 1.

made accessible via FOI, or seen before its closure, the AB collection – along with the collections at the Churchill Archives Centres – this thesis provides these insights.

Journalist Rosmarie Walder stated that science does not have a special position within newspapers. It is treated like all other subjects, typically giving 2-5% of their coverage to science.[103] Gwendolyn Blue has also argued that newspapers make possible certain cultural practices of engagement while suppressing and marginalizing others. As such, newspapers act similarly to other technologies of modernity by providing the conditions for norms of transparency, visibility, and contemporaneity to take hold in the public imaginary.[104] What this means for this thesis is that newspapers can legitimise and delegitimise narratives.

Structure of Thesis

This thesis offers a mostly chronological account of the nuclear industry's communication efforts during the 1970s and 1980s. This allows it to track themes within these efforts and to address my key research questions. Chapter Two explores key concepts and challenges that the industry faced in the 1970s as well as how it initially approached them. It is split into two parts. The first look at polling data across the period to provide quantitative data about public opinion on the industry and how this changed over time, revealing the levels of trust and the extent to which it had public support. The second part provides a brief history of the industry leading up to 1976 and how the industry framed its strategy around the phrase 'public acceptability'. Therefore, this chapter helps to frame the situation the industry was in pre-TMI, it also lays the foundation for the rest of the thesis.

Chapter Three looks at the UK's response to the accident at TMI. It will provide context to the United States response to the technological disaster so that it will allow me to draw out what lessons the UK industry intended to learn from the event. It will ask: did TMI change emergency procedures in the UK and what did this event mean for the industry moving forward? This chapter begins with the argument that the major accidents at TMI, and later Chernobyl, represent turning points in the industry's communication

[103] R. Walder, 'The role of newspapers', 91.
[104] G. Blue, 'Science Communication is Culture: Foregrounding Ritual in the Public Communication of Science'. *Science Communication*, (2018), 1011, 6.

strategy. This chapter will argue that while the industry argued that such an event could not happen to a UK reactor, they still wanted to be seen to be proactive in learning the lessons from TMI, especially within the context of seeking approval to build a PWR at Sizewell.

Chapter Four looks at the parliamentary and public forums designed to hold the nuclear industry to account and how the industry navigated through these conventions. Starting with parliamentary scrutiny in both the debating chamber and in select committees, as well as direct correspondence between industry officials and ministers. It will then look at the public inquiries that took place at Windscale, Sizewell B, and Hinkley Point. It will show how public inquiries, were part of the process to legitimise the construction of nuclear plants in the face of unfavourable public opinion. Therefore, this chapter will argue that these processes and parliamentary debates were a crucial part of the industry's communication strategy.

Chapter Five is the first of two chapters looking at the response of the UK government and industry to the accident at Chernobyl (1986). It asks three questions. How did Chernobyl impact the communication strategy? What lessons were 'learnt'? Who was the industry communicating with, and why? The chapter analyses two videos produced in the aftermath of the event, one made by the UKAEA, and one made by the CEGB. It will then look at the politicisation of the disaster as a means of concentrating blame on the policies of the Soviet Union, rather than any inherent fault with nuclear power. Finally, it looks at the impact of the disaster on opinion polling and the responses in the media to see how the narrative was forming. This chapter continues to argue the case made in Chapter Three that accidents like Chernobyl were turning points in the communication strategy, in this case, it represented a dramatic shift due to the severity of the accident.

Chapter Six further examines the UK's response to Chernobyl. It uses the regional case study of North Wales to look at how the UK government responded to the sheep farmers in the region, who faced restrictions after radiation was deposited in high amounts on sheep pastures. It will ask how did the industry communicate on a local level? How did different government departments and the nationalised industry work together? How did the industry respond to local MPs and political parties? This chapter will show how the focus of the response to Chernobyl shifted away from nuclear power towards

socio-economic concerns, due to the potential unintended consequences of the restrictions placed on the movement and slaughter of sheep putting the livelihoods of the farmers under threat.

Chapter Seven and the final thematic chapter looks at the emotional argument the industry made for nuclear power. This includes direct communication with the public through the 1984 demonstration nicknamed 'Operation Smash Hit' that involved a train crashing into a nuclear flask at 100mph. Lectures, including Walter Marshall's "garden lecture", which attempted to normalise or domesticate radiation as a substance that exists all around us. As well as the visitor centre at Sellafield that was redeveloped in 1987, which allowed the public to physically come into the place of the industry so that they could directly interact with it. This chapter will show the strategy for communicating with local communities and influential audiences, as well as that the industry intensified its efforts to make changes after the Chernobyl accident.

Placed together, these chapters chart the evolution of the public relations effort of the UK nuclear industry between 1975 and 1990. In doing so, this thesis offers a more nuanced perspective of how the nuclear industry viewed and communicated with the public, by examining the sum of its strategies through key moments and debates, both in public and within the halls of Westminster. It also shows the hierarchical nature of communication used by the industry to distinguish which audiences were worth talking to and what information, if any, they would receive. Finally, this thesis will show us the value of seeing the nuclear industry and government as a scientific communicator and will provide a more rounded view of how the public view science communication.

Chapter Two: Seeking Public Acceptance and Avoiding Public Hostility

This background chapter will contextualise this thesis, its different themes and will start to answer the overarching question: how did different branches of the British state communicate with the public about nuclear energy, and how and why did this change over time? I first provide a brief overview of the history of the nuclear industry to contextualise the period, highlighting problems with the stagnation in policy regarding the choice of reactor and how it impacts public communication. The second section identifies features of British public opinion on this topic between 1978 to 1992. This has been included to show the benefit of using polling data to contextualise our understanding of this topic and period. It also shows that terms such as for, against, or apathetic to describe public attitudes to nuclear power do not reflect the fluidity and at times, contradictory nature of public opinion. This section also investigates the industry's efforts to gain 'public acceptance' leading into the 1980s. This phrase often used by the industry was a broad term, employed to describe public relation campaigns, public inquiries, political processes, and science communication efforts. The third section covers the publication of the sixth report of the Royal Commission on Environmental pollution in 1976. This report, otherwise known as the Flowers Report, had extensive ramifications of the nuclear industry who were initially dismissive of the Royal Commission, pointing towards their supposed impeccable safety record. Eventually, the industry would have to address questions and concerns raised in the report, primarily around waste disposal. It also sets out the problems facing the industry before the 1980s and begins to explain how the industry approached these. Finally, I will also look at the industry's plans for a potential nuclear accident and how they intended to communicate to the public in such an event. This provides the context in which communications were managed in later accidents at Three Mile Island and Chernobyl. These preparations for responding to a nuclear accident can be described as basic, where the public were an afterthought rather than central to the plans of government and industry. I have used evidence from a plurality of sources from the period to provide as wide-ranging an analysis as possible.

This chapter argues that the current historical focus on cultural outputs from this period have overshadowed the evidence of a different understanding of the nature and extent of nuclear anxiety that emerges when we examine public opinion polling data. It

will show the fluidity, and at times, seemingly contradictory nature of public opinion. The polling data indicates that the public were in general, favourable towards existing nuclear power plants, but were sceptical about the development of new ones due to the perceived risks associated with nuclear waste and the potential for major nuclear accidents. This section will also show the limitations of using public opinion data in this context as while it will be shown that the industry knew of this data's existence, current gaps in the archives mean we cannot fully explore to what extent they were responsive to it. The chapter will also argue that the industry's public relations efforts throughout the 1980s were a response to challenges posed to them in the 1970s by publications such as the sixth report of the Royal Commission on Environmental Pollution and a perceived lack of public support leading to initiatives to improve so-called "public acceptance."

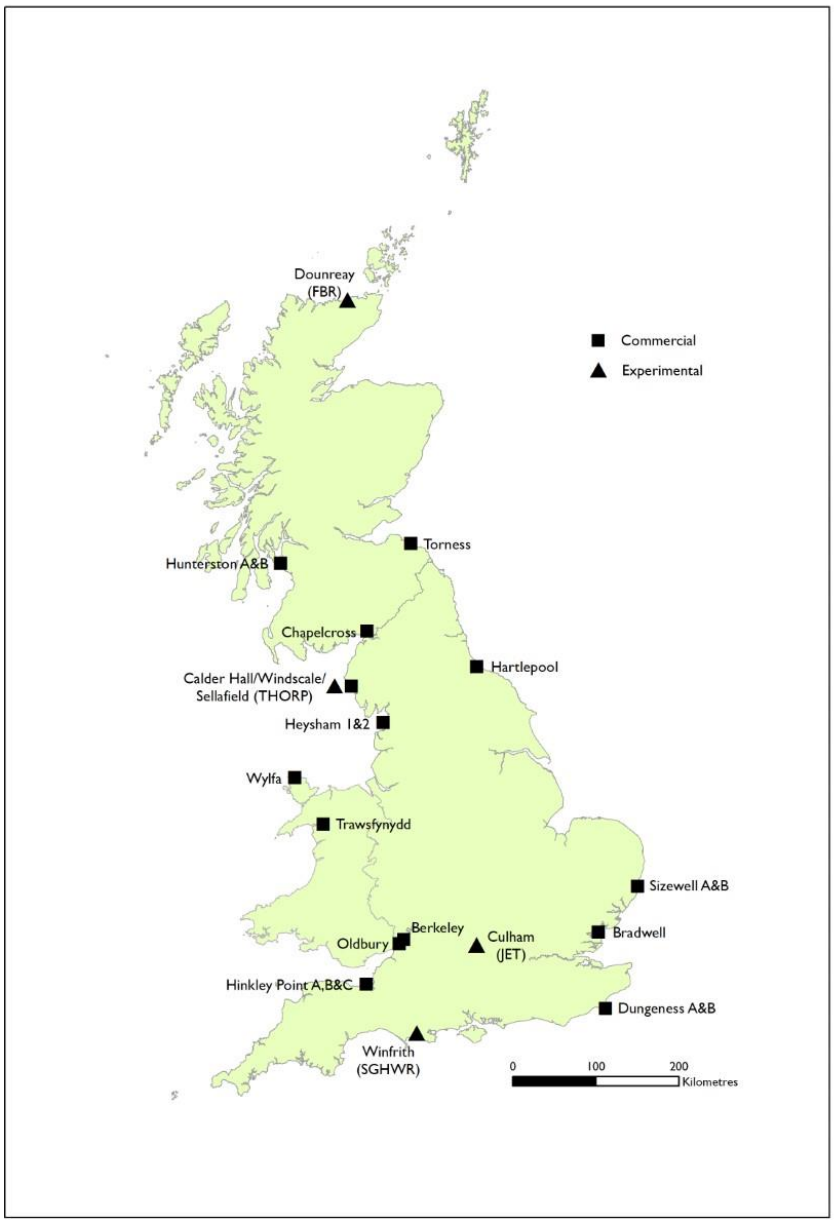
A brief overview of the history of UK nuclear power. From optimism to policy disarray and stagnation.

The UKAEA built and operated Calder Hall, the world's first full-scale nuclear power station to be connected to a national grid and later designed the gas-cooled reactors, called Magnox and Advanced Gas-cooled Reactors (AGR), that made up most UK nuclear reactors. The Magnox design derived from reactors originally created to produce plutonium for Britain's nuclear weapons programme; from Calder Hall, in Cumbria, and Chapelcross, on the south coast of Scotland. Both Magnox and the later AGR used graphite as a moderator and carbon dioxide as a coolant. This was in contrast to the US which designed PWRs which used water, typically light water, as the coolant. However, the UK government up to 1979, stuck with its own designs over the more popular American PWRs.[1] Figure 2.12 below shows the geographical location of the major commercial and experimental nuclear power sites in the UK. The CEGB, established in 1958, was responsible for generation in England and Wales, while the South of Scotland Electricity Board (SSEB), created in 1955, operated the nuclear power stations built in

[1] See 'Nuclear Power Reactors', https://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-power-reactors/nuclear-power-reactors.aspx Accessed 06/01/2021, for more information the global picture of nuclear power. There are currently only 14 AGR reactors in the world, compared to 301 PWRs. Tom Kelsey's recent thesis examining the economic arguments against nuclear power provides a detailed history on the history of choosing AGR over PWR. T. Kelsey, Picking Losers: Concorde, nuclear power, and their opponents in Britain, 1954-1995, (Kings College London, Unpublished thesis, 2020).

Scotland.[2] By 1971, Britain installed 4,500MW of nuclear electricity, in the shape of nine, commercial Magnox power stations.

Map 2.12 Map of the United Kingdom with marked nuclear power station sites.



Source: Author's collection, made by Dr Richard Jones using ArcGIS

[2] The CEGB took over the electricity supply and generating responsibilities of the Central Electricity Authority, which had been disbanded in 1957. The Central Electricity Authority was criticised for being responsible for both overseeing the electricity supply industry and running it. The Electricity Council was formed in 1958 to supervise the work of the CEGB.

The question of whether the UKAEA should continue to design nuclear reactors became a matter of controversy, especially inside Whitehall and the wider nuclear industry.[3] The CEGB objected to the UKAEA's monopoly over reactor development, and during the 1970s wanted to shift from building UKAEA designed AGR reactors to American-designed Pressurised Water PWRs.[4] The CEGBs shift was caused by the implementation of the Labour government's announcement in 1965, to embark on a second nuclear power programme of 8,000MW, through the construction of five AGR stations. Dungeness B was the first, with construction beginning in 1966. The building of Hinkley Point B and Hunterston B started in 1967, Hartlepool in 1968, and the fifth AGR in Heysham during 1970. By the time Labour left office in 1970, around 6,000MW worth of AGR plant was under construction, but none had been completed. All sites suffered from construction delays, with Dungeness B, which was supposed to be finished in 1970, connecting to the grid in 1983.[5] Debates on which nuclear reactor to build continued throughout the 1970s and the Labour government initially decided to go for the Steam Generating Heavy Water Reactor (SGHWR) in 1974.[6] However, the UKAEA failed to produce a workable design and in 1977 this project was cancelled.

The most important to the Royal Commission was the concerns over the feasibility of the FBR, which was subject to significant environmental and economic criticism. In 1976, the UKAEA forecast that by 2030, two-thirds of Britain's electricity supply would come from fast breeder reactors.[7] However, no full-scale FBR was ever built, primarily because the demand for nuclear power did not expand at the rate the UKAEA had forecast, and this left freshly mined uranium both abundant and cheap, which undercut the need for fast breeders. The FBR also raised concerns that the so-called 'plutonium economy' would infringe on civil liberties and raise the risk of the proliferation of nuclear material, that could be used in nuclear weapons. This was highlighted in an article in *The Guardian* that quoted 'experts', without naming them, as saying Plutonium was 'fiendishly toxic' and that the FBR would produce vast quantities of plutonium, the article goes onto say that 'if fast breeders are to come, man must learn

[3] See T. Kelsey, Picking Losers.
[4] For more on the SGHWR see, P. D. Henderson, 'Two British Errors: their probable size and some possible lessons', *Oxford Economic Papers*, 29, 2, (1977), 159-205.
[5] W. C. Patterson, *Going Critical: an unofficial history of British nuclear power* (London: Paladin Books 1985), 60.
[6] A 100MW prototype had been operating at Winfrith since 1967.
[7] Sir Brian Flowers, *Royal Commission on Environmental Pollution: nuclear power and the environment* (London, 1976), 195.

to live with the extensive traffic in one of the deadliest poisons he has yet discovered.'[8] It also suffered from design flaws with the prototype FBR that was brought online in 1975 only reaching its maximum generating capacity of 250MW in 1985. The CEGB was also cautious about the UKAEAs claims of the benefits of the FBR, at a conference on the 14th March 1974, senior CEGB engineers called for more data to show that an FBR would be a reliable form of generating electricity. Dr Eric Carpenter, head of physics at the CEGBs Berkeley Laboratory stated,

> If you are going to buy a new reactor system, the time to spend money is at the front end of the development programme.[9]

What Carpenter is saying here is that before you commit to implementing a new design you need to invest heavily in research and consultations before you buy the reactor. The disunified message in the wider nuclear industry was another major problem facing the nuclear industry during the 1970s. It led to delays in policy announcements, which contributed to the industry stagnating as industry and government could not agree on what kind of reactor should be built for the 3rd generation of nuclear power stations. This would change with the election of the Thatcher government in May 1979, who were in favour of building PWR stations. The 1980s was meant to bring new optimism to the nuclear industry, the disagreements over reactor design would mostly cease once the decision had been made.[10] The next battle was to overcome the challenges posed by the Royal Commission and the threat of nuclear accidents, especially after the accident at TMI.

Nuclear Anxiety and Polling data

This section will identify what previous studies have said about nuclear anxiety and public opinion and then analyse public attitudes in Britain using polling data. The data

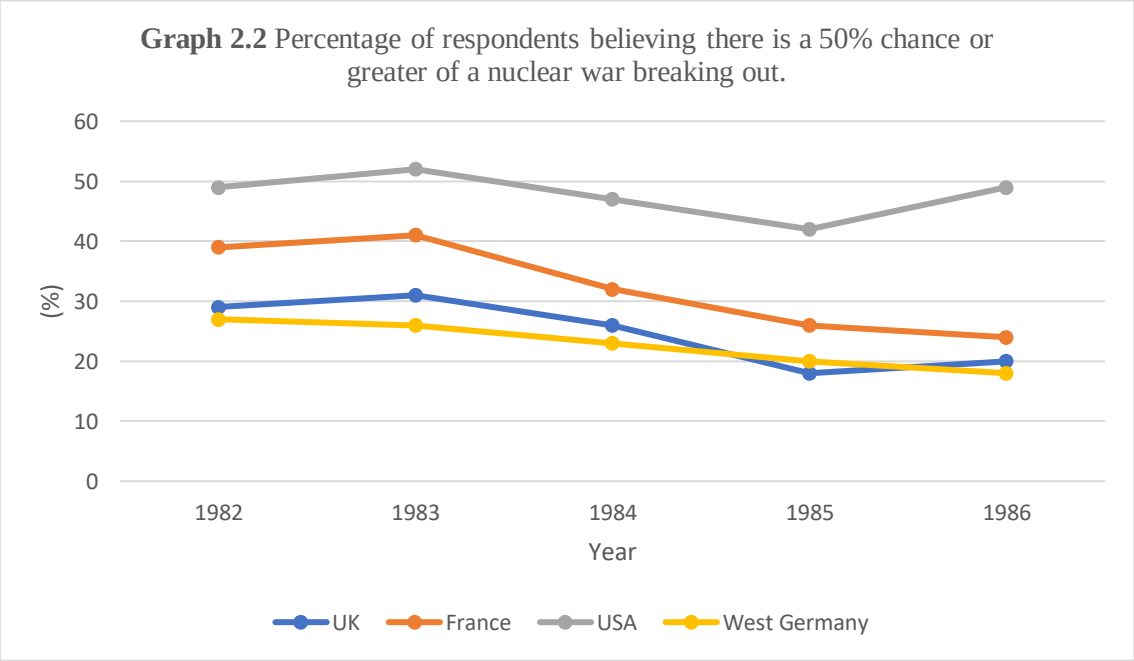
[8] *The Guardian*, 24th February 1974, 7.
[9] *The Guardian*, 15th March 1974, 18.
[10] There were some disagreements between the CEGB and South of Scotland Electricity Board (SSEB) on the performance of the AGR, with the SSEB arguing that the AGR had improved and was more economical than the PWR. See J. Agar, *Science Policy under Thatcher*, 141.

will show that the public's view of nuclear power depended precisely when the question was being asked, and how the question was gauging public opinion. Academic writing on nuclear anxiety and culture has suggested there was a significant rise in nuclear fear or anxiety in the late 1970s and early 1980s. However, polling during the late 1970s and 1980s does not support this. Table 2.1 below shows data from a *New Society* survey from 1979 demonstrating that only a small number of people believed that the UK would be involved in a nuclear war. Graph 2.2 presents data from several western democracies for the period 1982-86, including the UK, based on perceptions of the likelihood of a nuclear war starting. Compared to other major nuclear energy-producing countries, such as France and the USA, the UK public was less likely to believe war would break out and was more comparable to West Germany in its attitudes and while there was a rise in nuclear anxiety in 1982, it was a very marginal rise of 2%. With regard to the UK, the shift between 1979 data presented in *New Society*¸ and the data from 1982-1986 from Smith's analysis could be down to Cold War tensions spiking after the Soviet invasion of Afghanistan, as well as domestically the Greenham Common Women's Peace camp demonstrations, which drew attention from the media which in turn led to a lack of trust in the governments nuclear deterrence policy. While the data in this chapter from polling firms were claimed to be representative samples they were not broken down by gender, age, or any other kind of demographic identifier. While this does not allow for in-depth analysis of the polling data it does allow me to take a broader view of the state of public opinion in the UK. This differs from the current analysis which has focused on the cultural outputs of the period, ensuring that they may only capture certain viewpoints such as younger audiences who were the primary consumers of much of the contemporary popular culture.

Table 2.1 UK polling data from New Society on the likelihood of Britain being involved in a nuclear war.[11]

Likelihood of happening	(%)
Very likely	2.7
Fairly likely	10.8
Fairly unlikely	27.7
Very unlikely	51.8
Don't know	6.9

Source: *New Society* Survey, 1979



Source: T. W. Smith, 'A Report: Nuclear Anxiety'.

As Graph 2.2 shows there was a slight increase in those believing a nuclear war would break out in 1983. However, Smith stated in his analysis of the data that:

> overall, nuclear anxiety does not appear to be a raging neurosis. Expectations of nuclear war and worries over nuclear arms generally follow the fever chart of international crises and have not shown any long-term, secular growth. Nor are

[11] Data includes respondents from Northern Ireland, 'Britain' here appears to be erroneous.

> nuclear war or nuclear arms deemed to be among the most probable of future military consequences or the most crucial or pressing of problems. Only on the issue of nuclear survival do we find a decided and monotonic trend, with the public's evaluation of the consequence of nuclear war becoming more pessimistic over time.[12]

While Smith acknowledges that there was an increase in pessimism over time when it comes to nuclear survival, the anxiety surrounding the chance of nuclear war or nuclear-related incidents was not as high as some scholars contemporary to Smith had argued it was.[13] The note that nuclear war was not seen as the most crucial issue of the day also raises the question, what was, and where does nuclear power rank among the concerns of the public? Between 1983 and 1990 in MORI polling nuclear power does not even reach one percent of respondents most important issue until 1988. Unemployment consistently ranked as the highest issue by a substantial margin, with nuclear disarmament or the National Health Service being the second most important issue.[14] Table 2.3 shows public opinion polling from MORI in 1988 which provides a snapshot of what the British public thought were the most important current issue or issues for the country were.

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[12] Tom W. Smith, 'A Report: Nuclear Anxiety'. 561.
[13] D. Yankelovich, & J. Doble, 'The public mood: Nuclear weapons and the U.S.S.R'; M. D. Newcomb, 'Nuclear attitudes and reactions'; D. Mayton & M. C. Delamater, 'Indirect assessment of concern about nuclear war'; B. M. Kramer, M. S. B. Kalick, & M. A. Milburn, 'Attitudes toward nuclear weapons and nuclear war'; G. Diamond, & J. Bachman, 'High-school seniors and the nuclear threat.'
[14] Except for 1988, unemployment consistently polls above 40% during this period as the most important issue facing Britain. The second most important issue polls between five and ten percent. Data can be found at the Archive of Market and Social Research - https://amsr.contentdm.oclc.org/digital/collection/MORI-BPO Accessed 11/01/2021.

Table 2.3 UK polling data - 'What would you say is the most important issue facing Britain today?'

Issue	Most important %
Unemployment/lack of industry	25
National Health Service	12
Crime/law	10
Economy/economic situation	8
Nuclear weapons	4
Inflation	4
Common Market	4
Education	3
Northern Ireland	2
Pollution	2
Nuclear power/fuels	1
Other	17
Do not know	7

Source: MORI, *British Public Opinion*, Vol 10, No. 8, (October 1988).

This data could help explain why the Government proceeded with the construction of Sizewell B, as it was not the most salient issue for the public, and so could proceed without significant public outcry. Furthermore, as Table 2.3 shows, the public were more concerned about the prospects of unemployment at a time of deindustrialisation and the impact that it might have on the economy. However, nuclear power provided highly skilled and paid jobs for typically coastal communities. Therefore, while the risk of an accident at a nuclear power plant is catastrophic if one should occur, the immediacy of economic downturn and unemployment in terms of public opinion outweighed any immediate political risk to the government of the day.

However, while the polling may suggest a different narrative to the one presented in the historiography, which, has so far, tended to use cultural outputs from the period as its evidence base rather than polling data, that does not suggest that the intensity of opposition to nuclear power or weapons increased in this period.[15] Andy Byrom shows that there was some evidence that suggests that actual opposition to nuclear weapons did

[15] The data does not show is demographic breakdown. It is possible that within certain communities' nuclear anxiety and opposition did significantly increase.

not increase but rather the opposite occurred. With the number of people replying 'should,' increasing between 1981 and 1983, rather than 'should not,' to the question 'do you think Britain should or should not allow the [new American-controlled] cruise nuclear missiles to be based in Britain?'[16] Nevertheless, with regard to nuclear power the nature and scope of the Royal Commission on Environmental Pollution Sixth Report, the Windscale Inquiry and Sizewell B inquiry suggest that, at the very least, the risks associated with the industry were more visible. However, this is not to say that anxieties over nuclear power were more visible than those associated with nuclear war. Jonathan Hogg argues that leading into the 1980s,

> perceptions of nuclear technology influenced – sometimes profoundly – how individual British citizens lived their lives. Anxiety over possible nuclear attack is perhaps the most obvious example of how individuals framed new ways of thinking, acting, resisting and submitting to the psychological pressures at the heart of Cold War Britain.[17]

Hogg develops this further by stating that,

> the printed press sensationalized nuclear issues like never before, and the saturation of nuclear references through a variety of cultural means increased. The unique cultural politics of the 1980s allowed new types of expression to emerge, some of which were shocking and extreme in comparison to previous eras.[18]

The visibility of these issues might have played some part in why nuclear anxiety appeared to be a prevalent issue at the time. Hogg agrees, arguing that 'the cultural politics of the era gave rise to more extreme forms of unofficial nuclear expression.'[19] Yet, what the polling data has suggested is that this appearance of nuclear anxiety may

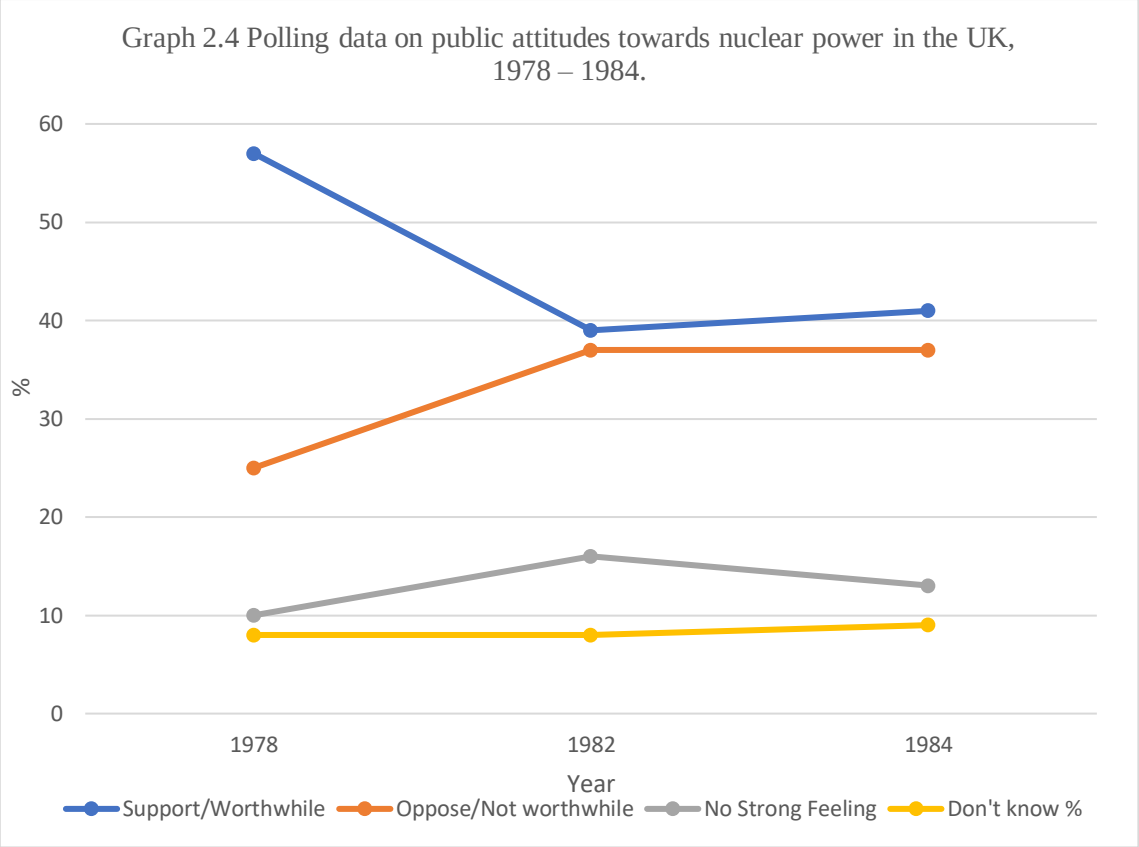
[16] A. Byrom, 'British attitudes on nuclear weapons.' *Journal of Public Affairs,* 7 (2007), 71-77, 73.
[17] J. Hogg, *British Nuclear Culture,* 18.
[18] Ibid, 134.
[19] Ibid, 186.

have been down to successful campaigning, or the professionalisation of campaigning, from anti-nuclear groups, rather than a majority, or even plurality of the public, believing that a nuclear war was likely. The polling evidence suggests that Hogg and other historians have mistaken cultural visibility with popular feeling.

There is not just polling data on nuclear anxiety that should be considered but also polling data on the UK population's favourability towards nuclear power. There were several polls conducted primarily by Eurobarometer, the European Community polling service that measured public opinion across the Community.[20] The data in Graph 2.4 shows that overall public opinion, in the UK, towards nuclear power was more favourable than unfavourable. Graph 2.4 also shows that in Eurobarometer polls there was never a majority of people unfavourable towards the development of nuclear power. However, in 1982 this plurality share fell to just two percentage points.

Therefore, although there is a perception that there was a rise in nuclear anxiety and an increase in opposition, or at least in the intensity of opposition towards nuclear power, the polling data in the tables below do not unambiguously reflect this. Between 1978 to 1984 a plurality of those polled supported nuclear power. However, there was a dramatic drop-in support from 57% to 39% between 1978 and 1982, probably due to the accident at TMI. Yet, the trend does not continue with support rising marginally to 41% in 1984. Opposition rose quite dramatically between 1978 to 1984 from 25% to 37% it never reached a plurality and remained at 37% through to 1984. The data shows that there was a plurality of support for nuclear power, but this does not mean it was not used to argue that the public were sceptical or even against nuclear power. For instance, *The Guardian*, a year before the report was fully published, ran the headline 'market research shows a nuclear switch off.' However, what *The Guardian* did was to mix UK public opinion within the European data to claim that public opinion was 'overwhelmingly in favour of the development of renewable energy supplies.'[21] Even this statement is a significant overreach with 51% of respondents across the EEC saying they favoured renewable sources, a majority, but hardly overwhelmingly in favour.

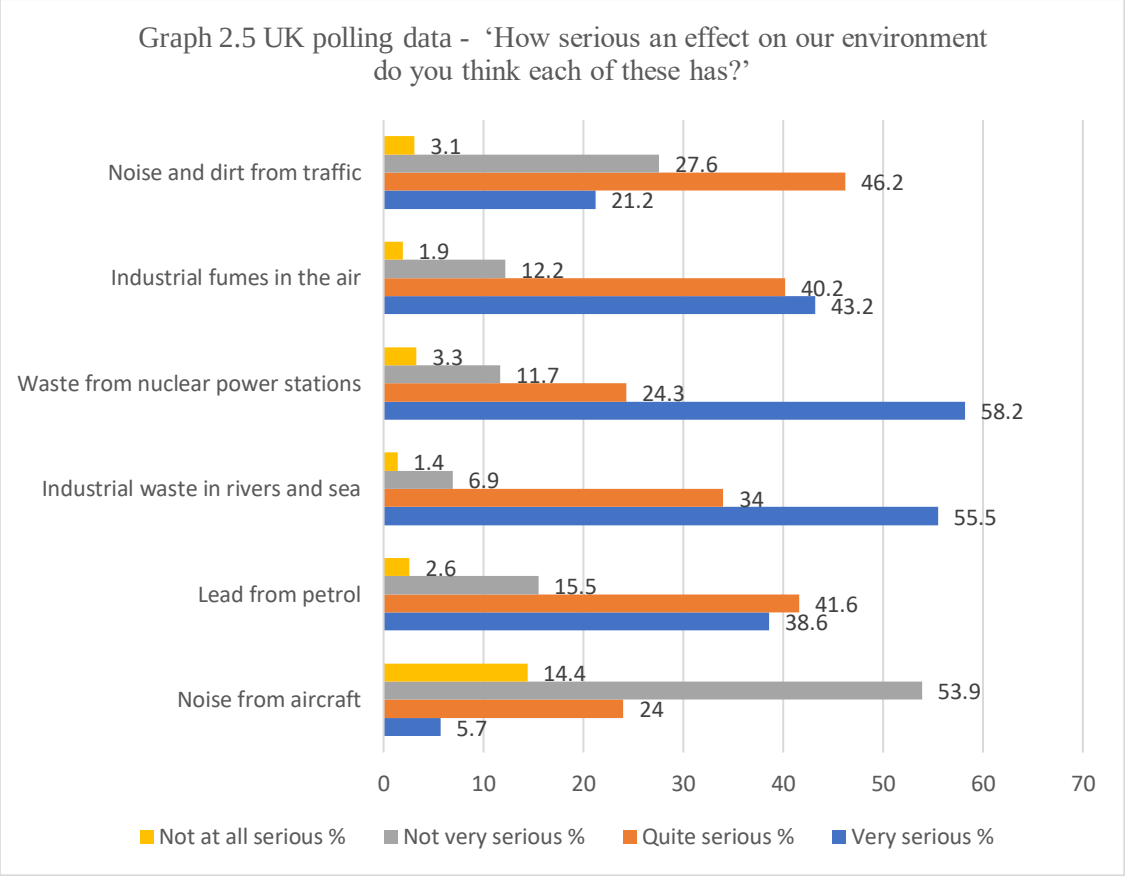
[20] Eurobarometer, *Public Opinion in the European Community on Energy in 1984* (Brussels: Commission of the European Communities, 1984), 62.
This data would also be in the Royal Society's report on the public understanding of science that will be discussed later. See The Royal Society, *The Public Understanding of Science* (Royal Society: 1985), 13.
[21] *The Guardian*, 19 September 1983, 6.



Source: Eurobarometer *Public Opinion in the European Economic Community on Energy in 1984*.

However, while this poll showed that there was a plurality of support for nuclear power in the UK, albeit, at times only marginally higher than the level of opposition, there was other polling conducted the *British Social Attitudes Survey* (BSA) between April and May 1985. Both surveys, shown in Graph 2.5, and tables 2.6, 2.7, and 2.8 provide a range of opinions on nuclear power that suggest it was not the preferred form of energy production and even at times, was undesirable.

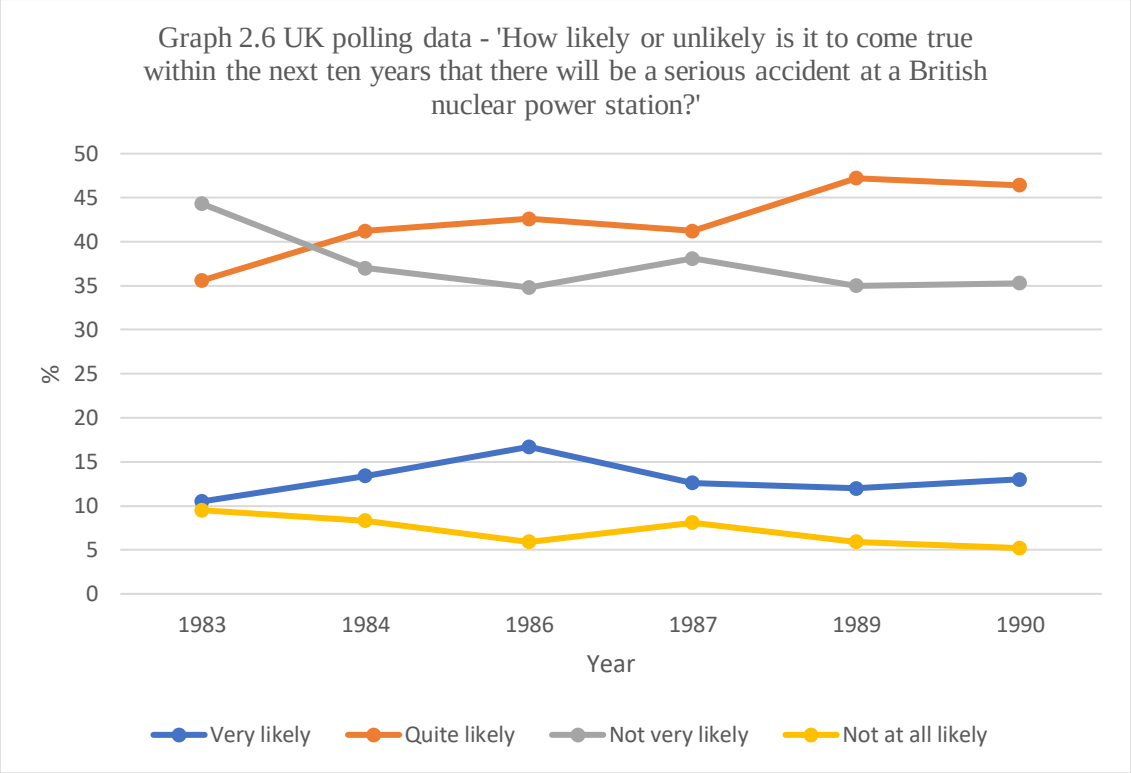
The BSA results in Graph 2.5 were collected after the intense public inquiry for the proposed construction of Sizewell B. What the data shows us is that out of all the risks selected waste from nuclear power stations was seen by a majority of respondents to be 'very serious,' although, the risk from industrial fumes was seen by more respondents to present varying degrees of severity for effects on the environment. This does not gauge whether respondents believed that these risks could be mitigated. Furthermore, something can be serious in its impact, but it does not implicitly mean that the risk was unacceptable. The clearest thing that this does show was that nuclear waste was viewed to be a serious concern. Yet, it is only one aspect of the industry, there are other concerns and benefits that this question does not include.



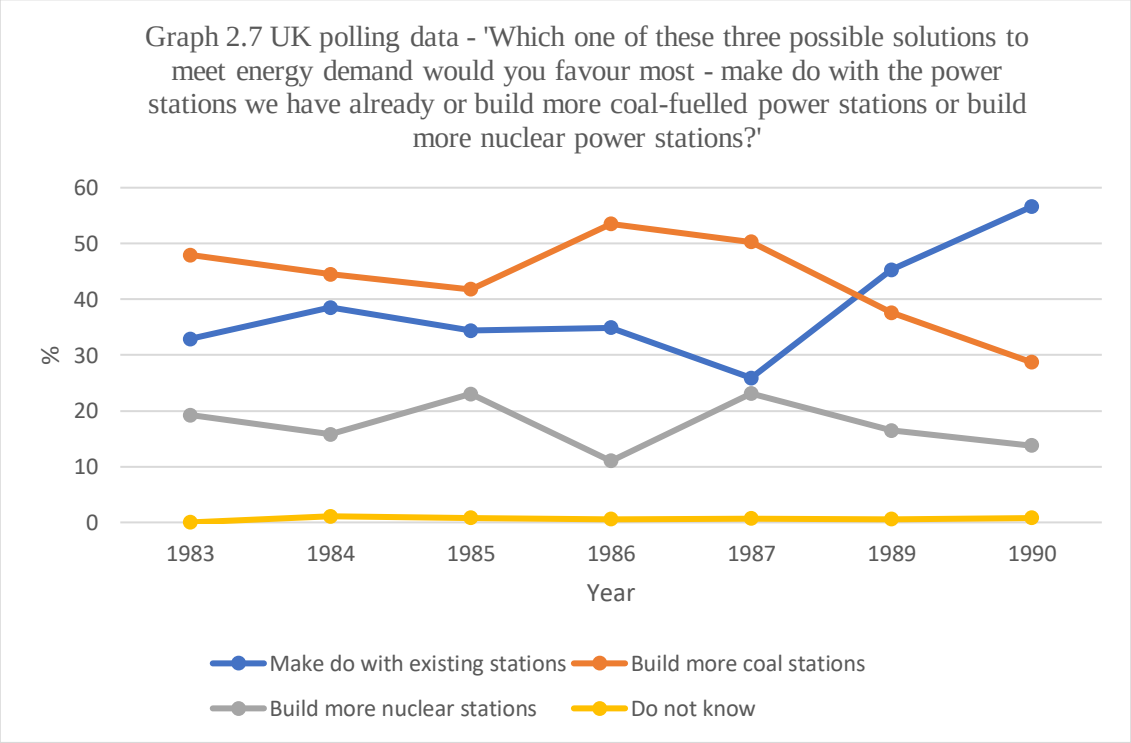
Source: S. Witherspoon *British Social Attitudes 1985 Survey Technical Report* January 1986.

Graphs 2.6, 2.7 and 2.8 present data between 1983 to 1990 from the BSA on three different questions on the likelihood of accidents, preferences on the construction of new power stations, and the risks posed by nuclear power. The data in Graph 2.6 was collated after the accident at TMI, which probably helps to explain why a majority of people believe that another accident was likely, and why a plurality of people believe that an event was 'fairly likely.' There are limitations to this question though. It does not define what a major accident might look like and whether it can be more or less damaging than what happened at TMI. Nonetheless, this data does show that there did exist anxiety that future nuclear accidents could happen, and this is a stronger explanation for the opposition towards nuclear power than fear of a potential nuclear war. Furthermore, Graph 2.6 shows that after 1986 the number of people who believed an accident was quite or very likely increases, probably because of the accident at Chernobyl. However, the number of people who thought that an accident was 'quite likely' and 'very likely' was already increasing before 1986. The number of people who believed an accident at a British nuclear power station was 'very likely' drops from 16.7% to 12.6% between 1986 and 1987. The number in 1987 is even lower than the 13.4% of respondents who believed

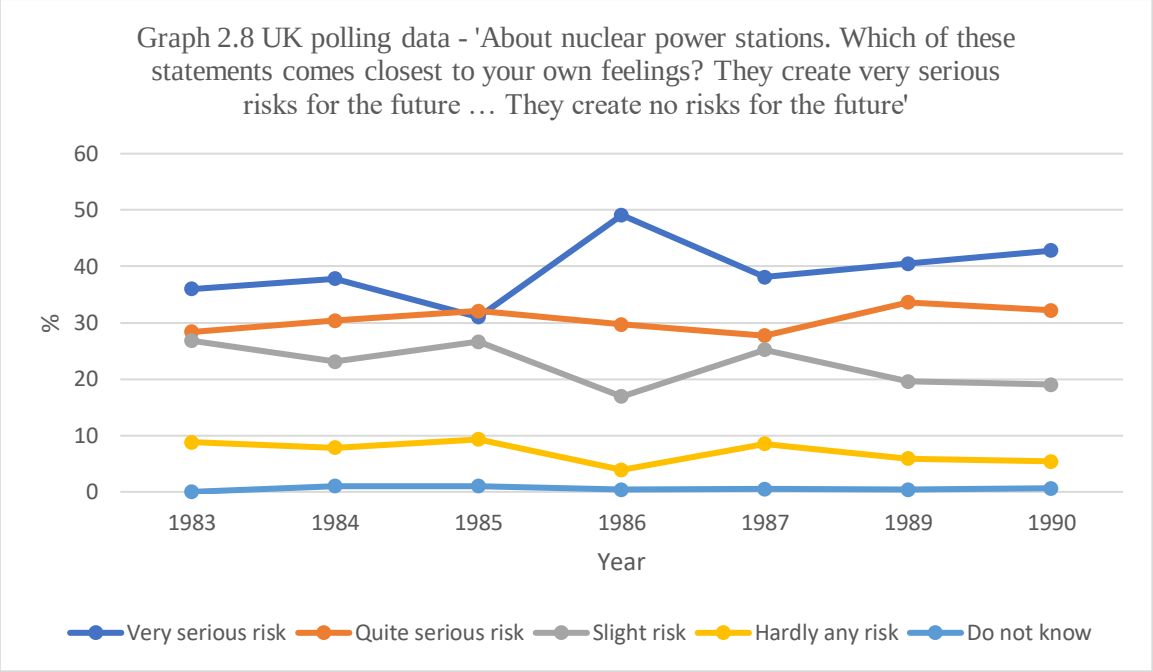
an accident was ‘very likely’ in 1984. Nevertheless, the number of respondents who thought a nuclear accident at a British nuclear power station reached a plurality in 1984 at 41.2% which was a 4.2% lead over ‘not quite likely.’ This may be down to the increased public scrutiny of nuclear power present due to the Sizewell B inquiry and the lasting impact of leaks at Sellafield. Graph 1.7 shows the preference on which power stations, if any, should be constructed. Nuclear power stations received consistently poor polling throughout the period, with coal power stations consistently being preferred over nuclear. Even in the aftermath of the coal miner strikes and the concerns over the environment increases, coal power stations were preferred over nuclear power stations by 21.1% in 1989 and 14.9% in 1990. Why this is the case could be explained by the data in Graph 2.8 on what the public thought the risks that nuclear power presented. The number of people who believed nuclear power presented a serious risk rose over the period with a spike in 1986 of 49.1%, correlating with the accident at Chernobyl. Although just because people thought that nuclear power posed a risk, does not mean that they believed it was an unacceptable risk, this is evident from Graph 2.4, where favourability numbers for the industry were still positive. Nevertheless, this was still problematic for the industry, it could limit the scale of the industry as the public and government sought to minimise the risk posed by nuclear power; worse still, another accident like Chernobyl could have been the death knell for the industry.



Source: BSA data. Obtained at the British Social Attitudes Information System http://www.britsocat.com/Home Accessed 11/01/2021.



Source: BSA data. Obtained from the British Social Attitudes Information System http://www.britsocat.com/Home Accessed 11/01/2021.



Source: BSA data. Obtained at the British Social Attitudes Information System http://www.britsocat.com/Home Accessed 11/01/2021.

There is further polling data present in the British Election Studies Information System (BESIS), based on data from the long-running British Election Study. This site has polling data taken from general election years covering several topics, including what people thought about nuclear power. Tables 2.9, 2.10 and 2.11 pose slightly different questions but do show some degree of change over time. While the questions asked are slightly different, Table 2.9 asks about future plans to expand future and Table 2.10 asks a retrospective question about whether the expansion of the industry has gone too far or not far enough. Despite the differences in the questions, overall respondents were favourable towards the development of the industry with a plurality in both surveys favouring its development in 1979, as seen in Table 2.9, or Table 2.11, the 1983 data shows that a plurality of respondents believed that the development of the industry was 'about right.' Yet both surveys show there was also a significant minority of around 29% that were against the development of the industry or thought that it had gone too far. As the decade progressed, we can see in Table 2.11 that opinions were shifting against nuclear power. A plurality of 37.2% still believed that the development of nuclear power was 'about right' in 1992, this was a drop of 8.3% from 1987 when 45.5% of respondents thought the development of nuclear power was 'about right.' Interestingly, the drop-in support did not happen in 1987, the year after the Chernobyl accident but six years later. This could be down to the government's decision to not build Hinkley Point C and the

problems that occurred with the initial plans to privatise nuclear power. These issues can be seen two years later in the *Financial Times* in the aftermath of the initial approval from the government to construct Hinkley Point C, which mentioned that Michael Barnes QC, the inspector who conducted the inquiry, believed that a delay to starting construction to Hinkley Point C would add another £154 million to the capital cost.[22] The economics of nuclear power increasingly came under scrutiny and when this resulted in the government scrapping plans to develop the industry it may have had a knock-on effect on public opinion who then became more sceptical.

Table 2.9 BESIS 1979 survey data on the importance of 'Going ahead with further expansion of the nuclear power industry?'

	%
Very important should be done	15.6
Fairly important should be done	30.3
Doesn't matter	12.5
Fairly important shouldn't be done	15.1
Very important should not be done	14.1
Do not know	12.4

Source: BESIS: British Election Survey, 1979.

Table 2.10 BESIS 1983 survey data from the question 'About some changes that have been happening in Britain over the years. Do you think this has gone too far, not gone far enough, or is it about right ... The building of nuclear power stations?'

	%
Gone too far	29.9
About right	48.9
Not gone far enough	8.8
Don't know	12.4

Source: BESIS: British Election Survey, 1983.

[22] *Financial Times*, 7 December 1989, 1.

Table 2.11 BESIS survey data from 1987 and 1992 asking 'Has Britain gone too far in the building of Nuclear power stations?'

	1987 (%)	**1992 (%)**
Gone much too far	10.6	10.4
Gone too far	29.5	35.0
About right	45.5	37.2
Not gone far enough	7.8	6.4
Not gone nearly far enough	0.6	0.5
Don't know	6.0	10.6

Source: BESIS: British Election Survey, 1987 and 1992.

This polling data helps frame our understanding of the challenges facing the industry and why the key communication 'battlegrounds' chosen for this thesis are important for our understanding of how and why the industry communicated in the way it did during this period. It also showcases the problems for the industry. First, that the public thought that the industry held significant risks, including the risk of accidents and waste from nuclear power harming the environment. Moreover, there was a preference to build coal-fired power stations rather than nuclear ones. This might also be because of the domestic issues at the times with the miners strikes that occurred during the 1970s and early and mid-1980s. However, the most important piece of evidence shown here is not that people thought there were risks, or that they preferred other means of energy generation but that even when they did favour the industry, it was rarely full-fledged support, it is 'just about right' or 'quite favourable.' While there tended to be firmer opinions held against nuclear power by its opponents, as seen in Table 2.13. Where the numbers for 'gone too far', or 'gone much too far', which totalled 40.1% in 1987 and 40.2% in 1992 were significantly higher than the numbers of 'not gone far enough' or 'not gone nearly far enough', which totalled 8.4% in 1987 and 6.9% in 1992. What this means for this thesis is that I have approached this matter with a sense of caution when talking about public hostility and public acceptance, attributing any exact emotion to the public's attitude to nuclear power would be inappropriate as the polling data has shown that rather than provide certainty to the public's opinion on nuclear power, it has shown how uncertain and fluid views were.

Public Acceptability of Nuclear Power

This section will look at what exactly the industry meant by the term public acceptability, how did they measure or observe 'acceptability'? What did the industry think it had to do

to improve this, and what did this term mean in practice when mentioned at public inquiries? At times, this phrase was contrasted with public hostility, which they sought to avoid. Public opinion also fits into this broad term but as this section shows, it was not always measured through polling data but rather it was about avoiding visible acts of public hostility through controlling the narrative.

The issue of public acceptability of nuclear power was brought to the attention of Glyn England, Chair of the CEGB between 1977 to 1982, who noted in May 1977 that discussions had been taking place at a conference of Directors-General of the CEGB about:

> increasing the knowledge of key staff in the Board to enable them to deal with questions raised about the safety of nuclear power, security aspects and storage of waste; all matters of some public concern.

England states that he intended to bring it up with the executive of the CEGB by adopting the following question:

> Are we doing all we might as a Board to increase the acceptability of nuclear power by the public?

England argued that the CEGB were already 'making contributions in a number of different areas' but that a review could find gaps in their 'longer-term strategy capable of "influencing the future."'[23] This suggests that the industry, at least the CEGB, were entering a new phase in its communication strategy that would evolve over time in an attempt to influence future opinions and decision-making.

Unfortunately, there was no direct mention of the results of this discussion in the archival collection present at the IET. However, from other evidence, we can begin to see what public acceptability meant in practice. In a record of a conversation between

[23] IET, SC MSS 264/1. 'Letter from Glyn England to executive members of CEGB, 26th May 1977.'

England and executive board member B. Tucker, who had been in contact with Lord Aldington from the National Nuclear Corporation (NNC), Aldington argued that they should restrict publication of the Thermal Reactor Assessment Report, the report into PWRs, to the first six pages of the 3rd volume and the narrative part of the appendix at the end. Aldington stated that 'to put anything more out was rushing matters too much.' This shows that narrative control was just as important to "public acceptability," as improving the public opinion of nuclear power. The report from the Health and Safety Commission on the 'generic safety issues' of PWRs was published in full and that this would suffice. England would tell Tucker that the board of the CEGB would not make a decision on PWRs, but that an 'informal discussion' would take place. All the media knew was that no decision was to be taken otherwise 'they would be waiting on the doorstep.'[24] Gaining public acceptability did not mean that the industry thought it should be transparent immediately and that discussions would be held to decide what information would be released and crucially when that information would be published.

This inconsistency is noticeable when investigating the public relations work that Sir John Hill, Chair of the UKAEA between 1967 to 1981, and BNFL between 1971 to 1983, did on behalf of both organisations. Again, in May 1977, Hill gave a paper at a debate organised by the Chemistry department at the University of York entitled 'Nuclear Power – the real problems and the emotional issues of the public debate.' In this paper, Hill sought to cover three topics. First, 'the world energy situation and the need for nuclear power.' Second, 'the case for plutonium and the fast reactor because these issues are at the centre of the present controversy,' the controversy being the development of THORP. Third, 'the public debate on nuclear power and the real issues.'[25] The content of the first topic on the place of nuclear power within world energy supplies is not relevant to my argument beyond stating that it was part of Hill's attempt to win over support. Again, controlling the narrative was seen as a means to improve public acceptability, it may also improve public favourability in the process, but the aim was to provide a narrative that claimed that nuclear power was essential. He does this by showing that nuclear power was required to meet energy demands as fossil fuel supplies were unsustainable and unreliable, and alternate energy supplies required further research and

[24] IET, SC MSS 264/2. 'Telephone conversation on Friday, 29th July 1977 between Mr. B. Tucker and Mr. G. England.'
[25] CAC, B.141. 'Papers re lecture 'Nuclear Power - The Real Problems of Emotional Issues of the Public Debate, 1.'

at that stage 'can only make a very small contribution to our needs.'[26] The second topic on the FBR provides a useful insight into how Hill sought to approach highly contentious technologies. Hill admits that there were 'technological problems' regarding the presence of liquid sodium compounds such as sodium hydroxide and sodium oxide, an impurity, but when they found a solution, it was 'childishly simple - keep it clean.' Hill states that its removal was 'simple' and that it was 'easier' to work with than water at the same temperature.[27] By admitting that there were technical problems, but that the industry could 'easily' deal with these issues through the process of research and engineering expertise, Hill was able to show that the industry would be transparent with the issues and that it had the technical knowledge to deal with these problems.

However, the crucial piece of evidence is Hill's postulation that 'the discussion about plutonium as a poison is far more emotive than rational.' Hill goes through two statements, including the supposed links between plutonium, 'the god of the devil,' and that plutonium was the most toxic material known to humankind. Hill said both were untrue. The association between leukaemia and nuclear energy was also brought up. Hill said that the statistics show that for populations around nuclear sites, leukaemia cases were 'no worse' than the national average, 'in fact, they are somewhat better than the population at large.' Hill suggested this was because the industry was a 'skilled industry' where people work in laboratories and 'clean chemical plants and the highest quality of light engineering.' Furthermore, not only was it clean but that those who work for the industry 'take an interest in their work' and in themselves where they are encouraged by industry doctors to 'look after their own health.'[28] What Hill argued was that while there was significant opposition to nuclear power on several issues, these concerns are not based on what the industry saw as accurate data but rather on irrational fears on what might happen if people came into contact with radiation. This was the narrative that the industry wanted to promote, that the opposition towards nuclear power was based on irrational fears based on inaccurate, misleading, or worse, no "scientific" data.

This previous section also tied into the final topic on the 'real issues.' Hill also mentioned the concerns over nuclear weapon proliferation caused by the development of the civil nuclear industry. He argued that by supporting nuclear industries around the

[26] CAC, B.141 '4.'
[27] Ibid. '7.'
[28] Ibid. '11.'

world it helps to prevent the proliferation. This was because countries that were denied civil nuclear programmes were more likely to develop nuclear weapons; the knowledge was no longer secret, and they cannot 'uninvent' the technology.[29] Hill's paper concluded that the country needed nuclear power and the FBR. Hill was 'sure we can run a nuclear industry with a higher standard of safety and less impact upon the environment than any alternative way of getting the energy we require.' However, Hill finished by stating 'I wish the issues could be discussed with more quantitative argument and less emotion. I am sure we would make more progress if we did.'[30] This is crucial to understanding the industry's position at this time. Industry officials thought that if the argument was based on what the industry saw as accurate and rational science and data, then the public would accept what the industry said to be true.

What this section has shown is the existing strategy in place at the start of the period I am examining. I have shown how public opinion data was not the only measure by which the industry judged the mood of the public, I have shown how avoiding public hostility through narrative control was equally important to measure whether the public "accepted" nuclear power.

Did the industry engage with public opinion data?

Throughout the period both advocates and opponents of nuclear power claimed that public opinion was on their side. For example, in BNFL's 1978/1979 annual report managing director Con Allday, claimed that there was public support for the expansion of the nuclear power programme, a claim echoed by other organisations within the wider nuclear industry. He made this claim on the basis that the public has seen the importance of meeting energy needs in the wake of the oil crisis and miners strikes during the 1970s. However, no figures are provided to back this claim and Michael Morris, a reporter for *The Guardian* argued that local public opinion around the site of the proposed Torness site opposed its development, stating that one survey conducted by the *East Lothian Courier* found 90% of its respondents were against the development.[31] It should be noted that this survey was just of the readers of the newspaper and no data was provided on the sample size or any methodology. The use of public opinion to support pre-existing positions can be seen later in the period as well. For instance, after the publication of the

[29] CAC, B.141 '12.'
[30] Ibid, '15.'
[31] *The Guardian*, 3rd August 1979, 14.

Sizewell B inquiry report, *The Guardian* wrote a piece of the views of Greenpeace, CND and FOE, all of whom used the current state of public opinion after Chernobyl to support their argument.[32] The Electricity Council prepared booklets for the leaders of the nuclear industry, including the chairman of the CEGB, containing relevant stories from a variety of publications from the mainstream newspapers to specialist journals.[33] The purpose of these was to provide the leadership of the industry with an overview of what was being written about, by journalists, anti-nuclear groups and politicians. More importantly, it also provided the industry with an insight into what information was publicly available, including public opinion data.

The industry might have taken notice of polling data and public opinion but there is a lack of evidence to say whether the industry conducted its own polling throughout the period. Con Allday in a lecture for the British Nuclear Energy Society 1978 conference talked about nuclear power and public opinion. However, Allday spoke of public opinion in broad terms and argued that it would be wrong to gauge public opinion from the sixth report of the Royal Commission on Environmental Pollution on nuclear power. Instead, he argued that,

> An inquiry, however, could perhaps deal with a policy issue requiring a decision on a fairly short timescale and might take better cognisance of and produce a better "feel" for public opinion than could a Royal Commission.[34]

Allday's comments were picked up by the *Financial Times* who added that Allday's words amounted to him saying that 'the danger was that vocal minority views were interpreted as public opinion.'[35] In another broad overview on the state of public opinion, Sir John Hill in a paper for the Royal Society for the Encouragement of Arts Manufactures and Commerce made clear that he was aware of public opinion stating that despite what he saw as the relative safety of the nuclear industry compared to other activities and industries, 'the public, or some of them, have a genuine worry about atomic energy.'[36] It is not clear if Hill had seen polling data to inform this claim or whether he

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[32] *The Guardian,* 13 March 1987, 1 & 6.
[33] You can find these booklets within Walter Marshall's papers at the CAC and Glyn England's papers at the IET. Examples include: IET, SC MSS 264/2/7/12. 'Electricity Council Daily Press Cuttings November 1977'; CAC, MRSL C. 321. 'The Electricity Council Daily Press Cuttings January 1990.'
[34] C. Allday, 'Nuclear power, politics and public opinion'. British Nuclear Energy Society, 18, 2 (1979), 77-84, 81.
[35] *Financial Times,* 8 December 1978, 12.
[36] CAC, B. 164. 'Nuclear Power in the Public Eye, 8.'

framed his understanding of where public opinion lay on the existence of anti-nuclear groups that could muster large demonstrations against nuclear power, which was what Allday and the *Financial Times* implied was the case.

In another paper from H. E. Bolter from BNFL published in 1989, Bolter mentioned how BNFL commissioned opinion research that showed what it saw as the impact' of having Sellafield featured in front-page news. Bolter claimed that polls showed that most people saw 'BNFL as an environmental polluter and a danger to health' and that Sellafield was dangerous, secretive, and dishonest.[37] Bolter does not provide the data, but this is clear evidence that public opinion polls were being used by at least BNFL. In correspondence between CEGB public relations director Peter Vey and regional nuclear power station managers, Vey stated that in July 1987, station managers received 'results of research on the first advertising campaign in local papers around nuclear power stations.' Unfortunately, the results of this research are not included in the archival collection. What this does tell us is that this was the first time the CEGB had issued a targeted advertising campaign around nuclear power stations. It is also evidence that the CEGB by 1987 were conducting market research into how the public received their advertisements.[38] It is not clear what kind of research this was, but it does signify that there was some engagement with the study of public opinion by 1987.

Although it is unclear whether the industry in the late 1970s commissioned their own public opinion data or even took notice of existing polling data, they knew that politicians did take notice of public opinion. Liberal party leader David Steel in response to the approval of THORP claimed that if 'things were to go wrong there at Windscale… public opinion would be outraged.'[39] Managing director of the CEGB, John Baker, also claimed that the Thatcher government was too concerned with public opinion regarding the Sizewell B inquiry.[40] Regardless of what the industry thought of public opinion polling data it was still important to elected decision-makers. This is why providing an overview of the polling data is useful as it provides context not only to the challenges the industry faced, but also why decisions over whether to develop the nuclear industry happened in the way that they did.

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[37] H. E. Bolter, 'Public acceptability' *Radioactive Waste Management* 2 (1989), 45-47, 45.
[38] Magnox LtD, File No. 15 Box no. D147 Microfilm on Sizewell site 001571. 'Letter from Peter Vey to Nuclear Power Station Managers, 15th July 1987.'
[39] *Financial Times*, 16 May 1978, 12.
[40] Sir John Baker, interview by T. Lean, BL Sounds, track 7 C1495/14.

Public understanding of science

These shifts in the use of public opinion also coincide with the public understanding of science campaign that emerged in the 1980s out of a concern among scientists that non-specialists had too little comprehension of basic science.[41] Spurred by the 1985 Royal Society report into the matter, otherwise known as the Bodmer Report, the movement to improve public education has been accused as being naïve, not only about what needed to be communicated, but also how the public might be reached, and crucially, why they might be sceptical. Although there was no member of any of the major nuclear industry organisations of the board writing the report, nuclear power featured prominently within the Bodmer Report, with 12 references to it throughout it. This included references to the state of public opinion as a means to gauge whether the public believed nuclear power was worthwhile and to identify what concerned the public the most about nuclear power compared to other countries in the EEC. The report notes that the level of concern in the UK 'was slightly below the European average on all issues except nuclear waste disposal.'[42] Crucially, the report also comments on the public's perception of risk and absolute safety with regards to nuclear power stations. The report argued that there is a,

> mistaken impression that science and technology are able to deliver absolute safety, reinforced by a lack of knowledge about the comparative risks of different products or activities, as well as a lack of understanding of the nature of risks.[43]

This report fitted into a growing concern within the nuclear industry that there was a climate of anxiety within the lay-public because they did not understand the science behind nuclear power. Wynne has also used the nuclear industry as a case study when it comes to literature on the public understanding of science. He argued that public understanding of science was automatically associated with public appreciation and support of science, as seen through the Bodmer Report, and with the public's correct understanding and use of technical knowledge and advice. Thus, when publics resist or ignore a programme advanced in the name of science, the cause was assumed to be their misunderstanding of the science.[44] Indeed after the Chernobyl accident, Walter Marshall

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[41] For an in-depth discussion on the literature on the public understanding of science and the various analytical models created by sociologists see J. Gregory, 'Problem/science/society'. *Science Museum Group Journal,* 6 (2016).
[42] The Royal Society, *The Public Understanding of Science*, 13.
[43] Ibid, 16.
[44] B. Wynne, 'Public Understanding of Science' in in S. Jasanoff, G. E. Markle, J. C. Petersen, T. Pinch (ed.) *Handbook of Science and Technology Studies* (London: Sage Publications, 1995), 361-388, 362.

wrote to Sir George Porter, president of the Royal Society, asking if the Royal Society might 'formulate a clear role' for 'explaining scientific and technological issues to the general public.'[45] From this letter we can see how the industry is asking the Royal Society to do more in the area of public communication, indeed Marshall wrote the letter suggesting that the nuclear industry was a leader in this area and that the Royal Society should be doing more to follow what the nuclear industry was already doing. Furthermore, this has been the only interaction between the nuclear industry and the Bodmer report and the Public Understanding of Science I have seen.[46] In fact, as we shall see in Chapter Seven the nuclear industry even before the publication of the Bodmer report was advocating for what the report recommends and with Operation Smash Hit and the development of visitor centres was seeking to go beyond the report by presenting an emotional argument, rather than just a scientific one, for nuclear power.

This disconnect between the focus given to the Public Understanding of Science and the nuclear industry in this thesis might be down to the fact I am observing how the nuclear industry viewed how the public understood science and how best to communicate it, rather than how they viewed the work of the Public Understanding of Science movement after 1985.

Royal Commission on Environmental Pollution: Nuclear Power and the Environment

The sixth report from the Royal Commission on Environmental Pollution, *Nuclear Power and the Environment*, sometimes simply called the Flowers Report, was released in September 1976. The commission was chaired by Physicist Sir Brian Flowers, who worked on the Anglo-Canadian Atomic Energy Project Tube Alloys from 1944 to 1946 and continued working for the AWRE between 1946 and 1950.[47] The report recommended that 'there should be no commitment to a large programme of nuclear

[45] CAC, Mrsl F.30. 'Letter to Sir George Porter 7th August 1986.'
Porter had his own ideas how best to improve the public's understanding of science that would not just focus on nuclear power and responded to Marshall that rather than specialised public relations officers they would have a broad 'Relations Officer for Science.' See ibid. 'Letter to Lord Marshall from George Porter, 4th August 1986.'
[46] There might be a larger discussion of this within the AB files I have not been able to view.
[47] Flowers believed that some in the Atomic Energy Authority saw him as a 'traitor' because he had allowed himself to see things through the eyes of others'.
S. Owens, *Knowledge, Policy, and Expertise: The UK Royal Commission on Environmental Pollution 1970-2011* (Oxford: Oxford University Press, 2015), 80.

fission power until it has been demonstrated beyond reasonable doubt that a method exists to ensure the safe containment of long-lived, highly radioactive waste for the indefinite future.'[48] The Flowers Report was prompted by a proposal in 1975 to set up an international nuclear fuel reprocessing plant in Windscale, which was met with strong opposition after a leak at the facility in 1973. This posed a challenge for the nuclear industry and BNFL, as not only did it draw significant scrutiny towards the site and the wider nuclear industry, but also placed the onus on dealing with waste on them.

The report is significant for our understanding of how the public understood nuclear power and its risk. It drew attention to the issue of waste, not just the generation of electricity, and so increased the number of topics on which the public needed reassurance. It lists the major issues of nuclear power and explores them to ensure that they can be seen in a perspective that allows people to understand the underlying social and ethical questions that they raise. It begins with the world energy demand, the scale of nuclear development, and nuclear hazards that stem from other technological developments.[49] The chapter on reactor safety and the risks associated with reactor incidents stated that absolute safety cannot be ensured. Furthermore, it argued that the advancing scale and complexity of technology tends to increase the possible consequences of serious accidents as well as the problems by which these accidents may be caused.[50] This line of argument led to the expectation that the techniques and disciplines used to ensure safety were enough to reduce accidents to 'acceptable rates,' although, it did not state what an 'acceptable rate' was. A link can be made between this report and the new approach to risk management that was emerging with the introduction of the Health and Safety at Work Act (1974).[51] This placed the onus on identifying risk and mitigating it, rather than just prohibiting things. This approach was already familiar in the nuclear sector, which could not simply ban the hazardous materials involved in its processes. This new act formalised and regulated this so that it could be adopted elsewhere. The biggest concern in this chapter, of the report, was the environmental effects of possible reactor accidents and the impact this may have on public health.[52]

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[48] Sir Brian Flowers, *Royal Commission on Environmental Pollution Sixth Report*, 85.
[49] Ibid, 71,
[50] Ibid, 105.
[51] *Health and Safety Work Act* (1974) chapter 37 (London: HMSO).
[52] Sir Brian Flowers, *Royal Commission on Environmental Pollution Sixth Report*, 106.

The chapter on radioactive waste, specifically on the highly radioactive waste that presents particularly difficult problems regarding its disposal and management, was also significant.[53] It covers the risks that are present in the storage of nuclear waste along with the steps that were being taken to ensure that no harm was caused to the environment.[54] Furthermore, this chapter considered possible means that exist for the safe disposal of nuclear waste and the organizational requirements needed to pursue each possibility.[55] Geographer Susan Owens, whose book represents the most in-depth analysis of the sixth report, states how the Commission's most 'radical stance' was on the 'vexed issues of radioactive waste disposal.' For some in the industry, this was the 'biggest non-problem of the century'; the Commission thought otherwise.[56] It was disturbed by the inadequacy of existing arrangements and unimpressed by the efforts to find a longer-term solution.[57] Owens goes onto say;

> some members [of the commission] were more confident than others about the technical feasibility of safe containment, but a collective view emerged that even if wastes could in practice be dealt with safely, this had to be demonstrated.[58]

This would change how the industry communicated its points in several ways. In chapter seven, we will see how the large-scale demonstration of a train crash in 1984 occurred as a response to this public pressure.

The final thematic chapter of the Commission's report focuses on nuclear power and public safety. It drew the line on which policy should be adopted towards the development of nuclear power. This chapter focuses on the United States and how the debate between the nuclear industry and the environmental movement has become increasingly controversial.[59] Crucially, the report states that the industry needs to provide more 'than bland, unsubstantiated official assurance that the environmental impact of

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[53] Sir Brian Flowers, *Royal Commission on Environmental Pollution Sixth Report*, 131.
[54] Ibid, 144.
[55] Ibid, 162.
[56] *The Guardian*, 23 September 1976, 11.
[57] S. Owens, *Knowledge, Policy, and Expertise: The UK Royal Commission on Environmental Pollution 1970-2011*, 80.
[58] Ibid.
[59] Sir Brian Flowers, *Royal Commission on Environmental Pollution Sixth Report,* 191.

nuclear power has been fully taken into account.'[60] This further shows that the major conclusion of the Royal Commission was that the industry could no longer just state that nuclear power was safe, it had to demonstrate it as well. This was laying the foundations for the industry to put forward emotion-based arguments for nuclear power.

In a radio interview after the publication of the report, Sir John Hill defended the nuclear industry against the Royal Commission's recommendations that development of the industry, particularly the development of an FBR, should be delayed, by arguing that there can be an accident in any industry but that the nuclear industry has an 'exemplary record' and that the nuclear industry has had 'a far better safety record than any other energy industry.'[61] However, Hill does mention that nuclear reactors should be kept remote as a precautionary measure until the public feels safer with them around.[62] What this implies is that the industry can be perceived as dangerous, but that this feeling of danger comes from the high-profile of the industry. By hiding them they prevent the social construction of links between possible health impacts and the industry. Instead, this would create what Kuchinskaya argued to be 'the social construction of ignorance.'[63] At the UKAEA press conference held on the 15th September 1976, Hill was keen to say that the FBR was 'operating satisfactorily' and that it would be 'stepped up to its designed power output of 250 MW(e).' He also points out that the site had previously been a reprocessing plant for enriched uranium fuel from the experimental FBR that had been operating at Dounreay since 1959. Indicating that a site could be active, in this case for 15 years, can be decontaminated and rebuilt, which Hill says was 'an example of the progress being made in that area of nuclear technology.'[64] Later in his initial speech, Hill draws particular attention to nuclear power and the environment. While not referencing the Royal Commission directly, it is clear that this section is a response to some of the critiques that the Commission raised. This includes a statement that in collaboration with

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[60] Sir Brian Flowers, *Royal Commission on Environmental Pollution Sixth Report*, 198.

[61] Hill does not evidence this claim. However, the World Nuclear Association has compiled information on energy-related accidents since 1975. In 1975 there was a hydroelectric dam failure resulting in the collapse of Banqiao Dam in China killing 30,000 people immediately and a further 200,000 in the aftermath of the event.
World Nuclear Association 'Safety of Nuclear Power Reactors: Appendices Appendix 1. The Hazards of Using Energy.' Available Online: https://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/appendices/safety-of-nuclear-power-reactors-appendix.aspx [Accessed 19/11/2019].

[62] Sir John Hill, 'John Hill on the future of nuclear energy in the UK' Sept 1976, Male interviewer unknown, LBC Radio [Interview].

[63] O. Kuchinskaya, *The Politics of Invisibility*, 2.

[64] CAC, Sir John Hill Papers, B.112. 'UKAEA Press conference 15th September 1976.'

BNFL, they had developed a method of immobilising the highly active fission products by a vitrification process. He goes on to state that:

> The glass is highly insoluble and capable of indefinite storage. I have here an example which I should, perhaps, add does not contain real fission products by an inactive simulated material. It is only the size of my hand but contains the amount of waste corresponding to one person's lifetime requirement of electricity at today's consumption. The vitrification process will be a major step in the total management of high-level radioactive waste.[65]

The UKAEA put considerable effort in communicating its counter-arguments via newspapers, including *The Times*, that the industry was safe and that the development of the FBR should continue and that it was putting out reports stating that the country would become increasingly reliant on nuclear power.[66] Later in the year, Hill went on a media offensive in *The Times* by examining the 'three important questions in the energy debate.' The first question Hill answers was 'Why do we need a nuclear power programme?' He stated that oil production will begin to decline, and that coal alone cannot fill the gap and that nuclear power was a cheaper means of electricity production than coal.

The second question was 'will a "plutonium economy' damage the fabric of our society?' Hill asserts that it will not because it will not be allowed to as there were too many complexities for a potential hijacker of plutonium if they were even able to hijack a shipment to make any use of it. This is a very narrow response from Hill to a question that seems quite broad in scope. There are limitations to the amount of words Hill can dedicate to this question in a newspaper article. The issue of terrorism also came up at the THORP inquiry. On the issue of whether terrorists could make a crude nuclear device, the chair of the inquiry, Justice Parker, said that 'I accept the Royal Commission's view that it is credible.' But he did not make a judgement on whether such a feat would be easy. He also draws attention to evidence submitted at the inquiry which states 'for over 25 years there has not been any terrorist abstraction or threat so far as is known.'[67] So

[65] CAC B. 112. '5.'
[66] *The Times*, 10 June 1976, 2.
[67] TNA, AT 103/1/1. 'Draft final report, 7.6.'

while this issue is a contentious one because of the severity of the consequences should it ever have occurred, because it had not happened the existing arrangements, while they could be further improved, were not inherently insufficient.[68] But answering this broad question with this extremely narrow answer also indicates that this was what Hill felt comfortable with. This is because a question on whether the industry would damage the fabric of society is a deeply sociological question and, even if Hill felt comfortable answering this, would it mean anything to the public at large? Probably not, hence the focus on the risk of terrorists hijacking plutonium shipments, who would then utilise it to irreparably damage society for their own goals.

The final question Hill answers was, 'are we going to leave future generations an insoluble problem about what to do with nuclear waste?' This was a rhetorical question as the answer Hill gave was an obvious one: no. Hill goes further though in stating that each generation passes onto the next both assets and liabilities, but that they are in a position now to mitigate those liabilities.[69] This normalisation of the industry gives the impression that the industry intended to make the nuclear industry just like any other part of society, one that provides assets in the form of energy and jobs, but liabilities as well in the form of nuclear waste. What can be seen from these answers is that the industry thought its best rhetorical strategy was to focus on the long-term outlook. By focusing on future energy demand and the fact that the industry has already existed for nearly 20 years, as well as the need for a long-term nuclear waste disposal strategy, regardless of whether the nuclear industry continued to develop, stagnate, or shut down. It allowed for the industry to provide the argument that the continued existence of the industry and, crucially, the ability to handle nuclear waste, was vital.

Responding to nuclear accidents before Three Mile Island

Major accidents have acted as crisis points for the industry and brought it under intense political and media scrutiny. The UK nuclear industry had experienced one major accident at Windscale in 1957 and the immediate response has been covered in detail.[70]

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[68] On two occasions Greenpeace activists have been able to gain access to the Sellafield site raising fears that someone with bad intentions could access the site. C. Nath, 'Terrorist Attacks at Nuclear Facilities', in I. G. Richter, S. Berking & R. Muller-Schmid (eds.) *Risk Society and the Culture of Precaution* (Palgrave Macmillan: London, 2006), 111-130, 118.
[69] *The Times*, 26 November 1976, 12.
[70] L. Arnold, *Windscale 1957*.

This included the disposal of milk over fears for public health under guidance from MAFF and the creation of standardised procedures across the UKAEA and CEGB reactors in the event of emergencies.[71] The communications procedure, as of May 1961, was rather basic and details on what should be said and how it should be said was not part of the brief. Instead, the brief that station managers received stated when and how many press releases and statements should be released and focused on operational matters, such as how many telephones should be available.[72] The brief was procedural, concentrating on practical arrangements, including where to buy furniture for the press rooms, how transport should be arranged and who should staff the press room and not the nature of the message that they might be used to convey.[73] This gives the impression that the industry saw these arrangements as a mere formality to set out procedure rather than content. There were only a few pieces of information that can be considered part of a communication strategy. These included stating that press statements should be issued twice daily 'even though they may repeat and reiterate known information.' though information on background radiation and other 'relevant information' should be kept for emergency use.[74] The UKAEA would also provide a dossier to the station managers of the questions which were put and the answers that were given.[75] These arrangements showed that the UK nuclear industry's various organisations would collaborate with one another to share their experiences and information to put together a communication strategy in the event of a major nuclear accident. However, this briefing still did not provide much detail on how the nuclear industry would put together its message. This is important as no two accidents would be the same and, as will be shown later in the thesis, major nuclear accidents could and would be far worse than what the industry initially expected.

While major nuclear accidents were rare, the nuclear industry categorised different accidents depending on the seriousness. They ranged from category A, the least serious, to category D, the most serious. The industry was conscious that these categories

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[71] L. Arnold, *Windscale 1957*, 58-59.
[72] TNA, POWE 14/1323. 'Public relations arrangements in the event of an accident at a nuclear power station.'
At least two phones for press and phone connections with Bankside and Winsley Street. Then another two lines at Winsley Street, the location of the press office. One to Bankside and one to the minister.
[73] Ibid.
The press room was to be staffed by 'press officer and information officer and stand by messenger.'
[74] Ibid.
[75] Ibid, 2.

might prompt different levels of public concern. For instance, category A was deemed to be 'by definition… not liable to give rise to public concern.'[76] While for category D accidents the press centre was to be located 'outside the area of immediate hazard' and that 'special precautions will need to be taken to prevent press representatives, as far as possible straying into the hazard area.'[77] Category D accident plans show that while they wanted the press to stay out of the immediate hazardous area, they argued that the information centre could still be located 'about one mile' from the plant.[78] From this we can deduce the industry, at this point, did not anticipate anything more serious than the fire at Windscale and certainly not anything on the scale of Chernobyl.

What is most significant about this communication strategy is what the goal of their focus was when it comes to the purpose of public relations during an accident. It was not to communicate what they were doing or what, if anything, the public should do, but rather to combat rumour and misconceptions. A briefing from the CEGB's public relations branch stated that:

> in view of the newsworthiness of nuclear power stations, small incidents at a nuclear power stations, should they come to the attention of press or public, are likely to be exaggerated. To prevent the spread of ill-founded rumour, it is important that accurate and rapid information about the incident be available if needed.[79]

While regarding major accidents:

> In the event of a major incident involving radioactive hazard, press and public relations must be handled in an efficient manner to establish and maintain public confidence in the arrangements prepared by the Generating Board and other interested parties, for dealing with such incidents.[80]

[76] TNA, POWE 14/1323. 'Draft press arrangements for incidents at nuclear power stations, 2.'
[77] Ibid, 4.
[78] Ibid, 5.
[79] Ibid. 'P.R. Procedure Circular No. 17.'
[80] TNA, POWE 14/1323. 'P.R. Procedure Circular No. 17.'

First, was the belief that the primary point of public relations in the event of a nuclear accident was to dispel rumour and exaggeration and maintain public confidence. The assumption was that the public simply did not have the knowledge required to separate rumour from the truth and were therefore susceptible to rumour and exaggeration. The industry hoped that they would be able to gain control of the news agenda and ensure that there was not a vacuum into which rumour and speculation could flow. Second, was that to dispel such rumours all the industry needs to do was provide accurate and rapid information about the accident, but only 'if needed.' This gives the impression that information should be held back until it was required rather than to provide transparency, indicating that the industry perceived that the public did not have the knowledge available to understand everything. Holding information back until it was needed allowed the industry to curate and focus its message, so that it might better control the narrative emerging in the media. This is why they thought it would be necessary to put out two press releases a day to keep control of what was being said and dispel any rumour before it gained traction. Finally, in the section on a major accident, we can see that there was an additional primary concern in ensuring continued confidence in the arrangements prepared by the industry. This admits that confidence in the industry could be damaged and that one way, if not the only way, to limit the damage was to ensure that the emergency arrangements in place are successful. Both points towards a viewpoint that a well organised public relations campaign would help ensure public confidence in the industry's ability to deal with the event itself. The lack of detail further illuminates that the appearance of competence reflects the industry's belief that such accidents were unlikely to the point of them being near impossible.[81] This is the context in which we need to see the response to TMI discussed in Chapter Three.

[81] Publications such as WASH-1400, otherwise known as the Rasmussen report on reactor safety stated that the chances of an accident happening in an LWR (a form of PWR) was 'relatively low compared to other man-made and natural risks.' This publication reinforces the argument that the industry just did not accept an accident could happen and therefore saw preparing a PR response to be unnecessary.
N. Rasmussen, *Reactor safety study. An assessment of accident risks in U. S. commercial nuclear power plants. Executive summary: main report,* (NRC, 1975).

Conclusion

Although the source base for this chapter has been limited due to the availability of official sources, this chapter has been able to provide crucial context for this thesis. I have shown the benefits of using polling data to highlight where public opinion stood beyond just using the cultural outputs of the period. It has shown the fluidity of public opinion towards nuclear power depended on the shifting narrative around events, typically negative for the industry, such as TMI, Chernobyl and the decision to not fund the construction of Hinkley Point C. However, it would be incorrect to say that the public were for or against the nuclear industry, or even that they were apathetic. Public opinion was and is often contradictory and views are formed depending on when and how you ask questions and the polling data shown in this chapter reflects this.[82] I have also shown how the industry increased its use of polling data, from being aware of it and broadly claiming that public opinion was supportive of the industry, to commissioning their own polling data to inform their communication strategies, although gaps in the archival memory mean that it is not possible to draw firm conclusions on the extent of the use of polling data. This has also challenged the arguments of other historians who have tended to focus on the cultural outputs of the period, rather than the quantitative data that represented a wider cross-section of British society.

I have shown how the industry framed its public relations strategy around the term 'public acceptability' and through the examples given was beginning to reformulate its strategy in light of the challenges posed by anti-nuclear groups to the development of THORP. This included the withholding of information, while paradoxically, seeking to be more active in its public relation campaigns as seen by the CEGB's review and Sir John Hill's lectures. In Chapter Four, I will explain how the conventions involved in securing approval for the construction of nuclear sites fit into this desire to secure public acceptability.

The Flowers Report, and the reactions to it, showed to the industry that they had to be prepared to challenge these messages from someone who had worked for the industry and therefore, whose words would carry weight. Like much of the nuclear industry's communication strategy, this was again achieved through the deployment of statistics, science, and technological understanding. The report and the industry's

[82] For more on how public opinion is sensitive to question wording see D. Broughton, *Public Opinion Polling and Politics in Britain* (London: Harvester Wheatsheaf, 1995).

response to it also highlighted the tensions between the industry's epistemological view that expanding the public's knowledge would alleviate their concerns and the ontological reality that the emotional concerns over nuclear power were based on.

The industry also publicly claimed that major nuclear accidents were very unlikely. They argued internally, that if they were to occur, then the primary objectives of the industry were to quell rumour and maintain confidence in emergency arrangements set up by the industry. As I will show these objectives did not change, what did change were the arrangements made, the places in which messages were communicated and the intensity with which they are made to certain audiences. They got better at targeting messages at different audiences, rather than adopting a one size fits all approach to responding to nuclear accidents. This is further highlighted in the developing narrative over the period this thesis covers, with safety concerns consistently present due to the accidents at TMI and Chernobyl and the industry's near consistent approach to deploy their technological expertise to explain why such an accident could not happen in the UK.

Chapter Three: 'Why it couldn't happen here!'[1] The British response to the accident at Three Mile Island.

The TMI accident, sometimes referred to as the Harrisburg accident, that occurred on the 25th March 1979, was the most significant nuclear accident since the Windscale Fire in 1957. There had been other accidents at nuclear power plants between these two dates, two of which occurred in the USA, at Idaho Falls, January 1961 at the US National Reactor Testing Station that saw three people being killed, and another in 1966 at the Enrico Fermi Nuclear Generating Station, Michigan, which saw a partial-core meltdown.[2] However, in both cases, no radiation was recorded to have been emitted to the surrounding environment and so drew little media attention in comparison to the TMI accident.

This major nuclear accident had a significant impact on the nuclear industry, both in the US and the UK. In the US it would set back a decade of rapid growth, and in the UK, it would be a major line of argument against the construction of a PWR reactor at Sizewell B. The analysis of this case study has been broken down into several different sections. The first investigates how the accident was handled by the plant operator, Metro Ed, and the response of the US government at both the state and federal level, including the response from the NRC. The second section looks at the UK nuclear industry's response to the accident. What, if any lessons, did they learn from the lessons learnt by the US or what role did techno-nationalistic hubris play in the UK's defence of nuclear power after the accident?[3] In this section, I will also show how TMI impacted the proceedings of the Sizewell B inquiry and how the industry and government responded to the claims that the PWR reactor was inherently unsafe. The third and final section will look at how the UK media responded to TMI. This chapter will conclude that the TMI accident did not extensively change how the industry communicated with the public.

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[1] *Daily Mail*, 4 April 1979, 6.

[2] See W. McKeown, *Idaho Falls: The Untold Story of America's First Nuclear Accident* (Toronto: ECW Press, 2003), & T. Tucker, *Atomic America: How a Deadly Explosion and a Feared Admiral Changed the Course of Nuclear History* (New York: Free Press 2009).

[3] Hecht calls the French CEA a 'nationalist technopolitical regime' that 'saw national grandeur first and foremost in terms of military technological prowess. It valued institutional autonomy and nuclear expertise, and it upheld a vision of nationalism that excluded communists.' My use of the term techno-nationalistic is similar in that the UKAEA and CEGB valued their own nuclear expertise and autonomy over their global counterparts. Hence why the UK decided to build AGRs rather than PWRs.
G. Hecht, *Radiance of France*, 65.

However, it did prompt the industry to place a greater emphasis on public communication, due to the intensified opposition experienced in the wake of the accident. The critical change that occurred because of the accident was that the industry's organisations better understood how to communicate and coordinate with each other and with relevant government departments.

The accident was caused when a routine maintenance check allowed for an air bubble to enter a secondary non-nuclear system in Three Mile Island reactor 2. This caused a malfunction in the monitoring equipment which gave an incorrect reading to control room staff and led to a relief valve being stuck open. The stuck relief valve allowed for large amounts of the radioactive coolant to escape the system, leading to a rise in core temperature. However, the operators believed that there was too much coolant in the system, causing an increase in steam, and therefore, an increase in pressure. This error was made worse when operators overrode the automatic emergency cooling system, as they continued to believe there was too much coolant. This radioactive coolant made its way into an auxiliary building outside of the containment boundary and from here radiation was released to the wider environment. Eventually, operators identified and rectified the errors and brought the reactor under control, but not before the core had suffered a partial meltdown and a significant amount of radiation had been released. According to the 1979 Kemeny Commission, 481-629 GBq of radioactive thyroid cancer-causing Iodine-131 and 480,000,000 GBq of relatively harmless radioactive noble gases, primarily Xenon-135 were released.[4] Compared to other major nuclear accidents, the amount of radiation released was relatively small. At Windscale, 740,000 GBq of Iodine-131 was released, while at Chernobyl 1,760,000,000 GBq of Iodine-131 was released. This is the case with all other radioactive substances, except Xenon-135, where it was emitted 25 times more at TMI than it was at Windscale.[5]

Unlike the British nuclear industry, which was a nationalised industry at the time of the accident, the American nuclear industry was privatised. This, along with the governing structure of the USA, meant that there were different private and state actors involved. The company in charge of the Three Mile Island Nuclear Power Plant was Metropolitan Edison, hereafter known as Metro Ed. The different spokespeople from

[4] J. Samuel Walker, *Three Mile Island*, 231.
[5] J. R. Cooper, K. Randle & R. S. Sokhi, *Radioactive Releases in the Environment: Impact and Assessment* (Hoboken: Wiley, 2003), 150.

Metro Ed, Jack Herebin and Harold Denton will play a significant part in this story. The US version of the Nuclear Installations Inspectorate (NII) was the NRC, which oversaw all nuclear reactors, and was the main governmental body handling the unfolding crisis at TMI. Finally, there are the state and federal governments. The Governor of Pennsylvania at the time was Richard L. Thornburgh and former nuclear submariner Jimmy Carter was the Democratic president at the time of the crisis.

The response of Metropolitan Edison and the US government: 'Trust was the biggest casualty'

On the 31st March 1979, Antero Pietila reported for *The Baltimore Sun* on the events at TMI and how people were preparing to evacuate in the event of a hydrogen explosion. The most striking aspect, however, was Pietila's statement that 'trust was the biggest casualty' at Three Mile Island.[6] This was a widely accepted view with the *New York Times* the day before running with the headline 'The Credibility Meltdown', Tom Jarriel, a reporter for ABC News, also claimed that, due to contradictory technical information, 'the first casualty of this accident may have been trust.'[7] This had ramifications for the UK industry as well, because of the British decision to plan to build PWRs similar to those used at TMI, rather than to continue building AGRs.

It was on Friday 30th and Saturday 31st March 1979, that the sequence of events and communication mishaps occurred. Confusion over what had happened, and what might happen induced public anxiety and panic over the two days. The atmosphere then, and the reasons for it, are described in the book *Crisis Contained, The Department of Energy at Three Mile Island*, by Philip Cantelon and Robert C. Williams.

> Friday appears to have become a turning point in the history of the accident because of two events: the sudden rise in reactor pressure shown by control room instruments on Wednesday afternoon which suggested a hydrogen explosion became known to the Nuclear Regulatory Commission; and the deliberate venting

[6] *The Baltimore Sun*, 31 March 1979, 1.
[7] *New York Times*, 30 March 1979, 1.
ABC News, Three Mile Island, Safety Fears in 1979, March 30 1979
https://www.youtube.com/watch?v=2VRdkTvv878 Accessed: 14/10/2018.

> of radioactive gases from the plant Friday morning which produced a reading of 1,200 millirems (12 mSv) directly above the stack of the auxiliary building. What made these significant was a series of misunderstandings caused, in part, by problems of communication within various state and federal agencies. Because of confused telephone conversations between people uninformed about the plant's status, officials concluded that the 1,200 millirems (12 mSv) reading was an off-site reading. They also believed that another hydrogen explosion was possible, that the Nuclear Regulatory Commission had ordered evacuation and that a meltdown was conceivable. Garbled communications reported by the media generated a debate over evacuation. Whether or not there were evacuation plans soon became academic. What happened on Friday was not a planned evacuation, but a weekend exodus based not on what was actually happening at Three Mile Island but on what government officials and the media imagined might happen. On Friday confused communications created the politics of fear.[8]

The report, *The Three Mile Island Accident: Lessons and Implications*, notes that before Friday residents were not concerned. For example, local residents Anne and Edward Trunk wrote that:

> To the residents of the area, this day passed without concern, even though a general emergency had been declared by 7.24 AM. The news arriving later in the day did not appear alarming, due to communication gaps and the early hour when the accident began. The public had not paid much attention to TMI happenings before March 28th. There had been some previous problems with Unit 2, but each time, the trouble had been rapidly attended to and the public reassured that things were under control.[9]

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[8] P. L. Cantelon & R. C. Williams, *Crisis Contained, The Department of Energy at Three Mile Island*, (Carbondale: Southern Illinois University Press, 1982), 50.

[9] A. D. Trunk & E. V. Trunk, 'Three Mile Island: A Resident's Perspective', in T. H. Moss and D. L. Sills (eds.) *The Three Mile Island Accident: Lessons and Implications* (New York: New York Academy of Sciences, 1981), 175-185, 177.

The Trunks go onto say how ‘odd lines of communication developed.’ For example, the Mayor of Harrisburg did not find out about the accident until a telephone call from a radio station in Boston.[10] The issue surrounding the lines of communication, and who says what, when and how was the first major communication problem that arose out of the crisis. In terms of the communication strategy, this was the area from which the most lessons were learnt by both the US and UK nuclear industry.

The second major communication problem was misleading, misinterpreted, or false information. Throughout their book, Cantelon and Williams note that the US Department of Energy took hundreds of environmental samples around TMI during the accident. But there were no unusually high readings, except for noble gases, and virtually no iodine, well below the readings required for there to be a wide concern for public health.[11] However, the accident caused a political storm, and it was raging, based on confusion and misinformation. J. Samuel Walker mentions that there were a lot of rumours going around in the days after the emergency was declared. One such rumour was that Middletown, a town close to the TMI plant, had been ‘completely obliterated’ while another town had been evacuated by helicopter.[12] These rumours were completely false. The only people to be advised to evacuate were pregnant women and pre-school children. However, this announcement by Governor Thornburgh led to an estimated 140,000 people leaving the 20-mile evacuation zone designated by the Pennsylvania Emergency Management Agency.[13] This panic was caused by the confusion created by the misleading statements not just from Metro Ed and the NRC but also from the state government. Scholars who have examined this agree that the fear of radiation and its invisible deadly nature help to explain why there was this panic.[14]

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[10] A. D. Trunk & E. V. Trunk, ‘Three Mile Island: A Resident’s Perspective’, in T. H. Moss and D. L. Sills (eds.) *The Three Mile Island Accident: Lessons and Implications,* 178.
[11] P. L. Cantelon & R. C. Williams, *Crisis Contained, The Department of Energy at Three Mile Island,* 42.
[12] J. Samuel Walker, *Three Mile Island*, 155.
[13] S. Cutter & K. Barnes, ‘Evacuation behavior and Three Mile Island’. *Disasters* 6, 2, (1982), 116-124, 118.
[14] S. R. Weart, *The Rise of Nuclear Fear*, 24.
Weart points out that radiation not only caused fear but was bound up with ‘the concept of life-force connected with speculation about the cosmic order, questions of procreation, and fantasies about magical powers capable of anything up to bodily immortality and would rebirth.’
J. Masco, *The Nuclear Borderlands: The Manhattan Project in Post-Cold War New Mexico* (Princeton: Princeton University Press, 2006), 3.
Radiation conjures up what Joseph Masco calls the 'nuclear uncanny', a 'rupture in one of the basic cognitive frames of orientation to the world': 'radiation disrupts the ability of individuals to differentiate their bodies from their environment, producing paranoia.’

On Wednesday, March 28th, hours after the core had collapsed into rubble, Lt. Gov. William W. Scranton appeared at a news briefing to say that Metro Ed, had assured the state that 'everything is under control.' By afternoon, Scranton altered his statement. The situation, he said, was 'more complex than the company first led us to believe.'[15] Scranton's contradictory statements were the fault of misinformation from the plant owners, rather than his own. However, what it did was to further the sense of mistrust that was developing, not just in the plant owners but now in the state authorities. It was not until President Carter visited the site that some confidence was restored, although, as Walker points out, the President still had to wear protective boots to avoid trace amounts of radioactive contamination on the floor.[16] Having confidence in the state and the experts they employ is critical when it comes to public communication during a crisis.[17] The US context was slightly different as the nuclear industry was in the hands of private companies, rather than the state as it was in the UK. However, the state still has an important role to play because if something goes wrong, the public look towards the state for answers and actions as they are a source of power and authority to make crucial decisions. In addition, they provide the regulatory bodies and set the rules which nuclear operators were meant to abide by.

The use of multiple spokespeople from Metro Ed highlighted not only a communication failure at TMI but also provided the UK industry with a lesson to learn from. Jack Herbein, one of the plant's spokespeople, whose primary role was a nuclear engineer, and his new role meant that the plant had lost the technical expertise of one of its experienced engineers. He also was not media trained and had little patience for explaining technical details that to him appeared to have been presented adequately. The Trunks stated that the 'press corps was treating him as a hostile witness. When they knew something about the 1,200-mR/hour reading about which he had not been informed, a communication gap arose.'[18] This communication gap persisted throughout the crisis and continued to undermine the credibility of statements from the nuclear industry. I have shown this lack of unity in message before when talking about the state government, but it was more critical here as these people were meant to be the experts on nuclear power.

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[15] *Washington Post*, 28 March 1989, 1.
[16] J. Samuel Walker, *Three Mile Island*, 182.
[17] Usually, the task is to rebuild trust and this falls to experts. See, S. Boudia, 'Global Regulation: Controlling and Accepting Radioactivity Risks'. *History and Technology*, 23, 4, (2007), 389-406.
[18] A. D. Trunk & E. V. Trunk, 'Three Mile Island', 180.

These experts in their white coats, who previously had been revered by American culture, were now seen to be standing around scratching their heads in confusion.[19]

However, statements from different experts from different organisations also meant that there were different projections on whether the situation would get worse. One of the tasks at hand was to claw back some of the earlier messages that had gone out and ensure consistency in the narratives conveyed. Samuel Walker provides an example of when Harold Denton, who replaced Herbein as the spokesperson for the plant, 'repeated his earlier statements (around hydrogen explosion)' and 'denied any fundamental discrepancy between his position and that of Joseph Hendrie, Chairman of the NRC. Hendrie believed that the potential for a hydrogen explosion was higher than the plant operators because they agreed that "there is no near-term danger at all."'[20] However, the consistency of message was not always present, and Denton would criticise his predecessor as a way of winning over the media to make his own statements seem more credible. One example of this can be seen at Herbein's last news conference on the morning of the 31st March. He announced that the hydrogen bubble had been reduced to two-thirds of its original dimensions and that the crisis had ended. An hour later, Denton took issue with Herbein. The difference between the two experts was played up in the news. Herbein was correct, but unfortunately, Denton's views carried more weight at this time. Even as late as Monday, when Met-Ed was saying that the bubble had become so small it might have disintegrated, the NRC insisted on a retraction of the story. Then at his 11:15 A.M. Monday news conference, Denton conservatively reported that the bubble had shown a decrease in size. It was not till Tuesday afternoon that Denton let the world in on what had been evident long before: 'the bubble has been eliminated.'[21]

This confused and incoherent communication strategy, if you could call it a strategy at all, was a key part of the lessons learnt by the US industry and was picked up on by the UK industry as well. This had a lasting impact on trust in the nuclear industry, not just in America but elsewhere in the West in general, as seen by the rise in the anti-

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[19] S. R. Weart, *The Rise of Nuclear Fear*, 109.
Science fiction movies typically represented the here as 'a white-gowned scientist who destroyed the monster with a new isotope – good atoms mastering bad ones… Overshadowing the clever scientist loomed their bastard offspring, unkillable despite all, 400 feet high and growing.'
[20] J. Samuel Walker, *Three Mile Island*, 168.
[21] A. D. Trunk & E. V. Trunk, 'Three Mile Island', 182.

nuclear movements, particularly in Sweden and West Germany.[22] This was also experienced in the UK where reinvigorated anti-nuclear groups, like FOE, CND and Greenpeace, launched a significant challenge against the decision to build PWRs at the Sizewell B inquiry. The UK industry, like its US counterparts, focused on the lessons learnt regarding technical and operator training requirements rather than the lessons to be learnt regarding communicating with the public. This is despite a drop in the favourability of public opinion towards nuclear power in the UK.[23] However, this suggests that the nuclear industry officials believed that if there were no future nuclear accidents, there would be no need to explain them to the public.

The British response to the accident at Three Mile Island

The consequences of the TMI accident were important to the British nuclear industry because they were at the time considering whether to continue with the AGR programme or whether to move to construction of PWRs of a similar design to the reactor used at the TMI power plant. There was a strong sense of British techno-nationalism behind the industry's claim that an accident like TMI could not happen in the UK. On LBC radio former Labour MP Robert Maxwell stated that he was 'convinced' that this kind of accident could not happen in this country, citing regulation and better training standards in the UK industry.[24] Maxwell owned Pergamon Press, a leading publisher of scientific journals in the UK. Along with his previous role as an MP, this could have given him the resources to acquire a greater amount of knowledge on nuclear power compared to the rest of the public. CEGB chairman Glyn England took a more conservative approach. At the annual delegate conference of the Electrical Power Engineers' Association on the 9th April 1979, twelve days after the accident, England affirmed that 'the sequence of events at Harrisburg could not happen in the Magnox and Advanced Gas-cooled Reactors.'

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[22] See F. Bösch, 'Taming Nuclear Power: The Accident near Harrisburg and the Change in West German and International Nuclear Policy in the 1970s and early 1980s.' *German History* 35, 1, (2017) 71-95; D. Nohrstedt, 'External shocks and policy change: Three Mile Island and Swedish nuclear energy policy.' *Journal of European Public Policy* 12, 6, (2005), 1041 –1059.

[23] C. de Boer & I. Catsburg, 'A Report: The Impact of Nuclear Accidents on Attitudes Toward Nuclear Energy.' *The Public Opinion Quarterly*, 52, 2 (Summer, 1988), 254-261, 258.
There are a few polls within this source covering years between 1976 to 1988. The majority relating to TMI show a sharp change against nuclear power after TMI, but it recovers. At least until the Chernobyl accident in 1986.

[24] Robert Maxwell & unidentified representative from CEGB, interviewed by unknown female, 'Three Mile Island nuclear accident,' [Radio Broadcast], LBC, 1979.
The term 'techo-nationalism' has been used by Edgerton in, D. Edgerton, *The Rise and Fall of the British Nation*, 328.

However, England also stressed that while he believed 'the chance of a significant release of radioactivity from our reactors to be remote. Nevertheless, this possibility cannot be ruled out.'[25] *The Guardian* only mentioned England's admission that accidents could not be ruled out.[26] This probably was not what England wanted the paper to focus on from the speech, but both statements were correct. The accident at TMI could not be replicated at UK reactors, as they were completely different designs. Yet, an accident of similar consequences could happen, and this was what mattered. The uncertainty, not only whether an accident could happen, but what impact that might have on the public's health, has a substantial emotional impact. Saying that it could not happen here was an attempt to replace this uncertainty with a sense of certainty using this unnuanced approach, focusing on the details of the event and transplanting them onto UK reactors to point out the differences.

This was also the line that Tony Benn the Secretary of State for Energy used, stating that 'the possibility of human error, which appears from initial reports from the US to have been a contributory factor, is always present.'[27] Benn's actions after TMI caused concern for the wider ESI. Sir Francis Tombs, Chairman of the Electricity Council, wrote to England and complained that the widespread concern about Harrisburg was being exacerbated by 'public statements made by Mr Benn, which are, to say the least, hostile to nuclear power.' Tombs also believed that as it was a general election year during a period of economic downturn, 'to redeem election pledges all parties will wish to cut public expenditure wherever possible after the general election.'[28] He was suggesting that there was a danger that because of the uncertainties not just about the safety, but also the economics of nuclear power, that its development would be stopped. This can be seen in the Labour Party election manifesto for the May 1979 election called for 'a major study and public inquiry would be held before any decision were to be taken' on the construction of new nuclear power plants.[29] The Conservatives did not make such as clear a commitment to an inquiry, instead, they stated.

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[25] IET, SC MSS 264/2/24/4/4/1. 'Address by Glyn England to annual delegate conference of Electrical Power Engineers' Association at York University 9th April 1979.'
[26] *The Guardian*, 10 April 1979, 2.
[27] IET, SC MSS 264/2/24/4/6. 'Letter from Tony Benn to Glyn England 11 April 1979.'
[28] IET, SC MSS 264/3/24/10. 'Letter from Sir Francis Tombs to Glyn England 2nd May 1979.'
[29] Labour Party, *1979 Labour Party Manifesto*, (1979).

> All energy developments raise important environmental issues, and we shall ensure the fullest public participation in major new decisions.[30]

TMI compounded already existing uncertainties over the development of nuclear power in the UK and statements from prominent figures like Tony Benn signalled to the UK industry that they would have to convince the post-election government to continue with the PWR plan and convince the public that nuclear power was safe and beneficial.

However, not all prominent politicians took the same stance as Tony Benn. In parliament, Prime Minister Jim Callaghan stated that 'I believe that I can safely claim and reassure the public that the accident in Harrisburg could not take place in this country because of the different nature of the reactors. It is important that this should be understood.'[31] The Health and Safety Executive also claimed, in a published report, that the regulatory system in the UK was superior to that which existed in the USA before the accident.

> One important aspect of the recommendation is that the nuclear industry should accept all responsibility for safety and reduce its dependence on compliance with detailed regulatory requirements. This would bring the US system much closer to that in Britain.[32]

These statements indicated that, except for Benn, most of the British government, and by association, the publicly funded nuclear industry, presented a united front in public to make the case that the nuclear industry in the UK was inherently safer because of the reactor design and system of government regulating the plants.

However, these reassurances somewhat undermined when the British government announced on the 18th December 1979, the decision to build American-style PWR reactors rather than the British-designed AGR reactors that they had been building

[30] Conservative Party, *1979 Conservative Party General Election Manifesto,* (1979).
[31] HC Parliamentary Debates, 3 April 1979, vol. 965, col 1160-1161.
[32] Health and Safety Executive, *The accident at Three Mile Island,* (Health and Safety Executive, 1979), 3.

previously. Although Robert Maxwell believed that an accident like TMI could not happen in the UK, he was concerned about the prospect of the UK building PWR reactors. He was also concerned that Britain's secretive nature meant that information might not be shared with the public.[33] This brings about an interesting contradiction. On one level, Maxwell was suggesting that such an accident could not happen in the UK but if one did happen the UK government would be highly secretive about it.

In parliament, earlier assumptions that such an accident could not occur in the UK were challenged in the House of Commons in questions to a statement given by the Energy Secretary David Howell. David Penhaligon, a Liberal MP, asked:

> How can the Minister justify the Government's obsession with nuclear power after the Three Mile Island incident, the colossal leak at Windscale, the extraordinarily slow progress of research into the disposal of nuclear waste and the current two-year American halt to any development of the industry? Would it not have made more sense if the Minister had said that until a full inquiry into the PWR had been completed and a method of safe disposal of nuclear waste had been discovered, no further expansion of the industry would take place?[34]

Howell responded with:

> I think that the word "obsession" is misplaced. We are concerned with a build-up which, the end of this programme, would lead to about 30 percent of our electricity coming from nuclear power, leaving us with a variety of sources for power, light and heat in future.
>
> The hon. Gentleman asked why we should be concerned with this programme. We should be concerned with it because we should be concerned with our children

[33] Robert Maxwell & unidentified representative from CEGB, interviewed by unknown female, 'Three Mile Island nuclear accident,' [Radio Broadcast], LBC, 1979.
[34] Penhaligon was a strong critic of the civil uses of nuclear energy. See Oxford Dictionary of National Biography, *Penhaligon, David Charles (1944-1986)* Available Online: https://www.oxforddnb.com/view/10.1093/ref:odnb/9780198614128.001.0001/odnb-9780198614128-e-61831 Accessed 16/02/2021.

> and our children's children, and the question whether they freeze and whether their industries work or not. That is the basis for our concern and for looking a little beyond the immediate future in working out our energy policy.
>
> I have already answered the point about waste disposal. I believe that that problem can be and is being managed. There is no immediate problem there for the foreseeable future. I hope that that meets the point made by the hon. Gentleman.[35]

As we can see Howell does not deal with the issue of TMI directly, instead, he diverts attention to growing energy needs and an energy policy that sought to use a multitude of different energy sources available to the UK. As we shall see in Chapter Four, this was a common deflection strategy.

What did the British Nuclear Industry learn from Three Mile Island?

Although the British nuclear industry claimed that the UK had a superior safety regime than the US, they still learned several key lessons from TMI. These can be categorised into two different groups. The first, and for the industry most important, is the technical aspects of PWR reactors. This was less about communicating with the public but rather communicating with itself to ensure that another accident did not occur. The second was to ensure all its operators were properly trained and that they had the paperwork to prove this. The final lesson, and most relevant to this thesis were the lessons in communicating with the public in the event of a nuclear accident. The first two lessons were the most important issues for the nuclear industry because they argued that preventing another nuclear accident was more important to the survival of the industry than communicating effectively in the event of an accident.

There was an added emphasis to prove the safety of PWRs after TMI and the decision to build them. To do this industry officials believed they needed to know exactly what happened at TMI to show that lessons could be learnt. Before they could show this there had to be considerable collaboration between the UK and US industries, and we can see this in Walter Marshall's private papers. At this time Marshall was the deputy director

[35] HC Parliamentary Debates, 18 December 1979, Vol 976, col 287-294.

at the UKAEA and even before his time at the CEGB he was famous among his colleagues for his detailed notetaking and diagrams that he would do during meetings. In one such debrief on the accident at TMI we can see the extent of the detail that Marshall was exposed to, taking at times a second-by-second account of the accident to pinpoint the exact moment the accident became irreversible. Marshall noted that it was in the 100th minute of the event that this was the 'last chance to close blocking valve.'[36] Marshall also noted several design faults with the reactor system including the fact that a reactor pump A turned on, even though containment was not sealed.[37] This is significant because it was this pump that would lead to the release of radioactivity. We can also see that the UKAEA as an organisation did an extensive analysis of degraded PWR cores. This analysis was part of the supporting evidence of the Sizewell B inquiry and covered 555 pages investigating: PWR accident sequences, performance and technology of water reactor fuel elements, oxidation of fuel cladding and hydrogen evolution, severe fuel damage and core melting, debris relocation studies, containment integrity and fission product behaviour.[38] This kind of material was not there to be read by the general public. It contains terms, calculations, and tables of data that the non-expert was unlikely to understand. These fact-finding missions were vital for the industry as they allowed them to formulate their response to events based on the science, which the industry thought was pivotal and what should inform the public opinion.

The CEGB thought it would be necessary to review the training that its operators received, due to the role human error played in the accident at TMI. Brian Edmonson, who led this review, suggested that this was 'more about showing that nuclear training was good enough rather than checking whether it was good enough.'[39] The real purpose was not to improve or evaluate the training of its operators but to show to the public that their operators received extensive safety training. Of course, only those within the nuclear industry - the CEGB, NII, BNFL, UKAEA - would be able to say with authority that the training was good enough. This is also part of the industry's efforts to rebuild and sustain public trust, or 'acceptability' as discussed in Chapter Two.

[36] CAC, Mrsl H. 44. 'Three Mile Island lecture.' From a folder so inscribed. Handwritten draft, with appended illustrations, 5.
[37] Ibid, 3.
[38] TNA, EG 2/350. 'UKAEA: PWR degraded core analysis, April 1982.'
[39] Brian Edmonson, interview by T. Lean, BL Sounds, track 12 C1495/17.

In another oral history interview, Peter Webster stated that as a result of TMI 'they saw that the emergency arrangements in the US had revealed some things which were learning opportunities.' CEGB decided to review its own emergency procedures and 'they set up a committee to have a look at that, it was chaired by John Baker.'[40] Webster does not go into great detail about what came out of this review, but its very existence shows that the CEGB thought that they had to show they were acting to ensure the highest levels of safety at their nuclear plants. We can see this desire to show action from the Secretary of State for Energy, David Howell, who, in a letter dated the 9th November 1979, over seven months since the accident, stated to W. Simpson, the Chair of the Health and Safety Executive, that 'we must not only learn the lessons of the Three Mile Island accident but also be able to show convincingly to the public that they have been learnt.'[41] In the letter, Howell reinforces this view that the reason to show lessons learnt was to enable the nuclear power programme to make progress.[42] This shows that the government not only saw the review as an environmental precaution but a political one as well. The act of being seen to act is a crucial political device.[43] Not only an insurance policy against claims of negligence in the event of a potential disaster but also to ensure, when questioned, they had a response ready. However, given this letter from Howell was over seven months since the accident, the UK government was hardly moving at a pace to learn the lessons from TMI.

Webster mentioned that the review called for the creation of 'press briefing centres' at nuclear sites around the country.[44] This was the UK industry's response to the US's NRC recommending the 'prompt establishment of press centers reasonably close to the site.'[45] This was not a significant policy change, in the event of an accident in the UK a site would be designated as the place for press briefings to take place, but what this did change was to make dedicated spaces that were properly equipped and staffed in the event of an accident. Therefore, the change was more about having the logistics in place for such an event rather than a change to the substance of the messaging. In a meeting of

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[40] Peter Webster, interview by T. Lean, BL Sounds, track 2 C1495/50.
[41] TNA, EF 7/698. 'Report to Secretary of State for Energy on the Three Mile Island incident'
[42] Ibid.
[43] Walker details how the aftermath of TMI saw presidential, congressional, and agency commissions piling on the operators, regulators, and owners of the facility. In part because the NRC was 'ill-prepared and ill-equipped' to deal with the accident.
J. S. Walker, *Three Mile Island*, 91.
[44] Webster, BL Sounds, track 2 C1495/50.
[45] TNA, AB 62/873. 'Three Mile Island, NRC Report, 244.'

UKAEA staff on the implications of TMI on public relations, Sir John Hill commented that the public relations aspects of TMI had 'been handled particularly unhappily in the United States.' It is clear from this meeting that the UKAEA wanted to coordinate with the CEGB, NNC, and BNFL to ensure that operators knew what to do in the event of an accident.[46] In other words, the industry wanted to avoid the perception of confusion and incompetence that plagued Met-Ed at TMI. Such centres would also allow the industry to control the movement of the press, as they would not be able to roam around the plant or ask questions outside it. Furthermore, it allowed them to better moderate and control the narrative as the press would hear only one voice at a time. The fact that this was the only procedural change that Webster mentioned that came out of this review implies the significance of this "lesson."

However, Webster also more broadly claimed that 'it was recognised that the activity of briefing the public and managing the public was a significant task.' Before this, Webster believed that the public's expectations were not recognised 'at all.'[47] This recollection gives us a sense of the changes that occurred after TMI and why what happened before them are consequential to our understanding of the public's emotions. Public expectations certainly were not the top priority but to say they were not managed at all does not do justice to the body of evidence that exists that suggests otherwise. In a note on a meeting of the implications of the TMI accident on public relations that took place on the 26th April 1979, a month after the accident, Sir John Hill was concerned about public relations but that 'there were good internal communication links within the Authority and BNFL, which would enable staff at all establishments to obtain information in the event of an accident at a particular site.' However, Hill and the group believed that this needed 'to be tested in a simulation exercise.'[48] What this does highlight is that the industry wanted to show that it was prepared for a potential future accident and that its response would mitigate the damage caused to public relations. The accident at TMI caused a significant change in the UK nuclear industry's public communication strategy. However, it was not a dramatic turning point; the attitude was still that large datasets, complex equations and technical drawings were the best way to assert scientific authority

[46] TNA, AB 46/116. 'Note of a meeting to discuss the implications of the Three Mile Island accident, 26th April 1979.'
[47] Webster, BL Sounds, track 2 C1495/50.
[48] TNA, AB 48/1136. 'Notes of meetings on implications of Three Mile Island accident on public relations.'

and through that ensure public confidence in the industry. This was also a recognition that there needed to be a coherent and thought-out communication strategy, but the nature of that strategy, that scientific and technical knowledge should inform the public's opinion, not irrational fears, stayed the same.

The British Press and Three Mile Island

While there was some consistency in the view of the national press that the British industry was generally better than the American industry, the proposal to introduce PWR reactors challenged that consensus. The media were key to the nuclear industry's communication strategy, either through written or audio-visual means. What was and was not included in the national press will show us what messages were picked up on and how they were interpreted.

Initial coverage of the accident was broadly the same across the spectrum of newspapers, with visible but minor changes in the language used to distinguish one newspaper from another. *The Observer* led with the headline 'Countdown to A-Plant Disaster'. Robert Chesshyre suggested that a major event was imminent and unavoidable. It calls it the 'worst civilian nuclear accident' while also mentioning the claims that the plant's owners were complacent.[49] On the 2nd April, *The Guardian* included an analysis on what Harold Jackson and Antony Tucker believed were the implications of the accident, including whether TMI would end with 50,000 square miles of the United States becoming uninhabitable and even if that did not happen the 'big question' was on the health impacts of the accident. In particular, whether it would lead to additional cancers downwind of the accident.[50] The *Daily Mail* also took an alarmist approach. In an article titled 'Let's get clear', Simon Winchester focused on the human element of the story unfolding at TMI: the confusion and sheer panic that families faced as they desperately 'flee in fear of nuclear death explosion.'[51] This article was extreme in how it plays up the fear of the accident at TMI; the "death explosion" would have triggered images of mushroom clouds causing unthinkable amounts of destruction. It does go into further detail to say that this explosion would be caused by a bubble of gases, but it does not explain what these gases were. Indeed, the article was devoid of any detailed science, except to say that the scientists know what the science was. The headlines from both

[49] *The Observer*, 1 April 1979, 6.
[50] *The Guardian*, 2 April 1979, 13.
[51] *Daily Mail*, 2 April 1979, 4.

papers are alarmist in hindsight, but what is significant is that they come to different conclusions. While the *Daily Mail* gives the reader the sense that while this event was bad it ends on the note that the nuclear engineers and scientists know what they are doing, and they were the only hope to prevent it from getting worse. *The Guardian*, though, places the blame directly on the plant owners, and through that, other plants they ran could follow a similar fate. Neither article was ideal for the industry, but this gives us an insight into which correspondents and papers took their lead from the industry. In this case, *The Daily Mail* who did run with the line that technical expertise would save the day, while *The Guardian* – with a broad audience of those who would define themselves as anti-nuclear – puts forward the arguments they are familiar with.

The *Daily Mail* ran two different articles that appear as opinion pieces, one on the 9th April titled 'Why it couldn't happen here,' written by Angus MacPherson, the science correspondent. The other a month later on the 9th May, titled 'The power we can't afford to cut off,' written by William Greaves. Both were very positive towards not just nuclear power but British nuclear power. Macpherson takes a techno-nationalistic stance, insisting that an accident like TMI could not happen in the UK because of the different reactor design leading to a perceived better safety record and a reduction in the risk of explosion.[52] This article reads like a industry press release, it contained a higher degree of technical detail than other articles being published at the time and used the primary line of argument given by the industry in response to TMI. Possibly because it was taken directly from a press release from one of the main bodies that make up the nuclear industry, although there is no direct evidence of this. Greaves' article was not as technical as MacPherson's, rather it focuses on what it sees as economic realities - it claims that nuclear power was essential to the energy policy of the UK. It states that:

> Britain cannot survive on four-fifths of her available power without a severe restriction of the liberties which are the bread and butter of everyone, including members of protest groups.[53]

[52] *Daily Mail*, 4 April 1979, 6.
[53] *Daily Mail*, 9 May 1979, 6.

It recognises that newly found gas resources in the North Sea would make Britain less dependent on nuclear power but 'only to a degree.' The argument that nuclear power was crucial to the economic wellbeing of the nation was made often, as seen in the previous chapter with Sir John Hill's lectures and, as we shall see in Chapter Four, on public inquiries and nuclear power in parliament.

The Economist commented on the accident, with two different articles. The first comments on how the prospect for American nuclear power would drastically change. It argues that the accident 'caps a string of misfortunes' for the industry suggesting that, along with additional economic costs, the political cost may just be too great in the future.[54] The second article talks about the implications for nuclear power around the world with the title 'we all live in Harrisburg.' This article reported on the protests that erupted after the accident; it used the words on one of the placards as the title to show the transnational implications of this accident. It also has the subheading of 'a special sort of fear,' in which it analyses how the reaction to TMI was unlike other disasters. It also suggests that the link to cancer caused by radiation compounded the fears experienced because it was not understood how to prevent it or reduce the amount of radiation released. It compares the risks of nuclear power to those of coal power stating:

> Coal-fired power stations kill people in the same sort of long-delayed way through respiratory problems, but deaths can be greatly reduced by adding on an extra safety box of tricks (flue gas scrubbers). Nuclear power by contrast seems to offer a peculiar all-or-nothing type of danger.[55]

The article went on to say that the *Economist* was still pro-nuclear, and that other advocates 'can argue that the fast-response safety systems at Harrisburg all worked.'[56] This would have irked anti-nuclear activists and scholars of risk, such as Charles Perrow, who commented on how in the nuclear industry engineers could be 'uncommonly cheerful,' when minor faults occur. He gives the example of an NRC journal, where one nuclear engineer was 'pleased' to point out that the melted fuel re-solidified only a short

[54] *The Economist*, 7 April 1979, 47.
[55] Ibid, 19.
[56] Ibid, 20.

distance from the hot spot and did not cause the melting of adjacent subassemblies.[57] Sir John Hill took a similar cheerful viewpoint in his speech entitled 'The Quest for Public Acceptance'. Hill argued that,

> The possibility of a substantial release of activity from the primary circuit had however been anticipated and prevented all but a minuscule release of activity to the environment. So, the unthinkable accident has happened, and it hurt nobody. This should be a plus for nuclear power, but it probably won't get the credit that is due.[58]

What this does show is that senior industry leaders did not believe that a disaster worse than TMI could happen, but also that Hill believed it should be seen as a positive news story showing that powerplant designs could mitigate the impacts of human error.

The debate over nuclear power post-TMI in the national press saw PWR as not only a threat to British technological nationalism but also as being more at risk of causing a nuclear accident. This sense of national pride in the nuclear industry had somewhat sheltered it from significant criticism. The analysis of the press also allows us to see the messages that the pro-nuclear advocates wanted to be spread, in a manner that could be digestible to the readers of any publication it was printed in. What this suggests is that the pro-nuclear advocates were stating that the nuclear industry was not at risk of a TMI-style accident occurring, unless they decide to build PWR reactors. Although the industry itself was actively reacting to the disaster, its response was not immediately played out. Instead, it used other opportunities like public inquiries and parliamentary select committees to convince the audiences it needed to persuade that nuclear power was still beneficial to the public.

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[57] C. Perrow, *Normal Accidents,* 54.
[58] CAC, B. 218. 'Lecture given to Institution of Nuclear Engineers and the British Nuclear Energy Society on 26th April 1979, The Quest for Public Acceptance, 14.'

Conclusion

For the United States, TMI was a turning point in the direction of the US nuclear industry. It halted the growth of nuclear power and ended the golden era of expansion that had been experienced over the past decade.[59] The crisis of confidence and trust that arose out of the accident not only affected the US industry but the UK one as well. Concerns were heightened when the UK government decided to end its AGR programme in favour of a PWR one. The pro-nuclear establishment argued that an accident like TMI could not happen in the UK because of superior operator training and that AGR reactors could not experience the same kind of accident because its coolant was gas rather than water. However, even without the decision to build PWR reactors in Britain, TMI became synonymous with a rise in nuclear anxiety, both in the US and the UK, that was compounded by a poor communication strategy that led to confusion and mistrust.

The UK industry was somewhat slow to react to the accident; after all, it posed no danger to public safety in the UK and the decision to build PWRs was not a certainty. Nonetheless, the UK industry did react to the accident and evaluated that there were some important lessons to be learnt. For the industry, the most important lessons were technical ones; arguing that they had learnt from the accident under the premise that such an accident could not happen again, as they had learnt from the previous one. However, it was the UK nuclear industry's communication strategy where most lessons were learnt. Through the confusion caused by TMI, the industry thought that in the event of a future accident they would have to create a space, in this case, a designated press room, in which to control the narrative through one voice. With the Sizewell B inquiry on the horizon as a result of the decision to build PWR reactors, the British industry would have to prove that nuclear power and all the risk that comes with it was safe in their hands. It would have to rebuild confidence and trust in nuclear power. It would be unjustifiable to say that TMI changed how this would be done, but what it did do was place greater scrutiny on nuclear power meaning that the industry would need to intensify its communication strategy to achieve its goals. From this point on they had to acknowledge that technical excellence was not enough, the ability to communicate that effectively was also required.

[59] J. S. Walker, *Three Mile Island*, 242.

Chapter Four: Going through the conventions - Communicating to Parliamentarians and Public Inquiries

This chapter examines how the industry communicated with parliament, how it communicated at public inquiries and how the public learnt about the industry through media coverage. It explores the challenges these processes posed the industry and how they sought to navigate through them that provides crucial context to Chapter Seven. It builds on the content of Chapter Two showing how the industry responded to concerns brought up by the 1976 Flowers Report. What this chapter will show is that the means of communicating in parliament and at public inquiries, as well as the overall themes of communicating the safety and economic viability of the industry, did not dramatically change over the period. However, there are noticeable moments where the content altered to reflect a change in government policy or to reflect the new threats that nuclear accidents were seen to pose to the existence of the industry.

This chapter is broken down into two sections. First, I will look at how the industry communicated with government and parliamentarians, either directly to them in personal meetings or All-Party Parliamentary Groups (APPGs), or indirectly through ministerial statements and parliamentary debates in the Commons and Lords chambers. I will also look at the role of select committees in attempting to hold the various organisations that made up the industry to account. This is because these committees not only show us which laws and regulations were of particular importance to the legality of the industry; they also provide moments where we can see the changing narrative take place. This first section will show how the industry saw parliament as a crucial forum in which it used as a platform to communicate its message at all levels. While a significant amount of effort was placed on communicating with ministers, backbench MPs from all parties would also experience the industry's lobbying efforts at APPGs and through parliamentary groupings and direct correspondence.

Second, I will look at what the industry communicated at the public inquiries held during this period. This includes the inquiry into whether to build THORP at Windscale, later known as Sellafield in 1977-1978, the Sizewell B inquiry into whether to construct a PWR held between 1982-1984 and the Hinkley Point C inquiry into whether to construct a second PWR, held between 1988-1989. I will look at the two major themes

of the industry's case: that nuclear power was safe and economically viable. I will also examine what the industry communicated at these inquiries and how they were part of a wider effort to control the narrative and to seek political legitimacy for the construction of new nuclear reactors. This section will reinforce some of the conclusions made by other academics such as Brian Wynne and Ian Welsh that these public inquiries were an inadequate forum through which to engage the public in the decision-making process. However, what I will also argue is that these inquiries were forums at which the industry could lay out its entire case to a select number of influential groups, including lawyers, scientists, politicians - particularly local politicians - and anti-nuclear groups.

This chapter is the strongest example in this thesis of how the industry did have a coherent strategy, they identified key audiences and planned out how to communicate with them. There was extensive planning and preparation for the public inquiries to ensure the industry was able to respond to the inquiry board and cross examinations, the public inquiries show how the various nuclear organisations had to collaborate and share information. However, this level of preparation and planning is unique in this thesis, while we see collaboration and planning in other areas of the thesis, we do not see it at the level seen in this chapter.

Lobbying parliamentarians

As the central decision-making legislature in the UK, ensuring a strong lobbying effort in parliament would be vital to the industry's objectives to continue to ensure nuclear power's place within the ESI and expand its place within it. Williams' work is particularly helpful to our understanding of the state of communication before Three Mile Island, as he stated that:

> From the perspective of government, the public nuclear debate of the mid-seventies could be viewed as having facilitated the discharge of two distinctively different functions. First, a controlled debate bringing in Parliament and with a good availability of information and adequate opportunities for involvement – itself quite different in participation… Second, public debate was also a genuine

> means, in circumstances involving at least some uncertainty, of getting all relevant questions identified if not answered, and of testing BNFL's case.[1]

Williams argued that there were two pathways of communication. One to Parliament and the other to the wider public. Parliamentary proceedings were reported on by the press and the first experimental radio broadcast in June 1975 and permanently after April 1978 on Radio 4. It was not until November 1989 that TV cameras were permanently allowed to view all parliamentary proceedings. Therefore, they were potentially accessible to the public, however, many members of the public were put off by how parliament worked.[2] One of the arguments that this thesis has developed is that different communication strategies depended on the audience, whether it be Parliament, the locality around nuclear plants or the wider public.

The following section looks at how the nuclear industry communicated to various groups within parliament and how the industry lobbied for resources, rather than just communicate the science of nuclear power. However, this should be seen as part of the wider communication strategy. This is because the governance structures of the UK, the head of the CEGB, UKAEA and BNFL, was appointed by the Secretary of State for Energy. They were accountable to the Secretary of State, who was then accountable to the rest of the cabinet and would need to lobby the Treasury for resources.[3] Ministers and secretaries of state were ultimately the decision-makers as to whether the nuclear industry would expand, contract, or maintain its position within the UK ESI. However, they would need to seek the legitimacy of parliament by passing votes on the construction of new nuclear sites such as THORP and Sizewell B.

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[1] R. Williams, *The Nuclear Power Decisions*, 313.

[2] David Hendy recounts that – 'Within the first two days of Radio 4's coverage in April 1978, the BBC received 343 phone calls and letters of complaint; by the end of May they'd received 2,799 – and only 31 letters of appreciation. Far from reconnecting with parliamentary democracy, the British public's first reaction was to be appalled at the rowdy and posturing behaviour in the House or confused by the arcane procedures. Sometimes they were simply bored.'
D. Hendy, 'Broadcasting Parliament,' BBC. Available Online: https://www.bbc.com/historyofthebbc/100-voices/elections/broadcasting-parliament [Accessed Online: 21/10/2019].

[3] For more on the opposition the industry faced from within the Treasury see, T. Kelsey, *Picking Losers*.

Direct engagement with ministers

This subsection will examine how the various groups within the industry sought to bring people into the fold so that they might support or continue to support the development of nuclear power. Through the alignment of messaging to create a united front to lobby ministers, or by pointing out inaccuracies in ministers' understanding of a subject to give the industry a sense of credibility.

CEGB officials would keep the chairman updated with what government ministers were saying publicly to better prepare them for their private meetings. We can see this in Glyn England's 'CEGB diary,' in 1977 when the government was deciding what kind of nuclear reactor they should build. In England's diary, he noted how Tony Benn was on *Question Time* stating how he was waiting for advice from the NII and Nuclear Power Corporation (NPC), before deciding on further orders of nuclear reactors.[4] This was important information for the CEGB to know because it told them that a decision had yet to be taken and that it would be some time until a decision was taken, allowing them to lobby Benn and groups like the NII and NPC that their preferred choice of reactor was the right decision. We can further see this delay in the decision-making process by Benn being noted by England after a meeting on the 5th August 1977, where Benn stated that the Cabinet Office had expected a decision by the end of July. However, for Benn 'this was not on' and that 'time was needed before final conclusions could be reached.'[5] This was an opportunity for the CEGB to present its case, which stated:

> We believe that our consultations have been of value as they should achieve, once decisions are made, the sort of commitment from a range of organisations and individuals that is necessary for real progress in this complex activity… This is essentially a matter for the nuclear and power plant manufacturing industries. It is our understanding, however, that our line of approach would not be unhelpful.

England goes on to offer opportunities to discuss this further in the future.[6] Therefore, while the lack of a decision on nuclear reactors was frustrating to some in the Cabinet

[4] IET, SC MSS 264/1 Jan to July 1977. 'Glyn England CEGB Diary 4-8th July 1977.'
[5] IET, SC MSS 264/2/4 August to December 1977. 'Note on meeting with Tony Benn 5th August 1977.'
[6] Ibid, 'letter from Glyn England to Tony Benn, 20th October 1977.'

Office and the strongest of the pro-nuclear voices. It was also seen as an opportunity by other groups, allowing them to put forward their vision during a time when the groups that made up the nuclear industry were not united on the choice of reactor that should be built.[7]

This direct and close relationship with ministers was also an opportunity for institutions within the industry to align themselves with various positions that others may or may not share. For example, in a memorandum from the CEGB on the choice of nuclear reactors, it is evident how the CEGB aligned itself with the NPC over their recommendation not to continue with the plan to build a 4GW programme of SGHWRs. However, while the CEGB supported the development of nuclear power arguing that it was more cost-effective than fossil fuel alternatives, the CEGB distanced itself from the UKAEA's viewpoint that the UK should focus on building PWR reactors sooner rather than later. It stated:

> The PWR will require further work before it can be constructed in this country and some detailed design changes are likely in order to meet NII requirements. These will take time. Time will also be required to obtain agreement on its siting. These various factors mean that it is not possible to say now which system will eventually be better for UK conditions – indeed, a situation can be envisaged in the longer term when both systems could be profitably employed.[8]

This memorandum, which was attached to the letter that Glyn England had sent to Tony Benn on the 20th October 1977, shows government ministers were directly approached by the CEGB. As others have argued, this highlights the rare but important divisions within the industry.[9] This also shows how the CEGB through direct correspondence sought to set out its case that while a PWR was a viable option, it would require extensive

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[7] It is not clear who Benn is referring to when he refers to the 'Cabinet Office.' However, he was potentially referring to the Permanent Secretary to the Cabinet Office at the time was Sir John Herbecq, who was previously the private secretary to the UKAEA Chair between 1950 and 1960. The decision was actually one which his predecessor Sir Arthur Hawkins was meant to take, but never did. Leaving it to England to decide.

[8] IET, SC MSS 264/2/4 August to December 1977. 'Memorandum on Thermal Reactor Strategy attached to letter to Tony Benn 20th October 1977.'

[9] R. Williams, *The Nuclear Power Decisions*, 92; I. Welsh, *Mobilising Modernity*, 131; T. Hall, *Nuclear Politics*, 124.

work and planning, and therefore time before a commitment could be made to take it to a public inquiry.

The consequences of this division can be seen with the election of the Thatcher government in 1979, which were initially keen to develop PWRs. David Lewis of the National Nuclear Corporation indicated in a letter to Richard Wilson, a civil servant in the Department of Energy, Lewis wrote that if the new Conservative government delayed in committing to a PWR programme then there would be 'unnecessary expenditure,' while warning that the cost of cancelling outright a PWR programme would waste $3.5 million, which had been spent working on plans with US companies.[10] Further correspondence between Wilson and other civil servants complained about the delays from the CEGB under England that the discussions over the letter of intent on the PWR 'are still going round and round and round.'[11] It is clear from a speaking note of a conversation with Glyn England, dated 4th March 1980, nearly eight months after the letter from the NNC, that the Conservative government was 'disturbed' by England's comments on the letter of intent for the PWR, stating that a delay of over two months was 'far too long, particularly since there still appear to be hurdles to overcome.'[12] The government's opinion was shifting against England by this time and by 1982 he would be replaced by Walter Marshall, who was significantly more pro-nuclear, being a nuclear scientist with a long career at AERE Harwell and the UKAEA.

During the Marshall years, this close relationship between the top officials in the industry and the government continued with Marshall being a highly qualified scientist involved in research, this period saw a greater focus on the communication of nuclear science. Although the Secretary of State was the ultimate political authority on whether new nuclear power stations could be built, Marshall was, for the government, the ultimate scientific authority on what nuclear power could achieve.[13] However, Marshall would, of course, have direct meetings with ministers and while his handwritten notes of these meetings contain scant detail, we can see what problems were facing the industry, according to him, and how the government could help. In a presentation to Norman Lamont on the 24th June 1981, at this time a minister in the Department for Energy,

[10] TNA, EG 12/173. 'Pressurised Water Reactor (PWR): development and choice of licensor, letter from David Lewis to Richard Wilson, dated 25th July 1979.'
[11] TNA, EG 12/173. 'Letter to Mr Wilcock from Richard Wilson, 29th February 1980.'
[12] Ibid. 'Speaking note of conversation with Glyn England, 4th March 1980.'
[13] For more on the structures of the Department of Energy see, P. Hennessey, *Whitehall*, 445-448.

Marshall, as the head of the UKAEA, before he became head of the CEGB, laid out the twelve problems facing the industry and how 'we must solve all at once, 11/12 is failure.' These problems include the need for a sympathetic government, a 'correct' decision between AGR and PWR and a programme to build a new fleet of reactors - all of which by the time of this meeting Marshall believed were solved. The other problems mostly related to the organisation of the industry and are not directly relevant here but one crucial point that Marshall believed needed changing was his belief that evidence from the NII at any public inquiry needed to be 'agreed,' with the CEGB before a public inquiry could take place.[14] This indicated that even before an inquiry took place, the NII and CEGB would submit a unified argument, despite the supposed independence of the NII.

This was a problem for Marshall as the NII had said in evidence to a Select Committee on Energy on the safety of PWR that they 'would not be able to go to that inquiry and say that I expected to license a PWR without getting challenged.' Marshall laid out a potential timetable between June 1981 and July 1983, where an inquiry could begin in October 1982 and finish in January 1983, and what would be needed for the NII to avoid a delay on the decision to issue a site license without causing potential awkwardness for the CEGB. Marshall's plan also required John Dunster, at this time at the NII as the Deputy Director-General, to withdraw or explain his comment at the Select Committee on Energy, which apparently, he was willing to do. Marshall believed that the CEGB must offer designs with 'fall-back options' to show they have thought of extra safety measures for a PWR at Sizewell, including extra relief valves and lower pressure in fuel cans. According to Marshall, this meant that 'some key questions need not be defended by NII in detail before issuing a site license.' Marshall hoped that this would mean that approval for a PWR at Sizewell could be secured at a faster pace while avoiding potential awkwardness over the role of the NII, meaning that there would be minimal political disruption to the Secretary of State in answering questions from objectors.[15]

However, he was called upon in the early years of the Thatcher government to provide his opinion and expertise on PWRs. The meeting that took place before he was appointed Chairman of the CEGB, on the 17th September 1981 at 10 Downing Street, was part of a steering group on the new design of reactor including Mr Stern of Westinghouse

[14] The meeting also discussed the role of private industry, the contractual conflicts between the NNC and CEGB, and 'institutional conflict' between various bodies, who is responsible for what?
[15] CAC, Mrsl H. 80. 'Flashcards of meeting with Mr. Lamont, 25th June 1981.'

and Mr Reinsch, President of the Bechtel Power Corporation. The meeting happened before Marshall had briefed the new Secretary of State for Energy on these developments. They wanted not only to report that they had unanimously chosen a design but Marshall also 'was absolutely confident that the NII would give their approval' by the 1st July 1982. Because of this, Marshall and the steering group said to Thatcher's Private Secretary that:

> it was now for the Secretary of State to announce the start of the public inquiry consistent with these dates. It ought, in his view, to be possible to start the public inquiry by October 1982… He recognised that the timescale was tight, and that there were political considerations which Ministers would have to take into account before deciding on the timing of the inquiry.[16]

Later in the meeting, Marshall persisted with an optimistic tone believing that, even post-TMI, he was confident on 'the safety angle', as it was based on:

> indications he already had from the NII on what their findings were going to be. Indeed, NII would be sending the Secretary of State early the following week a statement setting out the broad terms in which they intended to approve the design in their report.[17]

This meeting highlights several things. First, Marshall had a direct line of communication with Thatcher, in an attempt to push his agenda forward. This is potentially because of Thatcher's interest in science-related matters and her fascination with the French nuclear programme.[18] It is also possible that Marshall felt that he was accumulating political capital with the Thatcher government because of his strongly pro-nuclear position and so could approach the highest officials within the government. Second, again we see the

[16] TNA, PREM 19/572. 'Meeting with Dr Walter Marshall, Chairman of UKAEA, Ted Stern of Westinghouse Power Systems and Harry Reinsch, President of Bechtel Power Corporation, to discuss the Pressurised Water Reactor (PWR) programme.'
[17] Ibid, 2.
[18] R. Davies, 'The Sizewell B Nuclear Inquiry'. 23.

various institutions that made up the nuclear industry present a united front. In this case, we can see the UKAEA align itself with two private businesses to push forward with the PWR design. Third, and most crucial, is the apparent insider knowledge that Marshall held regarding the views of the NII concerning whether they would accept the design of the PWR. Ian Welsh argued that the NII was based upon the same organisational culture as the institutions it was intended to regulate. This led to a common cultural grounding with the management of risk-based in shared perceptions, customs, and practices. [19] This knowledge was used to push the government to start planning the inquiry but also to alleviate any fears that they may have about the inquiry, particularly post-TMI. Together these three different points highlight the networks of communication that existed that connected the nuclear industry with business, public bodies, and the government itself, and how they interacted and negotiated with each other to achieve their goals.

Communicating with APPGs and Associate Parliamentary Groups

APPGs are a crucial part of the functioning of the UK parliament. They provide a space in which MPs, across the political divide, group together around specific interests and focus on particular policy areas.[20] For the nuclear industry several APPGs and associate parliamentary groups, including the APPG for Energy Studies and Associate Parliamentary Group on Minerals, were relevant to their strategy for communicating to targeted groups of MPs, allowing them to show no particular political favour. An example of this is the Parliamentary and Scientific Committee, which John Hill spoke to in 1968 on the benefits of nuclear power and Walter Marshall spoke to in 1983 on the future of nuclear power and after the Chernobyl accident in 1986.[21] In this sub-section, I will use case studies of both Hill and Marshall to see what kind of groups they talked to, and how they approached them. These groups were likely to contain supporters and were not about converting sceptical MPs, but rather to shore up support with MPs so that they may then support the industry within the chamber, to constituents or the media.

An example of a senior nuclear official communicating with an APPG was John Hill's lecture to the Parliamentary Liaison Group for Alternate Energy Strategies, where

[19] I. Welsh¸ *Mobilising Modernity*, 97.
[20] P. E.J. Thomas, 'Reaching across the aisle – explaining the rise of All-Party Parliamentary Groups in the United Kingdom' Paper presented at the Political Studies Association 65th Annual International Conference, Sheffield, UK, March 30-April 1, 7.
[21] CAC B.4. 'Address given to Parliamentary and Scientific Committee, 12 March 1968.' Mrsl H. 170. 'The Future of Nuclear Energy, 23 November 1983.' Mrsl H.340-H.343. 'The hazards of civil nuclear power in the light of the Chernobyl disaster, 1 July 1986.'

he spoke on how 'clean and safe and cheap nuclear power is compared with other ways of producing electricity.' This meeting took place in the form of a debate as Walter C Paterson, an adviser on energy to FOE, was also present.[22] Before the lecture was given, the issue of the content of the slides Hill intended to show was brought up by the Information Services Branch of the UKAEA, who believed that there was too much information on the slides to be accessible to a large audience and that if Hill wanted these redone then it would take 'a few weeks to draft artwork, final artwork, then photography.'[23] This indicates that, if needed, the resources were available to do such work, but also that for this audience it was thought potentially worthwhile putting in such effort due to its influential nature. This also shows that the industry scrutinised public communications like this before they were presented to ensure they were effective. We can see that the fruits of this labour were worthwhile in a letter from Nigel Forman, Conservative MP for Carshalton and Wallington, suggesting:

> how impressed I was by the masterful way in which you dealt with the whole range of issues which arose at the… meeting yesterday evening. In my view, you did your camp a great deal of good by the comprehensive and fair-minded way in which you sought to answer all points raised.[24]

At least in terms of Forman, the meeting was a success for Hill. However, this is just one opinion that the archival files have retained and therefore, tells us nothing about the range of responses by those who attended. Nevertheless, this suggests the usefulness that these APPG meetings had in spreading the industry's message within the corridors of Westminster.

We can also see how Marshall, as both chairman of the UKAEA and later as chairman of the CEGB, enjoyed extensive interactions, not just with the Thatcher government but with different groupings within parliament, such as the APPG for Energy Studies. The APPG invited Marshall to give a talk on 'Nuclear Safety and the Transport

[22] CAC, B. 242. 'Letter from Frank Hooley MP to Sir John Hill, 24th May 1979.'
[23] CAC, B. 242. 'Letter from UKAEA Information Services Grant to D. Midgley, secretary to John Hill, 14 August 1979.'
[24] Ibid. 'Letter from Nigel Forman to Walter Marshall,

of Nuclear Waste,' on the 6th May 1981.[25] Marshall accepted but decided that he wanted the input of Roy Matthews, Director of Health and Safety from the CEGB, on the transportation of nuclear waste before he gave the talk.[26] Matthews replied with two booklets that summarised information 'given by the CEGB and British Rail in public presentations to local councils, the media and MPs during the last year.'[27] This demonstrates that first, the engagement with parliamentarians was a collaborative effort between the various organisations that made up the industry. Second, some of the information given to parliamentarians was not new or secret information, but rather information that was already publicly available. However, having Marshall deliver this information was potentially beneficial, because of his authoritative position as a respected nuclear scientist, and by 1983 he would be the chairman of the CEGB pushing for the construction of PWR plants.

The second point to make about this particular lecture to the APPG for Energy Studies is that the issue of nuclear transportation was particularly contentious at the time, with select committee hearings on the matter as well, this lecture would serve as an opportunity to reaffirm the CEGB's position on the transport of nuclear waste. As we can see in internal memos submitted to Marshall, the CEGB was working with the NII to show that the methods used to transport waste were indeed safe.[28] This was an important issue for the industry as Sir John Hill had also spoken to MPs about the transport of nuclear material - he had given a talk on the 3rd December 1980 to the APPG on Minerals. However, as this was a highly contentious issue and starting to dominate public-facing communications from the industry, new publications and statements were coming out regularly and so the industry had to consider new information. This included a film from Sandia Laboratory in California, called 'Accident Safe', on the ability of nuclear flasks to withstand high-speed impact collisions. The information on this film was briefed to Marshall with the intention that he then used it at the APPG lecture.[29]

Marshall spoke with the APPG on Minerals on the 29th May 1986. The purpose was to explain what was known about what happened at Chernobyl, and why the industry

[25] CAC, Mrsl H. 79. 'Letter from David Crouch to Dr. Marshall 12th December 1980.'
[26] Ibid, Letter from Dr. Marshall to Roy Matthews 24th December 1980.
[27] Ibid. ', Letter from Roy Matthews to Dr. Marshall 8th January 1981.
[28] CAC, Mrsl H. 79. 'Memo to Dr Walter Marshall briefing him on lecture on the transport of nuclear waste, 24th April 1981.'
[29] Ibid. 'Letter to Sir John Hill, with Walter Marshall copied in, on the film Accident Safe, 8th January 1981.'

believed it could not happen in the UK. At the address, Marshall stated that he believed 'the whole future of nuclear power depended on public and political reaction to Chernobyl.' Marshall took questions from MPs, including from Dr Michael Clark, Conservative MP for Rayleigh, who commented that 'in public eyes, the nuclear industry was only as safe as the least safe station in the world.' Marshall agreed with this statement, providing context to his efforts to create the World Association of Nuclear Operators (WANO) post-Chernobyl. Of particular interest was a question from Roy Mason, Labour MP for Barnsley Central and former Defence Secretary (1974-1976), who asked how the nuclear industry intended to regain public confidence. Marshall replied that

> it was important for people in the industry to talk in a language that the general public understood. The radiation protection agencies were a prime example of failure in this field. Too many people communicated in terms that were meaningless to the layman.[30]

We can gather from the questions that many of those present were supportive of the industry.[31] They asked no questions about whether the industry was inherently unsafe, or whether it should be closed down, but questions on how it could continue and bounce back from Chernobyl. Therefore, like the meetings with the other APPGs, this meeting was about shoring up the support of politicians, rather than converting sceptics. Senior officials' attendance at APPGs shows that they were seen as pivotal to maintain trust with influential figures who could support the industry in terms of parliamentary votes, but also as a lobbying force within the corridors of Westminster. This also shows the hierarchy of communication where decision-makers were given a priority in how and when they received information over the general public.

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[30] CAC, Mrsl H. 326. 'Statement on Chairman's address to Parliamentary All-Party Minerals Group, 29th May 1986.'

[31] There are no complete membership lists of the APPGs at the times of these interactions which would reveal any MPs belonging to them who were known sceptics or had, on the record, anti-nuclear power views. However, from the H. 79 file we can see that Lord Lloyd of Kilgerran, a Welsh Liberal member of the House of Lords, was one of the deputy chairs for the group but did not speak at this event. He had spoken in favour of nuclear power in a debate on nuclear safety in 1976, saying how 'the public must be encouraged… to have the highest confidence in nuclear activities.' HL Parliamentary Debates, 29 January 1976, vol 367, col 1181.

Select Committees

The primary role of select committees is to scrutinise the government of the day and their policies and actions. The departmental select committee system was set up under the Thatcher government in 1979. Therefore, this was a new parliamentary forum for the nuclear industry to engage with. In particular, the industry's adherence to regulations and laws were tested, and their importance to the wider communication strategy should not be understated. Jim Skea has argued that 'regulation and its effective enforcement are critical for… gaining public acceptability,' for the existence of a high-risk industry, such as the nuclear industry.[32] In this sub-section, I will look at how the industry responds to questions put to them at select committee hearings and evaluate their importance as part of the wider public relations strategy. These hearings were not viewed by the wider public and were not usually front-page news. Moreover, they were a place for the government to defend its energy policy, and by extension the nuclear industry. However, they provided parliamentarians with a forum to question industry representatives directly, a luxury not afforded to the wider public. I will use the case study of hearings on the government's strategy to start a new nuclear programme based on PWRs to show how select committees presented the industry with an opportunity to respond to specific questions about their plans before a public inquiry. Therefore, select committees could be used as a forum to test its arguments, as a form of dress rehearsal. This included questions on the economic viability of nuclear power, its public acceptance and transportation of nuclear materials. They also allowed the industry to demonstrate that they were enforcing regulations on safety at nuclear sites, thereby supporting their claim for public acceptance.

The Select Committee on Energy first took evidence on the Thatcher government's nuclear energy policy on the 30th January 1980, with a submission from the Secretary of State for Energy, David Howell. The submission covered a range of points, primarily around the context of energy supply and demand and the nuclear industry and how it fitted into the government's decision to want to expand the nuclear industry, including a statement of intention to hold a public inquiry that 'should be full and thorough'.[33] However, what is of note for this thesis is the round of questioning that

[32] J. Skea, et al 'Introduction' in *Energy Innovation for the Twentieth Century: Accelerating the Energy Revolution* (Edward Elgar Publishing Limited, 2019) 2-20.
[33] Select Committee on Energy, Session 1979-80, The Government's Statement on the New Nuclear Programme, Wednesday 30th January 1980, 5.

accompanied the written evidence. As part of these questions, Howell was asked by Ian Lloyd, Conservative MP for Havant, and chair of the committee, what impact public opinion had on the perception of risk:

> it has seemed to some of us that the perception of risk in the nuclear area is now supported by continuous and widespread analysis in the media, whereas the perception of risk, the hazard to human life, for example, following from a massive increase in the mining and consumption of coal, is not appreciated at all?

Howell responded by saying that his department had looked at this matter, adding that he believed that there was an 'imbalance' in public perceptions of risk. He added that there was a risk of not developing nuclear power, stating that:

> I would say the risks of not going ahead with expanding nuclear power were as great as the risks of cutting off oxygen to the living body.[34]

What select committees also allowed for was in-depth questioning, not just on whether it was desirable to develop the industry but on whether it was practical. For example, Arthur Palmer, Labour MP for Bristol North East, points out that Howell's statement to the Commons and then in his written evidence and answers to questions contained a lot of 'ifs' and 'the amount of qualification which is contained within it.' Pointing to the intention to build ten plants each with a capacity of 15GW over ten years, with no clear indication where these would be sited. Palmer states that these would only be built if they got approval at a public inquiry. Howell responds that the issue of siting is an issue for the CEGB to answer, but also that the uncertainty over whether they would gain approval was actually part of the process to gain public acceptance, and therefore, was beneficial.[35]

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[34] Select Committee on Energy, Session 1979-80, The Government's Statement on the New Nuclear Programme, Wednesday 30th January 1980, 40.
[35] Ibid, 50.

The CEGB, at an evidence hearing on the 6th February 1980, faced similar questions and presented similar evidence. Just like his questioning of Howell, Palmer questions Glyn England on the assumptions that the CEGB has made regarding the economics of nuclear power, particularly the discrepancies between how the Department of Energy and the CEGB calculated how much capital investment would be needed to fund a new nuclear power station. England's response to this question was that the CEGB and the Department of Energy did collaborate, but that in future:

> we must be very clear in explaining the basis that we have used, and I am sure the Department would do the same.[36]

What this indicates is that not only were select committees a forum in which MPs could directly question the government and industry bodies on specific policy, but they also presented, at least, in this case, an opportunity for the industry to pick out what questions might come up at a public inquiry. Where, although the conclusions were not legally binding, they helped provide the government with the legitimacy to undertake its plans to build new nuclear reactors.

The Flowers Commission (1976) solidified the issues of nuclear waste and the transportation of it as one of the primary concerns surrounding the development of the industry and this was raised during these select committee hearings. These provide us with an insight into how the industry and government looked to national and international regulations and authorities to legitimise and provide political and scientific authority to their approaches to dealing with waste. The CEGB claimed not to be responsible for disposal of high-level nuclear waste, yet asserted they were represented on all UK committees concerned with formulating waste policy and that they 'maintain close contact' with many 'international committees 'established by the IAEA, EEC, OECD, etc.' These international committees were also 'actively engaged with the study of these issues.' Which led the CEGB to believe that:

[36] Select Committee on Energy, Session 1979-80, The Government's Statement on the New Nuclear Programme, Wednesday 6th February 1980, 12.

> In the light of these contacts, the Board is confident that radioactive waste management does not pose insuperable problems for the nuclear programme.[37]

In the second session, David Howell explained how the UK formulated its policy surrounding the transportation of nuclear waste. This includes noting that policy was governed by the Department for Transport and based on international regulations, "Regulations for the Safe Transport of Radioactive Materials", set by the IAEA. Howell added how the Department of Transport:

> evaluates the detailed evidence which the owners of the package must submit to demonstrate that the package design meets the requisite IAEA safety standards.[38]

Regarding the actual disposal of waste, the written submission from Howell states how this was the joint responsibility of the Department of the Environment and MAFF, who act under the provisions of the Radioactive Substances Act 1960, which provides ministers with the power to appoint inspectors to assist the execution of their responsibilities under the Act.[39] This piece of legislation, in addition to others, have two purposes.[40] First, to identify that issues that came up had been considered by various national and international authorities and that they had agreed on approaches to dealing with these issues. Second, if the government and industry can prove it was acting within regulations and laws, then it helped to provide legitimacy not only to the nuclear industry's continued existence but also its potential development.

This section has shown that select committee hearings were part of the procedural requirements of the industry to be held to account by parliamentarians from across the political spectrum. This forum provided parliamentarians with the opportunity to

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[37] Select Committee on Energy, Session 1979-80, Wednesday 6th February 1980, 12, 9.
The CEGB does not state exactly which international committees it sits on.
[38] Select Committee on Energy, Session 1979-80, The Government's Statement on the New Nuclear Programme, Wednesday 30th July 1980, 603.
[39] Select Committee on Energy, Wednesday 30th July 1980, 604.
[40] Other pieces of legislation that are relevant include the Nuclear Installations Act (1965), which is the act used to grant licenses for the construction for new nuclear power stations. The Health and Safety at Work Act (1974), which created the framework that nuclear power stations have to operate in.

question industry representatives directly, on a range of issues concerning the safety and economic viability of nuclear power. While this was not a conscious choice, select committees presented the industry with an opportunity to respond to specific questions about their plans before a public inquiry.

Public Inquiries: Windscale, Sizewell B and Hinkley Point C

During the period covered by this thesis, there were three major public inquiries where the industry sought to develop either its capabilities to deal with nuclear waste or to build new nuclear reactors. These were the inquiry into whether to build a waste reprocessing plant, hereafter known as THORP, at Windscale, 1977-1978, the Sizewell B inquiry into whether to construct a PWR, 1982-1984, and the Hinkley Point C inquiry into whether to construct a second PWR, 1988-1989. Despite their name and statutory requirements to allow any member of the public to ask questions and voice opinions, public inquiries did not include large sections of the public in their proceedings. This was primarily due to the requirement under the Town and Country Planning Act (1971) to hold the inquiry in a suitable place within the locality of the proposed site. In the case of the nuclear industry, this was generally in remote areas away from major metropolitan centres, yet the issues discussed at the inquiry were of national importance.[41] Furthermore, academics such as Brian Wynne have noted that the costs involved in having an organised opposition to these proposals acted as a barrier to public engagement. It required large sums of money. For example, FOE estimated that it needed £25,000 for the THORP inquiry in 1977. This had to be raised privately compared to the public money that BNFL, UKAEA and the CEGB received to argue their case.[42] The purpose of this section is to show the basics of the industry's argument and some of the moments that demonstrate how the government sought to assist the industry to control the narrative and minimise potential obstacles. These public inquiries also reflect the changing narratives during this period, with changing government policy towards whether the industry should be publicly owned and the impacts of major nuclear accidents such as Three Mile Island and Chernobyl.

While it was my original intention to include the Black inquiry (1983) into leukaemia cases around Sellafield in this chapter, I have not been able to discuss this at

[41] For instance, the THORP inquiry was held at Whitehaven, the Sizewell B inquiry at Aldeburgh, and the Hinkley Point C inquiry at Cannington.
[42] B. Wynne, *Rationality and Ritual*, 120.

all. This is because of the archival problems previously mentioned in my introductory chapter, and the requirement to explore further the interactions between the nuclear industry and television producers. This is because the Black inquiry was linked to a Yorkshire Television programme Windscale – the Nuclear Laundry, which suggested the 'possibility of a link' between an apparent cluster of cancer cases, and in particular, leukaemia in children, to Sellafield.[43] Therefore, I made the decision to not include it here and focus instead on providing an overview of the arguments made at public inquiries which were not as impacted by the lack of access to material.

Roger Williams has argued that these public forums were a 'genuine' means of identifying all relevant questions and even answered most of them.[44] Brian Wynne challenges this claim. He argued that the Windscale inquiry was instead a 'ritual' where the outcome of the inquiry was predetermined, stating that:

> The Windscale inquiry was a ceremonial of collective self-delusion, with the judiciary left to plug the authority gap between the belief in objective control and the reality of interconnected but ad hoc historical developments.[45]

These public inquiries certainly were not inclusive to large sections of the public, and I support Wynne's claim that the judiciary was left to plug the authority gap as the primary audience of the inquiry.[46] However, these inquiries, particularly the Sizewell B inquiry due to its scale, do identify relevant questions and the industry would have to respond to these. Most of these questions can be broken down into questions over safety and questions over the economics of nuclear power, which is how the next section is structured.

Communicating the safety of the nuclear industry

This sub-section will look at how if at all, the industry communicated about its safety across these three public inquiries. The industry argued the development at THORP,

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[43] For discussion of Black inquiry see J. Agar, *Science Policy Under Thatcher,* 154-156.
[44] R. Williams, *The Nuclear Power Decisions*, 313.
[45] B. Wynne, *Rationality and Ritual*, 188.
[46] Public inquiries have had their legitimacy questioned before by John Tyme, an anti-road activist in the 1970s, by disrupting the proceedings. See B. Doherty, 'Opposition to Road-Building'. *Parliamentary Affairs*, 51, 3, (1998), 370-383.

Sizewell or Hinkley would not cause a significant release of radioactive material, either through radioactive leaks or through a nuclear accident.[47] Before the THORP inquiry, Windscale was already under severe scrutiny for the release of radioactive materials. These leaks were so detrimental to the image of the plant and BNFL that the NII even went as far to state that 'the impression of lack of openness arises when an incident takes place – BNFL may feel the need to conduct and complete their internal inquiry before saying very much.'[48] This was strong criticism from the nuclear regulator, a sign of how serious the situation was for the industry - a successful inquiry at Windscale was not guaranteed. By focusing on 'significant' releases it created an artificial threshold of concern, it sought to normalise the risks to health associated with 'less significant' releases of radiation.

Throughout all three inquiries, the industry argued that nuclear power was safe due to the technical expertise of the industry. However, due to accidents such as TMI and Chernobyl, the contents of the narrative changed. During the THORP inquiry, BNFL maintained its position that they had the technical expertise required to ensure that the plant was designed, built, and operated to high standards of safety. They were also able to convince the NII that this was the case, and they too were confident that BNFL would keep to these high standards of safety. During the routine operation of the plant, planned radioactive emissions would not place employees or the public at large under any increased risk.[49] This was the same message that Hill mentioned in response to the sixth report of the Royal Commission on Environmental Pollution, as discussed in Chapter Two. As is the standard at any public inquiry, scientific and technical witness statements alongside submitted written evidence of the same technical nature, given by representatives of BNFL and the UKAEA, were the cornerstone of the nuclear industry's communication strategy. While these were pivotal to the case for THORP, the NII had to be seen as an independent regulator. This ensured that when they provided their

[47] There is also the threat of terrorism but due to the limitations imposed by the word limit I have not included this within my thesis. For more on the concerns regarding terrorism and nuclear power see, C. Nath, 'Terrorist Attacks at Nuclear Facilities', in I. G. Richter, S. Berking & R. Muller-Schmid (eds.) *Risk Society and the Culture of Precaution* (Palgrave Macmillan: London, 2006), 111 – 130.
It should be stated that I use the term 'significant increase' because that was what the industry themselves preferred to use.
[48] TNA, AT 135/22. 'BNFL Windscale NII Safety Review.'
[49] TNA, AT 103/1/1. '5.1.'

recommendations it provided legitimacy and authority to the inquiries planning inspector's final report, as well as build trust in the planning process,

The UKAEA produced written evidence that it and the CEGB designed to demonstrate that, through science and experience, the industry was able to learn from previous accidents, like TMI, to prevent another such accident from happening again. One such example of this was a report from the UKAEA on *The probability of containment failure by steam explosion in PWR*. This report reviewed 'more recent information,' alluding to the event at TMI and 'recommends an upper limit to the range of probability values for containment failure by steam explosion for risk assessment for a plant such as the proposed Sizewell B station.'[50] This report was in addition to another from the UKAEA on PWR degraded core analysis. This report:

> contributes to an overall study of the risk from accidents to the proposed UK PWR which involve severe damage to the reactor core... These accidents are not considered within the formal safety analysis of the plant because the probability of their occurrence is so low that they lie beyond the design basis of the plant.[51]

The UKAEA argued that they conducted this study anyway to provide an 'appreciation of the depth of safety of the designed systems.' In the introduction, the report stated that 'public concern about the risks involved in the use of nuclear systems for power generation is such that the subject should be approached in an unbiased factual way.'[52] The industry constructed its interpretation of the word 'unbiased', implicitly suggesting that other perspectives lack legitimacy when in fact their own subjective views were also part of the assessment of one perspective being 'unbiased.' Furthermore, they had put considerable effort into parading their safety credentials and by raising the limit, to impose stricter regulations on themselves, they were trying to suggest that it was a responsible industry and that their perspective was the only legitimate one.

The CEGB wanted to make the point that the safety case, made for Hinkley Point C, was that barring changes made after the accident at Chernobyl and changes to 'specific

[50] TNA, EG 2/1054. 'The probability of containment failure by steam explosion in PWR, 2.'
[51] TNA, EG 2/350. 'PWR degraded core analysis preface.'
[52] TNA, EG 2/350. 'PWR degraded core analysis, 41.'

features' after the Sizewell inquiry, it was a 'replication' of the already approved Sizewell B design. For example, in their summary of the case, one of the changes they suggested was the use of forged elbows in the primary circuit coolant loops. They also note that they have thought of two other changes such as 'the use of set-on rather than set-in nozzles for the reactor pressure vessel; and the use of forged reactor internals.' However, they concluded that these two other changes were 'not appropriate to include'[53] The CEGB argued that by replicating the Sizewell B design they would ensure improved quality, take into account feedback from the experience of constructing Sizewell, standardise operating and maintenance instructions and procedures, which in turn would lead to 'the ability to concentrate greater resources on dealing with problems when they arise.'[54] The other major development between Sizewell B and the inquiry for Hinkley Point C were the proposals to privatise the industry, which led to concerns over whether a private industry would have safety as a top priority when managing the plant. In its statement of evidence on the impacts of privatisation, the CEGB argued that its health and safety department and its statutory responsibilities would be transferred upon privatisation to the larger of the two-generation companies created out of the CEGB's privatisation.[55] This meant the CEGB's nuclear expertise would remain intact and not be diluted by splitting between companies. To summarise, the CEGB's safety case for Hinkley C emphasised the institutional experience that the CEGB had been building up through working with PWR reactors and nuclear power in general. The image that the CEGB wanted to portray was that neither Chernobyl nor privatisation would be a cause for concern because the industry's practices were based on experience and their scientific knowledge, which would be passed on to any privatised body.

The Economic Case

The economic case made at the three inquiries in question were broadly the same. First, that they would provide jobs, particularly in deprived areas. Second, the development of these nuclear sites were crucial infrastructure projects that either were vital to the ESI or for dealing with nuclear waste. Finally, they were worth the initial high capital cost to the taxpayer, as nuclear power was a cost-effective and stable means for generating electricity and ensuring energy security. As with the last section, I focus on the cases

[53] TNA, EG 4/173. 'Outline statement of case CEGB Hinkley Point C. 31-34.'
[54] Ibid. 'Part 4. 9.'
[55] Ibid. 'CEGB Statement of Case: Privatisation. 9.'
National Power would be the generating company that would run the nuclear power stations.

made at THORP and Sizewell B, while using Hinkley Point C as supplementary evidence to show the replication of the case made at Sizewell and also the changing narrative deriving from the plans to privatise the industry.

BNFL put forward the argument that THORP was essential to the long-term survival of the industry by setting out the following points. The first and most crucial was setting out predictions for energy demand, both in the short and long-term.[56] The argument here was that THORP would allow for the continuation and expansion of the nuclear industry if energy demand were to continue rising. We can see this argument in debates within the House of Commons. In his opening statement on the conclusions of the THORP inquiry, hereafter known as the Parker Report, Secretary of State for the Environment Peter Shore makes it clear that utilising nuclear energy to secure energy supplies was vital.

> Forecasts of the extent of the so-called energy gap and its effect on different countries are inevitably subject to wide margins of error. But even with the most rigorous policies to conserve energy and the most energetic pursuit of new sources of energy supply, substantial further development of nuclear power in the main industrial countries and in the newly industrialising countries, too, seems now unavoidable.[57]

This evidence also leads on to the second argument, which was to provide the appearance of a credible waste management plan for dealing with the existing spent fuel rods being produced by UK reactors, as well as those spent fuel rods being shipped from overseas. In BNFL's submission, they argue that:

> Such recycling accords with sound waste management principles, employs methods for controlling for several decades' radioactivity contained in the

[56] TNA, AT 103/2. 'Windscale Inquiry: procedural documents; includes the submission by BNFL, 9.'
[57] HC Parliamentary Debates, 22 March 1978, 946, col 1539.
Shore does also state how the UKs reliance on nuclear power would be 'modest' in comparison to other countries due to the UKs large reserves of coal, oil, and gas.

> irradiated fuel and readily provides a basis for control in the longer term and eventual disposal.[58]

Industry officials believed that this was not only the smart approach to waste management but also the morally right thing to do to ensure a long term strategy towards waste management. In Parker's conclusions, he thought of the economic arguments that the industry put forward:

> It is necessary to keep the nuclear industry alive and able to expand should expansion be required. Such expansion might be required, either to meet additional energy demands, or to preserve a 'mix' and avoid over-dependence on a particular energy source, or to reduce the number of fossil-fuelled stations.[59]

Concerning a long-term waste management strategy, Parker stated that keeping the industry alive meant building more reactors, which would mean more spent fuel rods. This would lead to more plutonium that needs storing if there was no reprocessing and that this would require new storage methods that would be a 'costly and lengthy process.'

The primary purpose of any power station is to produce electricity that can be distributed by the grid. Between the late 1970s and early 1980s, the UK government predicted a continuous rise in the demand for electricity into the late 20th century and early 21st century.[60] For them, it was obvious that the UK had to increase its electricity production capacity and more power plants had to be built. However, how that electricity was produced was up for debate and the government decided it was within the UK's best interests to pursue a PWR programme to meet this growing demand. To communicate this decision, the CEGB and UKAEA produced numerous publications to show these predictions, the negative economic consequences that could occur if the UK did not meet this demand and how the PWR would provide the best value for money in meeting this

[58] HC Parliamentary Debates, 22 March 1978, 946, col 1539.
[59] TNA, AT 103/1/2. '17.1.'
[60] See D. Helm, *Energy, the State and the Market,* 100-101. Prediction that demand would reach 52GW in the winter of 1986/7. CEGB argued that demand would be met through 24GW of nuclear energy by the year 2000.

demand.[61] The UKAEA's *Nuclear Power: The Real Facts*, responds to another publication titled *Nuclear Power: The Facts they Don't Want You to Know* from an environmental movement called the European Network for Ecological Reflection and Action (ECOROPA), a European wide environmental pressure group set up in 1976, which asked: 'is nuclear power essential?' The UKAEA responded by setting out that existing nuclear power plants would come to the end of their operating life in the 1990s and that these would need to be replaced to maintain electricity production 'let alone growth in demand.' They argued that the new proposals to build PWR along with the existing AGR programme would provide a total of 22GW by the year 2000, which would, in turn, save the UK using 60 million tonnes of coal.[62] This book was published before the Sizewell B inquiry and acted as a polemic against not just ECOROPA but to all anti-nuclear groups and their arguments. Furthermore, this booklet also shows the evolving projections made by the industry and that the industry was preparing their case for Sizewell. Dieter Helm noted the changing projections made by the CEGB between 1980 to 1981 that saw initial projections that 35GW of nuclear energy would be needed to meet demand, which required a 15GW nuclear programme to be built, go down to 24GW. Helm argued that this showed how 'nuclear enthusiasts… too often argued from conclusion to the evidence.'[63] My evidence supports this statement and, as was shown in the section on select committees, these changing assumptions, without proper explanation, were not looked favourably upon. It undermined the trust in the economic case made for Sizewell B and, if the industry could not be trusted to get the economics right, would their assumptions about aspects of safety be right as well?

The CEGB's *Power Tomorrow* put a more detailed economic argument for Sizewell B front and centre of its case. The key pillar for the economic case was showing that the construction and operation of Sizewell B would be beneficial to the local economy. Interestingly, the CEGB stated that 'the board does not argue employment effects in support of Sizewell B'. However, 'it has commissioned studies, and these studies show that the total employment effect of building Sizewell B would average 10,000-man years over period of construction.'[64] This prediction also included the extra

[61] The coal miner strikes that happened throughout the 1970s and the oil crisis threatened the supply of electricity. The CEGB was tasked with "keeping the lights on." The supply of uranium did not experience the same volatility as oil and coal.
[62] UKAEA, *Nuclear Power: The Real Facts* (London: UKAEA, 1980), 3.
[63] D. Helm, *Energy, the State and the Market*, 101.
[64] Ibid, 201.

income that would be generated by the spending within the local community. The CEGB's publication was primarily aimed at the local area and local opinion formers, such as MPs, elected councillors, and officials in the local authorities.[65]

As with the safety case for Sizewell B, the economic case for Hinkley Point C from the CEGB's point of view was a replication of the one made for Sizewell B, with adjustments based upon experience and local factors. With arguments that a new plant at Hinkley Point would be necessary to meet energy demands as old Magnox reactors, which in total generated 'some 3.5GW', would be retired with the last reactor at Wylfa planned to be retired in 2001.[66] The plant would provide between 1500 to 1810 construction jobs and 180 to 230 full-time operational staff to the local populace, including a projection that £300 million would be 'injected into the Somerset economy during the construction period.'[67] Regarding the impact of privatisation, the CEGB argues that the Sizewell B inquiry had established the 'economic superiority of the PWR.'[68] Adding that:

> economic operation of power stations will be maintained by contracts for energy which will allow the grid to operate stations in a merit order, in a similar current practice within the framework of the CEGB.[69]

Again, the CEGB argued that this was a near-replication of the case made for Sizewell B and that changes like privatisation and changes due to the locality would not alter the economics of nuclear power too dramatically. In all three case studies, nuclear power was seen as a necessary infrastructure project to protect the energy supplies of the UK, to ensure it was not too dependent on fossil fuels, oil and coal in particular. The provision of jobs was also important; however, this would only be beneficial for the local communities. Nevertheless, despite the CEGB's argument that the case for Hinkley C

[65] There are other examples of local construction jobs being a big driving factor for the construction of nuclear sites. For instance, in Spain trade unions pushed for the construction of nuclear power plants. But they were then never made operational. See L. Sánchez-Vázquez & A. Menéndez-Navarro, 'Nuclear Energy in the Public Sphere: Anti-Nuclear Movements vs. Industrial Lobbies in Spain (1962–1979)'. *Minerva* 53, 1, (2015), 69-88, 76.
[66] TNA, EG 4/173. 'Part 1, 12.'
[67] Ibid. '57.'
[68] Ibid. 'Part 3, 3'.
[69] TNA, EG 4/173. '6.'

was a near repetition of the case for Sizewell B, rising costs due to increased safety measures after Chernobyl, and privatisation, saw plans for a PWR at Hinkley Point put on hold. This was a disaster for the industry, but not a completely unexpected one given Marshall's resignation from the CEGB in December 1990 after the change in government policy regarding the stalled privatisation of the nuclear industry which to him made it 'not a nuclear programme I feel able to advocate or defend.'[70] It was not until 2010 that the Conservative-Liberal Democrat coalition government announced that Hinkley Point would be the site of a new nuclear power station, with a license being granted in 2012 for a different reactor design.

Controlling the narrative

The collaboration between the CEGB and UKAEA is worth exploring further concerning the safety case. The UKAEA had what it deemed 'PR input' into the CEGB's closing speech for the Sizewell B inquiry. While this is a sign of significant collaboration between the two organisations, it was more about ensuring that the science was what the UKAEA deemed to withstand legal scrutiny rather than an effort to communicate the science to the general public. We can also see how the UKAEA systematically worked through different points that were raised by opposition groups. They were particularly interested in the claims made by organisations such as Greenpeace and FOE, as well as key figures such as FOE scientist Bjorn Kjellstrom. To do this, UKAEA divided the workload between various staff members. The two main scientists completing this work were Dr Gittus and Dr Hayes. Between them, they divided tasks, such as providing 'brief rebuttal' in response to points made over the 'design safety criteria;' to providing a 'thorough briefing on general question of acceptability criteria,' in response to a point made over 'stringent safety acceptability criteria proposed.'[71] What this shows us is that in this case the UKAEA and the advocates of nuclear power were not setting the conversation, they were responding to claims made by objectors and that it was crucial to reply to these claims. It is unlikely that they believed they could change the minds of groups such as the FOE or Greenpeace, but by responding to their claims they believed they were not allowing them to dominate the conversation.

[70] CAC, Mrsl C. 303. 'Electricity Council Daily Press Cuttings, 16th December.'
[71] TNA, AB 38/1809.

For example, one section of the UKAEA's advice deals with an area of contention over the probability risk assessments (PRA) that were conducted for various stages of the process of constructing and running a nuclear reactor. The FOE claimed that the CEGB's approach to safety studies and these PRAs were fundamentally flawed because they did not 'explicitly state the uncertainties in their results.'[72] The UKAEA picked up where these arguments have arisen and then discussed the evidence that the CEGB and other actors have presented to counter these arguments. Crucially, they note Kjellstrom's argument that 'there was no way of telling, from the safety documentation presented, how likely the CEGB is to have met its safety criteria.'[73] The UKAEA's approach to this situation was to see how these arguments fit within the existing guidelines that the NII had established. They noted the evidence of several key scientists within the CEGB and UKAEA that had spoken during the enquiry and pulled their evidence together for the closing speech. However, more significant was the UKAEA acknowledging the position of the NII stating that 'the NII express their reservations about uncertainties associated with, eg. Human factors, but in the main, they are very supportive of the CEGB's approach to the treatment of uncertainties.'[74] The UKAEA's input also shows that they were also attempting to predict what might be in the closing speeches of opposition groups, such as the FOE. They believed that 'it is possible that they might not have pulled together in a coordinated whole in the oppositions closing speeches.' However, the UKAEA thought that it would still be 'prudent for the closing speech to contain both the acceptance that uncertainties have not been addressed in a comprehensive manner vis a vis other analyses or even an 'ideal world' approach and a strong defence that its conclusions are robust notwithstanding the associated uncertainties.'[75] The UKAEA argued that the CEGB should accept the flaws in its argument but that it was still strong enough to pass the NII tests and that was all that mattered. This gives us a sense of how the UKAEA believed the CEGB should put its message together, which they and the CEGB knew would be picked up in the press. For instance, this issue of accidents was picked up by *The Guardian*, who reported that lessons from accidents had been 'incorporated' into Sizewell's design. The article also picks up on the FOE's counterclaims that the NII needed to comment on whether it would license the new power

[72] TNA, AB 65/1739. 'Sizewell B inquiry PR input to closing speech, topic note: uncertainty and its treatment, 2.'
[73] Ibid, 3
[74] TNA, AB 65/1739. 'topic note: uncertainty and its treatment, 10.'
[75] Ibid. '9.'

station. However, the article focused on the evidence presented by CEGB's witness, John Harrison, head of the PWRs health and safety department for the CEGB, rather than these counterclaims.[76] This collaboration between the two major bodies of the nuclear industry shows us how they would pool their resources and put together what they believed were watertight arguments.[77] By doing this it would make the press coverage of the inquiry less problematic than it potentially could be. Although, having to respond to claims that the industry was unsafe and make arguments that it was safe was not an ideal narrative, to begin with.

Gaining political legitimacy from parliament

John Baker, who led the CEGB's case at the Sizewell B inquiry, claimed that the government was too concerned with public opinion, indicating that the public inquiries were meant to ease government concerns. Indeed, Baker argued that the Sizewell public inquiry and its report did not change the views of anyone involved in the process. However, the outcome of the report would be important in dictating how the narrative would proceed and how public opinion would view the construction of Sizewell B, and polling data available for the period shows us why the government was cautious.[78] For instance, MORI polling between 1985 to 1987 shows that public opinion was uncertain. As seen in Table 4.1 in 1985, a slim majority of those polled favoured the construction of nuclear power stations 'for peaceful purposes.' However, a very significant minority either did not answer either way or did not know, indeed this number was 12% more than the 18% of those who opposed the development of nuclear power. Table 4.2, on the likelihood of a major accident at a nuclear power station happening 'in the new few years', excluding those who did not know, or answer, a plurality of respondents believed it would happen. However, when the number of those who did not know or answer this response becomes the plurality, representing the uncertainly that a lot of people felt towards nuclear power.

[76] *The Guardian*, 12 February 1983, 3.
[77] John Baker uses the word watertight to describe what the CEGBs arguments had to be.
Baker, BL Sounds, track 6 C1495/14.
[78] Baker also refers to the importance of negative newspaper headlines on the industry.
Baker, BL Sounds, track 7 C1495/14.

Table 4.1 Do you favour developing nuclear power for peaceful purposes in Britain or you oppose it?

No. respondents aged 15+	Favour %	Oppose %	Do not know/did not answer %
1824	52	18	30

Source: MORI, *British Public Opinion*, Vol 8, No. 8 (September 1985).

Table 4.2 Likelihood of a major accident happening at a nuclear power station.

No. respondents aged 15+	Likely %	Unlikely %	Do not know/did not answer %
1824	37	22	41

Source: MORI, *British Public Opinion*, Vol 8, No. 8 (September 1985).

In 1986 and 1987 we can see the shift in public opinion against nuclear power, probably because of the accident at Chernobyl. In 1986 MORI complied polling data from multiple polling firms. A *Gallup poll* found that 44% in Britain should not expand the nuclear industry, compared to 25% saying the same ten years previously. A further 31% said that Britain should stop nuclear power generation altogether, ten years ago this number was 14%. Only 20% of respondents believed that the proportion of nuclear power should be increased, ten years before this number was 47%. Polling in Wales by *Research and Marketing* in 1986 found that opinion was 'evenly divided' on whether to continue with the use of nuclear power. Two-thirds were opposed to the construction of a new nuclear power station in their locality.[79] However, there was some hope for the industry, as Table 4.3 indicates, the public would trust those living near a nuclear power station to tell the truth about the environmental consequences of nuclear power. The respondents for this data were just Scottish voters, however, this data can still tell us something about the state of public opinion at this time, as they were providing a judgement on nationwide institutions rather than just power stations and institutions in Scotland. As this thesis has argued, those living around the locality of nuclear power stations were one of the primary audiences of the nuclear industry, this polling could indicate why they were as they were trusted more than the industry itself. If local populations were favourable towards nuclear power, then the wider public may be more inclined to be favourable towards nuclear power. Although Table 4.3 also shows, people's trust in environmental pressure groups

[79] MORI, *British Public Opinion*, vol 8, no. 5, (May 1986), 8.

was higher than that in BNFL and the Government, this number could be down to the impact of the Chernobyl accident after years of the government and BNFL saying that nuclear accidents could not happen again after TMI.

Table 4.3 Scottish respondents' response to question, 'For each of the groups… how much you trust them to tell the truth about the environmental consequences of nuclear power?

	A great deal %	**A fair amount %**	**A little %**	**Not at all %**	**No opinion %**
People who live close to nuclear power stations	34	37	14	9	6
Environmental pressure groups	9	38	25	20	8
BNFL	3	18	25	47	7
The Government	3	17	22	55	2

Source: MORI, *British Public Opinion*, vol 8, no. 5, (May 1986).

By the time the Sizewell B inquiry report had come out, public opinion was still unfavourable towards nuclear power. In a reader's digest of polling data, MORI stated that 54% of the public did not want any more nuclear power stations to be built.[80] However, further polling does suggest that public opinion towards nuclear power was not aimed at any one plant. Table 4.4 demonstrates that the vast majority of respondents were not thinking of Sizewell in particular when they heard of the term nuclear. The most common response, at just over a third of respondents, to this question was the military dimension of nuclear energy.

[80] MORI, *British Public Opinion*, vol. 9, no.2, (March 1987), 8.

Table 4.4 'What are you thinking of when you hear the term nuclear power?'

What do you think of?	%
Atom bombs/weapons/nuclear tests	34
Power plant/nuclear power stations/reactors	23
Accidents/fear of the unknown	17
Cheap/economic generation of electricity	12
Accident at Chernobyl	11
Nuclear energy necessary	10
Sellafield/Windscale	9
Other related to power plants	6
Reduce/abandon nuclear power stations	5
Sizewell	5
Name of other nuclear plants	3
Nuclear energy safe	2
Peaceful use/progress	2
Demonstrations/protest movements	2
Other responses	2
Nothing/no opinion	8

Source: MORI, *British Public Opinion*, vol. 9, no.2, (March 1987).

Despite these unfavourable numbers, the government did proceed with approving the construction of the reactor. This can be seen in MORI polling data shown in Chapter Two, in Table 2.3, which shows what the public believed to be the most important issue facing the country. In Table 2.3 we see how nuclear power was selected only by 1% of respondents, compared to unemployment which came up as the most important issue from 25% of respondents.

The Sizewell B inquiry did not shift public opinion, but it did provide a forum for a range of opinions to be heard, enough for the government to justify approving the construction of the plant. Therefore, one of the purposes of these public inquiries was not just to test the acceptability of the industry's plans, but also to provide the government of the day with the political legitimacy to approve such plans. Peter Vey suggested that the report for Sizewell B was so strongly in favour it gave the government the authority it needed to order the construction of the plant.[81] We can see this in the Secretary of State

[81] Vey, BL Sounds, track 9 C1495/51.

for Energy, Peter Walker's statement to the House of Commons on his decision to approve the construction of Sizewell B. Walker stated that:

> In view of the inspector's conclusions and recommendations, together with my own consideration of the issues, I agree with his conclusions that Sizewell B is acceptably safe and would meet a national need by providing new capacity at least cost. That outweighs any disadvantage from disturbances to the locality.[82]

Later in response to Sir Anthony Grant, Conservative MP for South West Cambridgeshire, who was seeking assurances that the local environment in East Anglia would be preserved, Walker replied,

> I know that my hon. Friend is aware that Sir Frank Layfield took great care to examine the environmental impact of Sizewell B. He eradicated certain proposals that he considered to be environmentally unsound. I can assure my hon. Friend that careful consideration will be given by the Departments of Environment and Transport to any matters affecting the environment of East Anglia.[83]

Walker utilises the Layfield report to strengthen the legitimacy of his authority to provide consent for the construction of Sizewell B. However, the government publicly stated in the *Financial Times* that it would not use the report to legitimise its actions and would delay a decision until a debate had taken place in the House of Commons.[84] In this debate, the government, represented by Peter Walker, wanted to 'listen with care to the views expressed in the house', before deciding on Sizewell.[85] Conservative MPs, including former Secretary of State for Energy, David Howell, argues that the Layfield report was a 'painstaking and thorough document' and refers to the economic conclusions that nuclear power stations 'will produce cheaper electricity' than their coal, oil and natural

[82] HC Parliamentary Debates, 12 March 1987, Vol 112, col 476.
[83] Ibid, col 483.
[84] *Financial Times*, 27 January 1987, 1.
[85] HC Parliamentary Debates, 23 February 1987, Vol 111, col 26.

gas counterparts.[86] Sir John Osborn, Conservative MP for Sheffield Hallam, who 'as a member of the Council of Europe committee that has visited nuclear installations in France and elsewhere,' also refers to Layfield's conclusions as a means to support a decision to build Sizewell B, concluding:

> I welcome in principle the Layfield recommendations and I hope that the Secretary of State will endorse them, although I know he cannot do that today.[87]

Robert Harvey, another Conservative MP, for Clwyd South West, also believed that 'Sir Frank Layfield has answered all the questions within his terms of reference.' Yet, due to the impact that Chernobyl had on the sheep farming communities in Wales, and which were not part of the terms of reference for the inquiry, he urged the government 'not to proceed with Sizewell B in the near future.'[88] Others on the opposition benches also opposed the decision and used the Layfield report to argue that Sizewell B should not be built on the grounds of unsound economics and the risk of a nuclear accident. This included Kevin Barron, Labour MP for Rother Valley, a major coal mining constituency, who argued that the Layfield report concluded that the risk from Sizewell B was 'potentially large' and that this should not be ignored.[89] However, as the Conservative government of 1983-87 had a majority of 144 seats, it did not need opposition votes, it just needed to avoid a substantial backbench rebellion. The vote that took place on the 11th May 1987 resulted in a government victory of 340 ayes to 181 noes. No Conservative MP voted against the decision to build Sizewell B, but 57 Conservative MPs abstained.[90] The government could avoid rebellions when local MPs such as Sir Eldon Griffiths, Conservative MP for Bury St. Edmunds, say that:

> I would not agree to consent being given, unless I were convinced that my right hon. Friend the Secretary of State would impose on the CEGB all the

[86] HC Parliamentary Debates, 23 February 1987, Vol 111, cols 34-37.
[87] Ibid, col 46.
[88] Ibid, col 65.
[89] Ibid, col 60.
[90] HC Parliamentary Debates, 11 May 1987, Vol 116, col 124.
Robert Harvey is included in these 57 MPs.

environmental and traffic conditions that are recommended by the Layfield report.[91]

Walker met this requirement in the statement announcing his decision.[92] While Griffiths did not speak in the house in favour of the decision to build Sizewell B, he did vote for its approval. Furthermore, Howell's support for Sizewell was also significant due to his influence gained as a former Secretary of State for Energy, which was stressed in the *Financial Times* and *The Guardian* in their coverage of the debate.[93] These opinion formers were crucial not only to the government but to the industry as well who wanted to continue building PWRs. If they could maintain these relationships, then they could have mustered the political legitimacy within the corridors of power. However, as seen by the vote on the 11th May 1987, the vote to approve Sizewell B became a polarised one based along party lines, only Conservative MPs voted for its approval. Although right-wing MPs in other parties would vote against Sizewell B, including Enoch Powell, at this point an MP for the Ulster Unionist Party nuclear power was increasingly seen as the power generator of choice for the right of British politics.[94] If the vote had failed, it would have been difficult to go ahead with the construction of Sizewell B.

Conclusion

This chapter has examined how the industry communicated with parliamentarians in different forums, and how the industry communicated with the public in formal, legal arenas at public inquiries. In both cases, we can see how the industry prioritised who it communicated with using their privileged position to communicate directly with ministers and influential MPs chairing APPGs. While facing some form of accountability at select committees, where they could test their cases for new nuclear reactors. Communicating with parliamentarians was undoubtedly a major objective for the industry, using their most influential and authoritative figures, like Sir John Hill and Lord Walter Marshall, to carry the industry's message forward. This direct access to those at

[91] HC Parliamentary Debates, 11 May 1987, Vol 116, col 49.
[92] HC Parliamentary Debates, 12 March 1987, Vol 112, col 476.
[93] *Financial Times*, 24 February 1987, 14; T*he Guardian,* 24 February 1987, 7.
[94] This would have been one of Enoch Powells last votes as parliament was dissolved a week later for the general election held on the 11 June 1987 where Powell lost his seat to the Social Democratic Party.

the top of the industry was not an accidental choice. It ensured that parliamentarians would have moments to have a dialogue with the technical and bureaucratic decision-makers of the industry, rather than just a representative of the industry. Parliamentarians would also be the ones who would vote on the government's proposals once it had approved the construction of new nuclear power stations.

Regarding public inquiries, John Baker stated that they were 'pretty discouraging…. no better than watching paint dry or seeing grass grow.'[95] Despite their name, these inquiries were not truly inclusive of the public. Other scholars such as Wynne and Welsh have made this argument, but what this chapter has been able to show is an overview of how the industry made its case within this "public" forum. I have shown that while the content changes from inquiry to inquiry, the overall themes remained the same. That the industry was safe due to its operating experience and intricate safety measures. That the industry and government had plans in place to mitigate the worst impacts in the event of an accident. Regarding the economic case, that these sites would provide an influx of construction jobs and money in the local economy around the sites while providing a smaller number of permanent, high paid jobs once construction had been completed. While the primary economic argument was that these nuclear developments were necessary to the overall economy as it ensured that the UK would meet its energy needs and not be overly dependent on fossil fuels, primarily oil and coal, which had seen fluctuations in their supply over the last decade.

Together, these two different forums show us the processes that the industry had to go through to achieve their aims to maintain and expand. They were also part of the wider communication strategy to sustain and potentially grow public acceptability, even though they were either not inclusive or directed at the public in the widest sense of the term. However, as was revealed in the polling data, public favourability of nuclear power did not grow, if anything it was reduced after the Chernobyl accident. Nevertheless, the industry was able to push forward with Sizewell B because it had managed to "win" the arguments at the inquiry. In turn, this convinced the government to proceed with its policy to construct Sizewell B. This is also part of how the industry sought to control the narrative throughout this period and claim political legitimacy for its actions, going

[95] Baker, BL Sounds, track 7 C1495/14.

through the conventions required of it, and minimising negative headlines in the media. They did this by having what the industry considered its scientific and technical authority.

Chapter Five: Learning more about Communication than Radioactivity - The UK Government's Communication Strategy after the Chernobyl accident

The Chernobyl accident occurred at a particularly sensitive-period in the history of the British nuclear industry. The industry was awaiting the report of the Sizewell B Inquiry, which had already been hard-fought after the accident at Three Mile Island. An anti-nuclear culture was forming in Britain with 'nuclear-free' cities such as Manchester, Leeds, and Leicester. This included the backlash of the *Protect and Survive* public information campaigns, leading to publications such as E. P. Thompson's parody of the government's plans with the pamphlet titled *Protest and Survive*.[1] The weekend the accident occurred happened to be when a summit in Tokyo was taking place, which meant that Margaret Thatcher was not in the UK to provide leadership from the very top of government. To make matters worse, it was also a bank holiday weekend, ensuring many civil servants were on holiday, with this poor timing being further compounded by poor international coordination from the Soviet Union which withheld crucial information for several months. It is within this context that this chapter will explore how the UK government and nuclear industry communicated its response, how it sought to calm the fears of the British public and crucially why it communicated in the way that it did.[2]

The nuclear accident that took place at reactor 4 of the Chernobyl Nuclear Power Plant in Ukraine on the 26th April 1986 was the worst nuclear accident to have taken place in the nuclear industry since its creation in the 1950s. It also transpired in a notoriously secretive state, particularly on matters relating to nuclear power.[3] The accident occurred due to a combination of inherent design flaws in the High-Power Reactor (RBMK) and the intentional disengaging of safety systems by the plant's operators to conduct an experiment, paradoxically aimed at improving safety. The explosion was caused by a positive void coefficient; where water is replaced by steam that raises the temperature, causing more water to rush in which then generates more steam and pressure until containment breaches. This allowed for the spread of radioactive material, in this case

[1] E. P. Thompson, *Protest and Survive* (CND, 1980).
[2] Kate Brown argues that Soviet officials could have helped the situation by relaying more information about the global disaster. K. Brown, *Manual for Survival*, 22
[3] The 'Kyshtym disaster' of 1957 was a nuclear accident that happened near the Mayak plant in Russia. It has been described by James Mahaffey as a 'black hole in the firmament of knowledge' due to information on the event being hidden for many decades. J. Mahaffey, *Atomic Accidents*, 277.

across the European continent, reaching as far as the Scottish Highlands, Cumbria and Wales. It was not until the 28th of April 1986, that the Soviet news programme *Vremya* mentioned in its 9pm news segment that there had been an accident at Chernobyl and not until the 29th that it was admitted that radiation had been released. The UK government did not know radioactive fallout was heading towards the UK until the 2nd of May when radiation was detected by the automatic monitoring system at Dungeness Nuclear Power Plant on the Kent coastline.[4]

In this chapter, I will first examine the chaotic initial steps taken by both government and industry to respond to the accident, including the rushed set up of phone lines to respond to public anxieties and the subsequent research into not only the technicalities of the accident but also how best to communicate it. Second, I will analyse two videos, one produced by the UKAEA and the other by the CEGB. Although they both sought to convey the message that a Chernobyl style accident could not happen in the UK, their purpose and audience were different. Third, I will look at how the Thatcher government sought to use the Chernobyl accident for political capital, to show the flaws in the socialist, Soviet-style of government. Finally, I will look at the impact of Chernobyl on opinion polling and the media narrative, as a proxy for public opinion. I will show that the major problem facing the nuclear industry was not a lack of scientific and technical expertise, but a lack of information from the Soviet Union, that led to a knee-jerk response in the immediate aftermath of the accident and only through the expertise of Lord Walter Marshall was the industry able to put an immediate response together. It then took several months for the flow of information from the Soviet Union to trickle through and for a more coherent, thought-out strategy to appear. This chapter will also provide the national context for Chapter Six that examines the impacts of the Chernobyl accident on North Wales.

Formulating the response to Chernobyl

The severity of the accident at Chernobyl and the transnational nature of the damage caused by the radioactive fallout was a watershed moment in how the UK nuclear community viewed the public. In an interview on LBC radio on the 6th May 1986 John

[4] Vey, BL Sounds, track 11 C1495/51.
Vey claims that they did not know radiation was heading their way because the French did not claim that radiation was over their own skies.

Dunster, the Director of the National Radiological Protection Board (NRPB), stated, 'I think we've learnt more about communications than radioactivity.'[5] Within the context of this interview, Dunster was referring to inter-government communications rather than the public, stating the need for more resources to monitor the fallout and to formulate a better response to the crisis. However, Chernobyl undoubtedly was also a turning point in public relations, in terms of the amount and format of content going out. In this next section, I explore how the UK government and nuclear industry formulated its initial response. This will show how, in the face of a lack of information from the Soviet Union, they relied on their expertise and knowledge to put a response together that they hoped would mitigate the publics fears of radiation.

Lord Walter Marshall sought to communicate at the highest possible level the response to the Chernobyl accident and to defend against the criticisms faced by the industry. In a letter from Marshall to Margaret Thatcher dated 2nd May 1986, we can see how Marshall warned Thatcher,

> to not say anything unwise in public. The Russian reactor is refuelled on-load without containment just as is done in our AGR and Magnox reactors. The safety implications of that are, in my opinion, in no way comparable in detail, but they are obviously comparable in concept.[6]

Here we see how Marshall suggested avoiding the whole topic altogether, rather than just avoiding the use of such "jargon." However, this was still very early days, there was still a lack of information from the Soviet Union on what happened at Chernobyl, so it should also be seen in this context. Nevertheless, Marshall was not just trying to simplify the information the public received but was also actively seeking to avoid difficult conversations with the public about how British nuclear reactors were operated. As becoming increasingly apparent when examining subsequent responses to the accidents, a hierarchy of communication and different sections of society were made aware of different pieces of information, while others were not.

Knowing what to communicate proved to be increasingly difficult when ministers underestimated the seriousness of the situation. In a memo dated 30th June 1986 from

[5] John Dunster 'John Dunster on Chernobyl fallout,' interviewed by Paul Maurice [Radio Broadcast] LBC, 6 May 1986.
[6] TNA, PREM 19/3656. 'Chernobyl-Soviet Nuclear Accident.'

Elizabeth Attridge, the Assistant Secretary for MAFF, she stated that she would have had sympathy with the problems that William Waldegrave, the Minister of State for the department, faced 'if he had not been so difficult at the time, we were trying to draw attention to the problem in sheep.' The memo goes onto claim that Waldegrave's attitude to the situation was 'ambiguous' and MAFF officials had great difficulty getting the Department for the Environment officials to reference the sheep and milk problem.[7] Wynne also mentioned in their article the contradictory nature of government announcements, concerning the Secretary of State for Environment, Kenneth Baker, who claimed there was no danger while Agriculture Minister, Michael Jopling, announced a ban on the movement and slaughter of sheep.[8] This lack of coherence in the message would prove to be a problem, particularly for sheep farmers, which I will explore in the next chapter. It also shows the chaotic nature of the UK response with different departments, led by different personalities, taking a different view of the severity of Chernobyl. However, in the absence of information from the USSR, knowing what to communicate was unclear. This is noticeable when civil servants and ministers were discussing how best to respond to the radioactive fallout that was affecting localised areas in the Scottish Highlands, Cumbria, and Wales. At times, not communicating anything was seen as a better strategy to respond to the Chernobyl accident. Civil servants in MAFF employed a 'strictly "need to know" approach' regarding the monitoring of radiation in foodstuffs. This was because they feared that the potential for a leak would lead to pre-emptive action from Ministers or farmers scattering their flocks that MAFF wanted to monitor.[9]

The initial chaos of the UK response can also be seen through the phone lines that were set up in the immediacy of the accident. Beata Brooks, a Conservative MEP for North Wales, complained on the 1st of July 1986 that the incident room was not only insufficiently staffed but was also giving inadequate information to farmers and the general public.[10] This complaint suggests that the government struggled to properly resource helplines with scientifically literate civil servants or provide comprehensive training to those who worked on the phonelines. However, the number of calls received after the 7th July dramatically dropped to below five enquiries a day, with most callers

[7] TNA, MAF 298/204. 'Chernobyl nuclear accident: sheepmeat restrictions.'
[8] B. Wynne, 'Sheep farming after Chernobyl', 14
[9] TNA, MAF 298/204.
[10] TNA, BD 85/72. 'Chernobyl nuclear accident, Soviet Union: ministerial correspondence.'

raising concerns about milk for their children.[11] According to officials, a lot of these queries also indicated that people believed that the government was withholding information. The distrust in the government's response line also posed a problem for the industry in its attempt to communicate what the government was doing to minimise damage from Chernobyl.

The lack of information from the USSR on the accident also led to challenges for the various bodies making up the nuclear industry. Minutes from the Electricity Council help to summarise this problem. First, the lack of information on what happened at Chernobyl meant that the industry could 'not predict' what safety implications it would have for the UK's reactors. Second, this led to 'some 30-research staff' being diverted from current research to fill this gap to see whether "Chernobyl" could happen in the UK. Third, and most significantly, the minutes show a divide in opinion between board members. Electricity Council Board member D.A. Davies believed that the CEGB should not have a high media profile until 'they knew more of what happened,' while Professor Stanley Hunt took an opposing view, saying that this would allow for anti-nuclear views to further permeate in the media unchallenged.[12]

The minutes then shifted to the topic of public opinion, Davies believed because the RBMK reactor had both a graphite moderator and water coolant it would make the CEGB 'superficially vulnerable to public concern.' The chairman of the council, Sir Alan Cottrell, suggested that the CEGB should make clear the differences between its reactors and the RBMK 'in terms a layperson could understand.' However, what is most striking was the comment from board member, Dr C. Suckling, that he believed the public saw anti-nuclear voices as 'independent' while ESI experts were 'biased.' To this end, Davies suggested the use of the judiciary, Royal Commissions and 'especially university professors' as suitable to provide expert 'unbiased' opinion.[13] This debate suggests concerns amongst the CEGB board about an information vacuum forming, as well as the impact this vacuum might have on public opinion against nuclear power. In turn, it also seemed to be an acknowledgement that the industry could not rely on its experts to

[11] TNA, BD 85/53. 'Chernobyl nuclear accident, Soviet Union: telex messages received from agriculture regional offices.'
[12] Walter Marshall and other CEGB representatives had been giving interviews, so this last claim is not entirely accurate.
[13] MUSI, 1989, 338/1/2/66/32. 'Electricity Supply Research Cttee Mtgs 155 – 162. 162nd meeting 22 May 1986'

communicate information that it believed to be the only information that mattered. Furthermore, it found itself in a conundrum where communicating without all the relevant information would lead to further questions but not communicating at all would allow for anti-nuclear views to go unopposed within the media. Chernobyl placed the nuclear industry in a difficult and complex situation, with no obvious strategy that would not, from the industry's perspective, lead to some counter-productive outcomes. Industry officials believed that researching what happened at Chernobyl was the surest way of putting together a comprehensive, legitimate, and effective public relations response to the disaster.

In further minutes from the Electricity Council, we can see the evolution of this research taking place. In the paper on the causes of Chernobyl, Dr Carpenter from the CEGB, said that Chernobyl had not presented any new scientific areas which needed to be investigated to understand the causes of the accident. Research had indicated that the positive void coefficient was the 'fundamental' cause of the disaster. This was not new science to the industry; they knew that positive void coefficients of radioactivity at low power occur within RBMKs, and only within RBMKs. What they could not predict were the 'operational' errors that led up to the explosion within the reactor. This research was possible because of previous exchanges between the UK and Soviet nuclear industries when the UK was choosing what reactor design to build in the 1970s.[14] Carpenter's presentation to the council also showcased other research, including that into graphite fires that had been used to assist the CEGB's Department of Information and Public Affairs in its public response.[15] This was vital to the UK industry as its nuclear reactors used a graphite moderator. The report into graphite fires stated that UK reactors are designed so that 'if something goes wrong, they switch off and everything cools down.' It stated that this meant that nothing could go wrong, with the important caveat that something could go wrong if a coolant circuit was breached, which could lead to a sequence of events where other 'essential systems fail to perform their functions.'[16] This is an eventuality which Charles Perrow argued would happen in his book *Normal*

[14] The RBMK design was rejected by the British nuclear industry in 1976 on safety grounds. See CEGB Department of Information and Public Affairs, Chernobyl - could it happen here? [Video-Recording], read by unknown (CEGB, 1986).
[15] MUSI, 1989, 338/1/2/66/33. 'Electricity Supply Research Cttee Mtgs 163-165, minutes of meeting 164 19th November 1986.'
[16] Ibid. 'Appendix 3, Graphite fires.'

Accidents.[17] However, Perrow also argued that nuclear industries around the world were too quick to blame 'operator error.[18] The key point to take from this is that the CEGB thought that communicating defence in depth was still the best way to convince people that nuclear power was safe, that the cause of Chernobyl was not a technical one inherent to nuclear power. Instead, it was operators who were working in a closed Soviet system that put production targets above safety protocols who were at fault.[19] Therefore, understanding processes and regulations, and why the industry was keen to frame its response within these, is important to understanding the industry's communication strategy with the general public. It would argue that operators acted outside of those processes and regulations, under pressure from senior officials in the Soviet Union, that the technology itself could be safe if operators acted within agreed and scrutinised frameworks.

Research into the technical causes of Chernobyl was not the only research that the industry conducted. Research and discussions into public relations were also 'hastily arranged' by the Electricity Council. The CEGB research into the safety of the Chernobyl plant and UK stations fed into the industry's public relations post-accident. Dr Carpenter, the Research Director for nuclear plants at the CEGB, stated that the 'threat posed by Chernobyl was not to any particular reactor type but to nuclear power in general.' While publicly, the industry argued that a Chernobyl type accident could not happen in the UK, the industry privately recognised that an accident of the same magnitude as Chernobyl could happen: 'the basic question was whether the probabilities were low enough for the hazards.'[20] This meant that the industry had to justify that an accident of the same magnitude as Chernobyl had such a small possibility as to not outweigh the economic benefits of nuclear power.

The Electricity Council set up a public relations conference to discuss how best to formulate the response to Chernobyl and to disseminate the research done into the implications of Chernobyl. This conference had representatives from the CEGB and the

[17] C. Perrow, *Normal Accidents,* 5.
[18] Ibid, 9.
[19] As example of this view from the CEGB can be seen in internal CEGB documents Marshall speaks of how 'in the western world' they take a pessimistic approach to safety and that pipes carrying water will breach hence why they build containment buildings which the reactor at Chernobyl did not have. See Magnox LtD, box OTC0009 NDA-00000038137. 'Chernobyl Accident Newsletters June/July 1986'
[20] MUSI, 1989, 338/1/2/66/33. 'CEGB Safety Research-Post-Chernobyl, ESRC 32/86.'

regional boards, although this was not the first conference of its kind.[21] Chernobyl was the primary item on the agenda and this covered a re-edited film, based on the video discussed in the next section, made by the CEGB, with new information aimed internally for the ESI, increased media scrutiny, parliamentary scrutiny; and where the ESI stood on nuclear power in light of Chernobyl. The meeting noted that despite the 'extensive press briefing' provided by the CEGB, its facilities were overwhelmed due to the pressures of the enquiries being made. Mr Beaumont from the CEGB blamed activists from Greenpeace and FOE, who disrupted communication between CEGB senior officials and press officers. He accused them of getting hold of the press officers' phone numbers and calling them with 'false enquiries.'[22] The meeting also concluded that with increased parliamentary scrutiny, it was necessary to keep in close touch with MPs, whose constituencies contained nuclear power stations, to make sure they were well briefed on nuclear matters. As so often in this thesis, communicating with MPs was seen by the industry as being paramount. The meeting concluded with members saying that the ESI was still pro-nuclear but 'a suitable public relations policy had yet to evolve as a result of the incident.' This is striking as this meeting took place more than a month after the accident had happened. Members also agreed that the CEGB, rather than its regional boards, should take the lead on deciding how the nuclear programme should be 'portrayed in PR terms' but, given the industry's 'view of the situation a pro-active PR strategy might not be practical.'[23]

What this section shows then is that the response to Chernobyl was a gradual process that involved research into the technical causes of the accident and discussions on how the industry would communicate this to the public. Through these discussions and research, the industry concluded that it would continue with a similar message that it took after TMI; that an accident, like that at Chernobyl, could not happen in the UK because of the technical differences in reactors and the superior safety regime in the UK.

[21] The meeting held on the 29th May 1986, was the 38th meeting of its kind, but the first on Chernobyl. It is not clear whether these were held on a routine basis or in response to key events, but this event was clearly called in response to Chernobyl.
[22] In other words, they prank-called the CEGB.
[23] MUSI, 1989, 338/1/2/66/33.

Comparing the CEGB and UKAEA short films

Proving that Chernobyl could not happen in the UK was the primary focus of the government's response, a replication of the argument made in the wake of TMI. However, because of the multifaceted nature of the UK government and the nuclear industry, there was not one single voice speaking for the industry. The CEGB under Walter Marshall took a leading role in the effort to communicate with a multitude of audiences, with both the booklet and film titled *Chernobyl – Could it Happen Here?* being the main product of this effort.[24] This multitude of voices raised concerns over whose responsibility it was to communicate that Chernobyl could not happen in the UK. Both the CEGB and UKAEA coordinated their response made through videos explaining how an accident like the one that occurred at Chernobyl could not happen at a British reactor. However, to avoid a duplication of effort the videos were intended for different audiences. While the CEGB video was created for the general UK public, the UKAEA video was for its own staff. This was because Gerry Gibbons, one of the project leads, believed the CEGB video 'does not attempt to explain technicalities such as void coefficients in the detail many [UK]AEA staff will expect.'[25] This belief that authority staff would expect more, suggesting that UKAEA staff had a comprehensive understanding of nuclear power and this certainly cannot be true of all of its staff, particularly those working as administrative assistants. It can also show how those working at the top of the UKAEA argued that the public expected its staff, regardless of their position within the organisation, to know more about nuclear energy than the average member of the public. Eventually, the video was made available to the public, although UKAEA officials believed that it was best aimed at science teachers and cost £5. Presumably, they believed that science teachers might use it in their lessons and would be able to guide students through the technicalities of the video. The differences between the two videos were simple, yet important to understand how the nuclear industry viewed the public.

Both dealt with the details of what happened at Chernobyl, and both emphasised why it could not happen in the UK. The level of detail, both verbal and visual, and the extent of the analysis showing what structures, physical and institutional, existed to prevent a breakdown in the safety regime in the UK, were considerably different. The CEGB video explained how design flaws in the RBMK reactor allowed for a positive

[24] CEGB Department of Information and Public Affairs, *Chernobyl - could it happen here?*
[25] TNA, AB 38/2164. 'Chernobyl Accident (USSR): UKAEA public relations.'

void coefficient, explaining what one is in the process, with an animated graphic showing how more steam equalled more heat which resulted in more water and so on. It emphasised keywords such as 'deliberately,' 'safety regime,' and 'withdrew control rods,' words that emphasise operator error. From this, we can see that there were two parts to the CEGB video.[26] The first is that it sets up the triggering mechanism for the accident to occur, the positive void coefficient. The second is that ultimately this mechanism and subsequently the accident was caused by human error in the form of the operators deliberately disengaging safety mechanisms, such as the control rods.

By contrast, the UKAEA video, while covering much of the same ground just in more detail, also places its emphasis on different aspects. The first was a greater emphasis upon the 'fatal flaw' in the RBMK reactor design. These were identified as a combination of the speed of the control rod insertion, the lack of automatic reactor shutdown, and how the reactor was allowed to operate below 20 per cent power which prevented the positive void coefficient from counterbalancing the Doppler coefficient from taking place. The second was that far less emphasis was placed on operator error. Dr John Gittus, who is the voice of the UKAEA in the video, claims that 'far too much responsibility was placed on the operator's shoulders' suggesting that it was the management structures that were to blame for the operator's bad decision making. Furthermore, the last point made in the conclusion to the video was that 'the operators allowed it to operate in an unstable regime.'[27]

Whether it was inherent design flaws or operator error that caused the accident at Chernobyl has been the source of much scholarly debate.[28] Rather than simply add to this debate, what these videos show is a difference in priorities in communicating the accident depending on the audience's perceived backgrounds. The audience with scientific backgrounds tended to receive a message based on the design flaws, while those without

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[26] CEGB Department of Information and Public Affairs, *Chernobyl - could it happen here?* [Video-Recording], read by unknown (CEGB, 1986).
[27] TNA, AB 38/2164.
[28] Authors such as Sonya Schmid, who blames operators for withdrawing the control rods. Others, such as V. Kortov and Yu Ustyantsev blame the safety regime in the Soviet Union and the design flaws in the RBMK reactor, arguing that 'The operators working with RBMK-1000 reactor were not informed of its flaws… This situation was due to the secrecy order of the Soviet nuclear science and industry.' Sergei Kapitza, a former Soviet scientist takes an integrated approach with Kapitza blaming a complete lack of understanding of nuclear power reactor physics from the operators and that this lack of understanding was due to the poor technical education that existed within the Soviet Union. S. D. Schmid, *Producing Power*, 130; V. Kortov & Y. Ustyantsev, 'Chernobyl accident: Causes, consequences and problems of radiation measurements'. *Radiation Measurements* 55, (2013), 12-16, 16; S. P. Kapitza, 'Lessons of Chernobyl: The Cultural Causes of the Meltdown'. *Foreign Affairs*, 72, 3 (Summer, 1993), 7-11, 9.

received a message blaming human error. The CEGB video also featured its own nuclear power operators, to give the sense that their workers supported the industry. All say that they felt safe and, crucially, that their families feel safe. By using its workers, the CEGB was attempting to make the content of the video more relatable, workers were not in suits, several have strong accents from around the UK, giving the sense that the nuclear industry was not just an elitist group of scientists. It gave the image that the industry was just like other industries, with "ordinary" workers doing an "ordinary" job.[29] This further supports the view that the CEGB was attempting to communicate with a wider audience, crossing class boundaries by having the two different voices; the authoritative, BBC-style narrator and the 'everyday' 'working man' to reaffirm what the narrator was saying and to give people a curated insight, or impression, into what it was like to work in a nuclear power station.

The UKAEA did not include these extra voices, just the voice of Gittus with Peter Evans from Science Now on BBC Radio 4, who acted as the interviewer. Emphasising the human element in the CEGB video, while excluding it from the film produced by the UKAEA, in turn, showed the industry's perception that the general public did not have the scientific background necessary to understand the technicalities of the design flaws of the RBMK. This is not a difference of opinion between the UKAEA and CEGB, rather it reflected the different intended purposes and audiences of these videos. This can be characterised as a hierarchy of communication, helping us to understand how the industry and by extension the government, perceived the level of public understanding surrounding, risk, radiation and nuclear reactors.[30] Wynne's article on the government's response to Cumbrian sheep farmers after Chernobyl, for instance, shows how government scientists and officials saw the public as having a knowledge deficit.[31] This was the current consensus of the scientific establishment at this point, as seen by the Bodmer Report (1985).[32] Yet they also understood that the public would not have had to

[29] Claire Langhammer has looked at what it meant to be ordinary in history and that 'what appears to be a straightforward social history category is actually a slippery, deeply politicised, often fought-over and dynamic identity; one which people moved in and out of according to context. And, most importantly, that it was, and remains, a category with real political purchase.' C. Langhamer, 'Who the hell are ordinary people?' Ordinariness as a category of historical analysis'. 195.
[30] Welsh describes the PR effort from the CEGB and BNFL teams as men in light grey suits that evoked suspicion. My use of the term "hierarchy of communication" is to provide more nuance to describe these efforts. Some audiences like journalists and politicians might be treated to fancy dinners, the public around a nuclear site might see a "man in grey suit." Most however, would only read or hear the words of the industry via the media. I. Welsh, *Mobilising Modernity*, 185.
[31] B. Wynne, 'Sheep farming after Chernobyl'.
[32] The Royal Society, *The Public Understanding of Science*.

learn about the specifications of the RBMK reactor and how it was different from British AGRs and the proposed PWR.[33]

As we have seen, one of the key messages from the UK industry was that an accident of the kind that happened at Chernobyl could not happen in the UK. This was a position shared by both the UKAEA and CEGB videos, despite being far more strongly worded in the former.

In the transcript for the interview, Gittus claimed that an accident like Chernobyl was simply 'impossible' in Britain. Evans pressed him on this, given the severity of the claim. Gittus responded using a quotation from the 'leading Soviet nuclear scientist' Legasov stating that 'such an accident could only happen to this particular Russian design of reactor.' Gittus then developed this argument by stating the 'three fatal flaws' in the Russian reactor: it was unstable below 20% power because of its positive void coefficient, it had too slow a shut-down system, with no automatic trip to switch off, and it was operated within an 'unstable regime.' What is then interesting is Gittus made an important clarification. While a 'Chernobyl-type accident is impossible' in British reactors, any 'severe reactor accident of any type, is virtually impossible.'[34]

This is a draft of the interview, so although it may seem as though Evans was challenging Gittus, it was staged. As in the CEGB video, which used its workers to support their case, the UKAEA staged a confrontation between Gittus and what was meant to be the independent and authoritative voice of Peter Evans from the BBC.[35] This means that when Gittus responds with clear and detailed evidence and Evans agreed with Gittus' claim that if we want to have 'total impossibility' it 'would mean living in a cave', it helped to strengthen the UKAEA's case that British reactors were safe.[36] We can also see the argument that it would cause immense damage to the UK if the entire civil nuclear industry was immediately closed down.

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[33] There is also relevance here to Anthony Giddens institutional analysis of modernity and their influential discussion of the role of trust and risk in mediating lay and expert relations. The industry did not expect, or trust, the entire public to understand the technicalities of nuclear power. However, they did expect or want some sections of the public to understand it. See A. Giddens, *The Consequences of Modernity* (Cambridge: Polity, 1991).
[34] TNA, AB 38/2164. 'Page 12 of the transcript of the UKAEA video.'
[35] This probably does not say much about the BBCs position to on neutrality but rather than individuals within the BBC would have their own views. Which may feed into how they report.
[36] Ibid, 13.

The importance of language in the transcript is also reflected in subsequent redrafts. For example, the phrase 'virtually impossible' was originally 'initially impossible.' There were some clear reasons why this was changed. First, saying something 'is initially impossible' means that at some point it will no longer be impossible and will, in fact, be possible, with the potential for it to become increasingly possible. Saying something 'is virtually impossible' was a more accurate representation of the risk calculations behind whether such an accident could occur. It was not impossible but from the industry's perspective, the risk was so low that it may as well be impossible.[37] We saw how, in Chapter Three on TMI, the CEGB and UKAEA felt confident to dismiss any comparisons between the UK industry and its US counterpart because of a mixture of technical and managerial differences between the two. That in turn led to an attitude of British techno-nationalism that such an accident occurring in the UK was not possible simply because the UK was better and more responsible than others. However, in 1986 in a sense, it did not matter whether the UK industry was able to demonstrate that its nuclear plants were safe, as the effects of the disaster impacted the UK, despite Chernobyl's geographic distance.

Some problems arise from the strategy of proving that British reactors were safe. Charles Perrow explains the simple, yet significant issue that occurs with high-risk technology. You may resolve an issue when it arises, add in another layer of safety, but you can never be sure where the next issue will appear. You can reduce risk but never eliminate it.[38] This meant that the plan to "prove" that British reactors were safe was inherently flawed, helping to explain why the UKAEA, CEGB and government ministers formulated their strategy. The primary point in showing how British reactors were safe and that it could never happen here was to choose the language carefully. This was evident in correspondence within the UKAEA's Safety and Reliability Directorate. In a Post- Chernobyl Review Meeting, they admitted that the wording of questions was key.

[37] The Rasmussen report, published in, 1975. Stated that someone was more likely to be hit by a meteor than it was a nuclear power station accident occurring. N. Rasmussen, *Reactor safety study. An assessment of accident risks in U. S. commercial nuclear power plants. Executive summary: main report*, (NRC, 1975),140.
[38] C. Perrow, *Normal Accidents*, 4.

> The questions have been posed in the form – 1. Is there any risk of positive void coefficient in any Authority reactor? 2. Is there any risk of either a prompt critical (or super prompt critical) excursion in any Authority reactor?[39]

Leaving the wording as it was, the answer to these questions was yes. This would not be within the UKAEA's interests. In reply to these questions, Dr Gittus, the Director of the Directorate, points out how this can change.

> However, if the underlined word of in each question is changed to 'from' then the answer to both questions is 'no' based on a practical definition of risk in line with current Western thinking on the safety of nuclear power which (for example) underlies the published 'NII Safety Assessment Principles'.[40]

The crucial part here was the recognition of how risk was defined. They knew that there was no way to absolutely prove that UKAEA reactors were not at risk of positive void coefficient occurring, but they could credibly show how UKAEA reactors were not at risk from such an occurrence due to the defence-in-depth strategy. However, as Beck postulated in *Risk Society* following the shock of Chernobyl, the world will never be the same again.[41] This continuation of claiming nuclear power stations were protected because they had a "defence-in-depth" strategy would get weaker if further nuclear accidents happened. Shifting how the public interpreted the risk of nuclear power and radiation would be crucial in the post-Chernobyl reality.

Using political capital

While there were many challenges posed by the Chernobyl accident, it also provided opportunities for the British government and the UK nuclear industry to present it as a Soviet problem. In a time of Glasnost and Perestroika, the accident proved to be a useful weapon for Thatcher in her ideological crusade against Communism. In a speech aired on the 3rd May, Thatcher claimed that the accident 'shows very vividly the closed Communist society and open, Western societies.' She went on to contrast the American response to the Challenger space shuttle accident and their apparent openness compared

[39] TNA, AB 38/2164.
[40] Ibid.
[41] U. Beck, *Risk Society*.

to the Soviet tight control on information.[42] This was not unique to Thatcher, other government ministers such as Timothy Eggar, Under-Secretary of State for the Foreign and Commonwealth Office, also said that 'the lesson of this incident is that the openness which Mr Gorbachev has said is necessary for Soviet society must become a reality.'[43] In response, John Hannam, a backbench Conservative MP for Exeter, argued that,

> My right hon. Friend the Secretary of State for Energy was right to state that there would have been no disaster at Chernobyl had the Soviet Union followed the procedures of the democracies.[44]

Neither was it unique to parliamentarians of the governing party. In an opinion piece the *Daily Telegraph's* East Europe correspondent, Robin Gedye, said that there was a paranoid secrecy within the Soviet Union. This was in stark contrast to Poland which Gedye noted had experienced a 'popular revolution' and this meant that 'Warsaw is now forced to keep its people informed on all sensitive matters to diffuse any potential discontent.'[45]

However, laying part of the blame on the Soviet Union was criticised by some within the Labour Party. Dr John Cunningham, Labour MP for Copeland, the constituency that contained Sellafield, argued in a debate on nuclear safety on the 13th May 1986, that,

> Nor, I must emphasise, do we support self-righteous attacks on the Soviet Union. The Soviet Union should be more open about the nature and scale of the accident, but the "holier than thou" approach of some people in the British Government—and, even worse, the attitude of the American Government—did nothing to help

[42] M. Thatcher, 'Margaret Thatcher on handling of Chernobyl' no interviewer, [Radio Broadcast] LBC, 3 May 1986.
[43] *Daily Telegraph,* 1 May 1986, 8.
[44] HC Parliamentary Debates, 13 May 1986, Vol 97, col 616.
[45] *Daily Telegraph,* 2 May 1986, 6.

> or to encourage the Soviet Union to be more open and forthcoming; indeed, they probably had the opposite effect.[46]

As the MP for Copeland, Cunningham would not want to criticise nuclear power too strongly, instead focusing upon how nuclear power was managed. In contrast, Stanley Orme, the Shadow Secretary of State for Energy, takes a more direct attack against the nuclear industry stating that,

> The Prime Minister joined in to emphasise Britain's openness compared with the secretive approach of the Soviet Union. Yet the self-same obsession with secrecy has dominated Britain's nuclear industry.[47]

Orme identifies an important line of critique against the British nuclear industry, due to its military origins was shrouded in secrecy. However, at this time the nuclear industry was making some steps to becoming more transparent as explored in Chapter Seven. The politicisation of Chernobyl was therefore not monopolised by one wing of British politics. Despite this fact, Thatcher's Conservative government explicitly used Chernobyl to attack the Soviet Union, as well as socialist ideology more broadly. These attacks had obvious flaws, allowing Labour MPs to retort that TMI and Windscale were proof that nuclear accidents could happen anywhere, even in democracies. Nor indeed, was the Soviet Union unique in their inadequacies in communicating what had happened during the accident. As I argued in Chapter Three, Metro Ed had not been forthcoming with information about TMI and the information that did come out was often confusing. In consequence, TMI left a lasting imprint on the public's memory of nuclear power. Helmuth Trischler and Robert Bud have also argued that in several countries, public anxieties proved so strong during the 1970s that development was prevented. This happened in Austria and Denmark, and in Sweden, as public attitudes began to turn strongly against nuclear power in the early 1970s.[48] Chernobyl, regardless of its Soviet

[46] HC Parliamentary Debates, 13 May 1986, Vol 97 col 596.
[47] HC Parliamentary Debates, 13 May 1986, Vol 97, col 639.
[48] H. Trischler & R. Bud, Public technology: nuclear energy in Europe, *History and Technology*, 34, 3-4, (2018), 187-212, 199.

context, only reinforced this image that nuclear power presented a serious risk to public health, with the public largely ignoring the ideological trappings of political debates about the disaster.

Nevertheless, by discrediting the communist system of government operating the Chernobyl plant, the industry and Conservative government helped to create a distinction between safety regimes and the decision-making processes in the UK and the Soviet Union. Walter Marshall consistently made clear that 'the Chernobyl design could not have been licensed or even considered for construction in the United Kingdom,' emphasising that Chernobyl was not a reflection of inherent problems with all nuclear power stations, just Soviet ones.[49] Marshall also questioned the evidence and made it clear that the operators, although they caused the accident, were operating within a system that was designed to fail. This led to Marshall's suggestion that, 'for these reasons, the main reaction of reactor operators in the UK will be one of reassurance that we do not depend solely upon them to guarantee safety.'[50] This not only highlights that the UK had a defence in depth strategy, but also that industry experts were keen to defend those who operated nuclear power plants, arguing that it was not their fault when things go wrong if the system they operated in allowed them to fail.

Chernobyl in the news and its impact on public opinion

Chernobyl captured the attention of the media and the public. In part due to its dramatic and real implications on the environment across Europe and people's health, but also the rumour, panic, and misinformation that occurred in the immediate days after the accident.[51] In the *Daily Mail,* it was reported that 2000 people had died in 'atom horror.'[52] The *Daily Mirror* also reported this erroneous figure, while also claiming that UK students were 'terrified' and were desperate to get back to the UK.[53] This alarmist reporting explains why Chernobyl produced so much fear. Not only is radiation invisible to the human senses, and dangerous to human health in large amounts, this coverage compounded this fear as it reported that it was killing large amounts of people in a short

[49] J. H. Gittus, D. Hicks, R.S Bulloch, P. N. Clough, I. H. Dunbar, M. J. Egan, A. N. Hall, W. Nixon, D. P. Luckhurst, A. R. Maccabee, *The Chernobyl Accident and its Consequences (*London: United Kingdom Atomic Energy Authority, 1987), 1.
[50] J. H. Gittus, et al, *The Chernobyl Accident and its Consequences*, 2.
[51] Due in part to the USSR's secretive approach, rather than tabloid irresponsibility
[52] *Daily Mail*, 30 April 1986, 1.
[53] *Daily Mirror*, 30 April 1986, 1.

amount of time. This also helps to explain why public opinion in Britain dramatically turned against nuclear power in the immediate months after Chernobyl, but then slowly returned to where it was before the accident, as information became clearer and the perception that this would lead to significant amounts of immediate deaths receded. This section will look at the challenges presented in the media and how the industry used the media to "correct" the record, also noting the impact on public opinion polling and why the shifts occurred.

Susanna Hornig noted that risk stories in the mass media are typically judged on how well they contribute to public education designed to eradicate wrong thinking and that information is the central weapon mobilised, largely through mass media, to diffuse the anxiety and opposition generated when the public feel at risk from science.[54] This was certainly what the British government aimed for after the Chernobyl crisis. However, it is critical to know what kind of information was diffused to understand the government's communication strategy. Quantitative information, like the vast quantities of monitoring data MAFF collected, was referred to, but rarely mentioned explicitly in media such as newspapers, while on radio and audio-visual formats such data was more readily used. One such interview was with Dr Grant Meekings, of MAFF, who stated that only 'one or two animals' had the highest level of 5000kbg, and that, a 'certain number of animals' over 1000bq/kg also had to be removed from the food chain.[55] In this format, Meekings would not have the time to go through all of the data available but the lack of exact numbers regarding those over 1000bq/kg allows for ambiguity, which also could have contributed to feelings of distrust between the industry and those communities where radiation was deposited in large amounts. Conversely, demonstrating that the data existed would have likely given the impression that the situation was being taken seriously, that it was being monitored and that there were structures in place to address problems should they be detected. To some extent, this data would have helped to restore credibility in the governments' handling of the situation and that it had things under control, even if uncertainties still existed.

Walter Marshall also attempted to communicate the science behind the accident through newspaper articles, using analogies to explain technical concepts such as the

[54] S. Hornig, 'Reading risk: public response to print media accounts of technological risk.' 96.
[55] G. Meekings, 'Chernobyl repercussions in the UK one year on' interviewer unknown, [Radio Broadcast] LBC, April 1987.

positive void coefficient. In *The Sun* Marshall compares the RBMK reactor to a car saying it was,

> a bit like having a powerful automatic car which has a design fault so that, if it is driven below 20mph, the operator needs to give constant attention to the brake to stop the speed surging away – and if the fan-belt snaps or if a piece of rust interrupts the flow of coolant water, the car instantly accelerates to 100mph or more with no chance for the driver to put the brake on in time.[56]

John Wybrew, who advised the Prime Minister on energy and transport matters, claimed it was 'a nice analogy' and useful for explaining the shortcomings of the safety regime in the USSR.[57] However, the government and industry did not have a monopoly on the information published in newspapers, with anti-nuclear groups views such as FOE also publishing contradicting press releases challenging the government. For instance, on the 6th May 1986, *The Times* reported that the government believed that all water was safe to drink.[58] Then, on the 15th May 1986, *The Times* ran a story from FOE disputing the claims that there was no danger to the public from water or milk.[59] The *Liverpool Daily Post* also reported that a dead goose in Clwyd could have been a victim of the Chernobyl accident. MAFF responded by refusing to comment on individual cases and yet destroyed the corpse as a precautionary measure. There was also the claim that the UK government was attempting to cover up reports of high radiation in Cumbria by burying the statistics with 'a mass of favourable statistics for the rest of Britain,' trying to create a national average of radioactive disposition so that they could 'hide' particularly high radiation counts within it.[60] This links to the earlier point concerning the collecting of vast quantities of data to show a complete picture for the UK, but the *Liverpool Daily Post* argues against this claiming that it buries the bad data. Sean Martin notes the politicisation of Chernobyl in his article on Welsh sheep farmers, where he argues that 'the positioning of the accident in the Ukraine vis-a-vis the nuclear industry in Britain was certainly

[56] TNA, PREM 19/3656. 'Chernobyl-Soviet Nuclear Accident.'
[57] Ibid.
[58] *The Times*, 7 May 1986, 4.
[59] *The Times*, 15 May 1986, 19.
[60] TNA, BD 85/54. 'Chernobyl nuclear accident, Soviet Union: telex messages received from agriculture regional offices.'

fruitful ground for accusations of cover-ups and conspiracies.'[61] In the *Guardian* defence correspondent David Fairhall concluded that Chernobyl shows how there was 'no such thing as a nuclear-free zone,' pointing to the transnational nature of the Chernobyl accident.[62] To mark the first anniversary of the disaster, the paper covered a demonstration at Hinkley Point stating that a 'staggering line' of 700 protesters walked around the boundaries of the power plant.[63] Here we can also see how Chernobyl was being used as a political tool to push particular agendas, whether it being anti-Thatcher or anti-nuclear views.

As seen in the previous chapter, public opinion polling showed that the public's acceptability of nuclear power dropped after the Chernobyl accident. However, polling evidence also suggests that despite the anxiety shown by members of the public immediately after the accident, this anxiety was short-lived. For instance, in 1986, Gallup polling asked the question, 'from what you have read or heard, how safe do you think nuclear power stations are?' Polling responses showed that there was a very sharp drop from 17% to 9% in respondents saying they felt very safe about nuclear power, as well as a drop from 47% to 35% saying they felt fairly safe between January 1986 to May 1986. However, the positive figures began to increase the following month, reaching the level by March 1987 where 18% said they felt very safe and 46% said they felt fairly safe.[64] In a subsequent report on the impact of nuclear accidents on attitudes to nuclear energy, Connie de Boer and Ineke Catsburg note that: 'British support for the construction of a nuclear power station in Britain was very stable in the period before Chernobyl. The percentage opposing construction then increased sharply but tended to return to its "normal" level in 1987.'[65] While it can be argued that this stabilisation of public opinion perhaps reflected an abatement of these anxieties, they perhaps also reflected the fact that the media focused more on stories relating to the socio-economic issues of Chernobyl, than on the actual accident itself.[66] This certainly happened in the UK, as the Chernobyl story shifted away from the technicalities of nuclear power and the

[61] S. Martin & M. E. Williams, 'Politicising Chernobyl'. 286.
[62] *The Guardian*, 7 August 1986, 4.
[63] *The Guardian*, 18 April 1987, 3.
[64] C. de Boer and I. Catsburg, 'A Report: The Impact of Nuclear Accidents on Attitudes Toward Nuclear Energy'. 257.
[65] Ibid, 254.
[66] This is like what Kuchinskya finds. See O. Kuchinskaya, *The Politics of Invisibility*, 74.

disaster itself, to the restrictions faced by sheep-farmers whose live-stock grazed on uplands where radioactive deposition had taken place.

One example of where polling data suggested continuing hostility to nuclear power can be seen in MORI polling. A year after the Chernobyl accident 54% of respondents said they were against the further building of nuclear power stations. 50% also believed that an accident like the one at Chernobyl could happen at a UK nuclear power station. However, the industry would see a glimmer of hope in that 37%, while opposed to the further construction of nuclear power, believed they were not very well informed about nuclear energy.[67] As shall be explored in Chapter Seven, the lesson the industry took from this that by demonstrating the safety of nuclear power through demonstrations, lectures, and visitor centre's public opinion would be more favourable towards nuclear power.

Conclusion

I have shown how Chernobyl and its aftermath compounded already existing problems for the UK nuclear industry. The chaotic immediate response to the accident, in part due to unfortunate circumstances regarding its timing, but also due to the slow release of information from the Soviet Union, meant that the UK's initial response can only be described as a knee-jerk and chaotic. It shows how to talk about a communication strategy we have to acknowledge that crises like this upend previously laid plans and force a rethink in how the industry believed it should communicate to the public. The basis of this rethink was Lord Walter Marshall's expertise on RBMK reactors formed the basis of the response and the claim that an accident like Chernobyl could not happen in the UK. This was the same argument that the UK made in response to the accident at TMI nearly seven years prior.

I have shown through the videos produced by the UKAEA and CEGB that while the industry produced a unified message that Chernobyl could not happen in the UK. Their audience and purpose were different, this furthers my argument that the communication strategy for the UK nuclear industry can be described as being a hierarchy, where different audiences received different information depending on what

[67] MORI, *British Public Opinion*, Vol IX, 2, (March, 1987), 6-7.

the industry considered they would be able to understand. The videos also show us how in comparison to the accident at TMI, the nuclear industry invested considerably more resources into the production of materials for public relations campaigns. Indeed, once it became more apparent that the expertise of Marshall was indeed accurate regarding the RBMK, understanding how to communicate with the public became more important than understanding what to communicate.

For the Thatcher government, Chernobyl represented an opportunity to point out the flaws within the socialist, Soviet-style of government, in comparison to the UK's democratic capitalist society. This is important within the era of glasnost as Thatcher attempted to put pressure on the crumbling Soviet empire to maintain its commitments to reform. However, domestically it became a political tool in an increasingly polarised politicised debate over nuclear power. The government and industry argued that, yes, nuclear power can be dangerous, but it was only dangerous when it was being managed by an authoritarian Soviet government. Ignoring the history of nuclear accidents at TMI in 1979 and the fire at the Windscale plant in 1957, they were being selective about which parts of their history to remember or recognise for polemical purposes. Nevertheless, Marshall also used this message as well to support the industry's argument that Chernobyl could not happen in the UK due to the differences in the safety regimes as a result of the style of government.

Chernobyl had an immediate and dramatic impact on public opinion in the UK and the media narrative. Opinion sharply turned against nuclear power; however, this did not last indefinitely. As the media shifted its conversations, as we shall see in the next chapter, public opinion towards nuclear power became more positive again. However, while favourability might have improved, this did not mean the public wanted to build new nuclear power stations and the perception of risks associated with nuclear power had only increased. How the industry sought to respond to these risks is explored in Chapter Seven. Nevertheless, Chernobyl represented a significant turning point in the fortunes of the nuclear industry. Nuclear power had directly killed people, had left a significant area of Ukraine uninhabitable and was posing a threat to the health of millions of people across the continent. Even if the industry could prove that another accident like Chernobyl could not happen in the UK, the transnational risk had become ingrained in the minds of the public.

Chapter Six: 'Carrying the 'can' for Chernobyl'[1] - The impact of Chernobyl on farmers in North Wales and the government's response

As described in the previous chapter, an estimated 14000 PBq or roughly, 14 billion-billion Bq of radiation was emitted from reactor four at the Chernobyl Nuclear Power Plant. Out of this, a significant amount came to be unevenly deposited on the UK. In parts of Scotland, officials measured Caesium deposition from rainfall and discovered areas had received 20,000 Bq/m^2. However, a large proportion of this radioactive deposition landed in the uplands of North Wales, with official measurements of Caesium-137 as high as 1785 Bq/m^2.[2] This caused significant anxiety over whether their sheep would become too contaminated for human consumption. Thatcher did not want her government to look complacent and so policies were enacted that restricted the movement of sheep. However, for the farmers who were now unable to sell sheep at market value, this caused problems of its own. MAFF developed two primary responses. To calm public anxiety, they marked sheep with paint to indicate whether they were over the limit of radioactive contamination. These animals were then visible to the local public as they grazed in the open air and to the wider population through media reporting. Changes in colour over time marked the decline in contamination and served as a constant reminder of the system in place to prevent contaminated sheep meat from entering the human food chain. This process was known as the Mark and Release Scheme. For the farmers, the government initiated a compensation scheme to recompense them for any financial damages arising from the decision to allay public anxiety by taking meat out of the food chain, communicating a commitment to the long-term future of this industry. Together these measures can be seen as different forms of science communication, underpinned by the visual articulation of what was deemed safe and what was not as the government sought support for its policies from an anxious public.

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[1] TNA, BD 85/45/2. 'Chernobyl nuclear incident, Soviet Union: radiological monitoring and livestock movement restrictions; marking of sheep.'
This was the title of a press release from the Farmers Union for Wales (FUW) for January 1st, 1987.

[2] W. A. Kerr & S. Mooney, 'A System Disrupted - The Grazing Economy of North Wales in the Wake of Chernobyl.' *Agriculture Systems,* 28, (1988),13-27, 20; B. Wynne, 'Sheepfarming After Chernobyl: A Case Study in Communicating Scientific Information'. *Environment: Science and Policy for Sustainable Development*, 31, 2 (1989), 10-39, 13.

This chapter will first provide the context for the nuclear power and farming industries in North Wales.[3] Second, it investigates why restrictions were put in place. Third, it will analyse the Mark and Release scheme that was set up to ease sheep out of the restrictions, as well as its communicative purposes for showing the decline in radiation. Fourth, it will explore why a compensation policy had to be introduced and then updated. Finally, it will look at the role of the nuclear industry and the Welsh Office in monitoring the contamination and communicating the health risk and government policies and guidelines to the public. Through this, I will show that the government's thinking behind the policies to restrict sheep was because of an initial knee-jerk response, due to the confusion in the immediate days after the Chernobyl accident and a mishap in understanding the local topography. The Mark and Release scheme was not only a means to show which sheep could be sold to market, and which could not, but also a method of communicating and making visible, at least partially, the invisible nature of radioactivity, emphasising its decline over time.[4] The compensation policy was introduced and then updated, due to a desire to placate farmers, a key Conservative voter demographic, who were frustrated not just at the government for imposing restrictions but nuclear power in general. North Wales included several marginal constituencies including Ynys Môn that the local Conservatives were anxious not to lose. The North Wales case study is important historically, not only because of the amount of untapped primary evidence that exists. It also gives us a clear perspective of how the government sought to respond to the Chernobyl accident on a small scale, its perception of the public in an area with not just one civil nuclear site, but two, and how government departments and public bodies interacted with one another and the public.

Nuclear Power in North Wales

Sheep farming was one of the only major sources of income for North Wales, with Shotton steelworks closing in 1980 and tourism providing income only on a seasonal basis. The nuclear industry in North Wales was the only other major industry in the region, directly employing over 1000 people. This does not include the numerous

[3] North Wales is made up of 6 principal areas Isle of Anglesey, Conwy County Borough, Denbighshire, Flintshire, Gwynedd, and Wrexham County Borough.
[4] O. Kuchinskaya, *The Politics of Invisibility*, 2.
Kuchinskaya talks about the different ways in which we can make radiation and its effects observable and publicly visible, or how we make them unobservable and publicly non-existent. Here we are seeing both.

suppliers and contractors that would work indirectly for the power plants. There were two nuclear power plants in North Wales: Wylfa Nuclear Power Station situated on the island of Anglesey on its northern coastline and Trawsfynydd Nuclear Power Station located inland on the artificial reservoir Llyn Trawsfynydd within the Snowdonia National Park. Wylfa had been operating since 1971 and Trawsfynydd since 1965. According to Walter Marshall in 1985, the local population supported the existence of the plants.[5] However, this supposed popularity did not stop the CEGB curtailing its highly publicised twenty-first birthday celebrations for the Trawsfynydd plant, that were due to take place just after the Chernobyl accident.[6] Keith Best, whose constituency, Ynys Môn, contained Wylfa, was even lobbying to expand the nuclear power station at Wylfa by lobbying the CEGB to build one of its new PWR stations there. Marshall responded that North Wales was a candidate but that they preferred first to establish a power plant, not necessarily nuclear, in South Wales to ensure efficient coverage.[7] Nonetheless, in a CEGB press release on the 15th March 1985, the board acknowledged they were looking at 'various options' for electricity generation but no plans currently existed. They knew of the local concern about future employment once Trawsfynydd was closed.[8] At the time of the Chernobyl accident, the industry and its supporters were seeking to expand its generating capacity. However, the accident at Chernobyl threw these plans into jeopardy, as we shall see later the concern over radiation from Chernobyl became mixed with wider concerns over radiation from these nuclear power plants in the local vicinity.

There were growing concerns over radiation in the months just before the Chernobyl accident. Leaks at the Sellafield plant had spread radioactive contaminants to the North Wales coastline. A letter from Alistair Goodlad, the Under-Secretary of State for Energy dated 28th February 1986, stated:

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[5] NLW, Keith Best Papers CEGB 20.
T. Lean & S. Horrocks, 'Good Nuclear Neighbours', 1.
[6] The Guardian, 7 May 1986, 2.
Ironically this also coincided with a safety check that was overdue by 20 years.
[7] NLW, Best CEGB 20.
[8] These jobs were high skilled high paid jobs as well. There were very few other local options for anyone with the qualifications.

> Recent weeks have seen renewed efforts to discredit the nuclear industry. I am determined we should increase public awareness of the industry's excellent safety record and its enormous and growing contribution to the economy.

The leak that occurred on the 18th February 1986 was around 250 gallons of radioactive liquid with no airborne contamination. Two people were contaminated through their clothes when they repaired the leak but were able to wash off radiation. Goodlad goes onto say how:

> It is important not to let these relatively minor incidents, whose importance has been exaggerated by some out of all proportion to the real risks to health and safety overshadow the fact that BNFL has substantially reduced its discharges in recent years at Sellafield.[9]

By calling these incidents minor it downplays the potential threat of radiation. However, when the significant amount of radiation from Chernobyl was deposited on the UK, the government also insisted that the health risk was minimum. Yet, they also advised the public not to drink rainwater and then restricted the slaughter of sheep. Contradictory messages like these hindered trust not only in the government's ability to handle the situation but the scientists advising them. It also caused concern in the local populace; if this was how much radiation could come from a major accident 1400 miles away, how much radiation would there be if a major accident happened at one of the local stations? We can chart this rise in concern in the press of north Wales where the *Daily Post* ran the headline 'Nuclear plants gas leak panic' on the 15th May 1986. The story was that eight tonnes of radioactive carbon dioxide gas had leaked from Hinkley Point due to an ill-fitting nut and bolt. The CEGB claimed that no one was killed, injured and no radiation left the site; while also stating that they would not publish the full report into the accident to 'protect' staff confidentiality. Nonetheless, the timing of the accident and inquiry was

[9] NLW, Best CEGB 20.

unfortunate for the CEGB and, as the headline alludes to, any radiation leak would immediately be associated with the events at Chernobyl.

The initial response: complacency, paranoia and restrictions

Whilst the Chernobyl 'cloud' that reached the UK at the beginning of May contaminated many parts of the country, the topography of some regions meant that radioactive fallout was retained in the ground, and thus the food chain, for a longer period. Some of the uplands of north-west Wales, especially in parts of Snowdonia, bordering on Trawsfynydd nuclear power station, towards the Denbigh Moors and the Isle of Anglesey, containing Wylfa nuclear power station, were particularly hospitable to this radioactivity due to the climate, soil type and drainage factors.[10] This meant that the contamination, and the need for monitoring, remained for decades. The initial reaction from the British government was one of calm, describing the contamination level as 'very low' and posing 'no health risk to the public.'[11] The radiation was reported in North Wales on the 5th May 1986 with local newspapers reporting claims that some people felt sick including Brian Rearden, a former mayor of Builth Wells and his wife Anne, who claimed to be sick with headache and nausea caused by the radiation.[12] It is not clear whether these illnesses were caused by radiation, but the very existence of these articles illustrates the concerns generating from the invisible radiation.

Monitoring in North Wales began on 16th May 1986 following a Welsh office announcement. The data was collected by the CEGB, the UKAEA, and the NRPB across multiple sites including Trawsfynydd and Wylfa. Although, their preparedness for monitoring radiation had been brought into question by Dr J. A. V. Pritchard, a Scientific Advisor at the Welsh Office. Pritchard wrote to civil servants that, pre-Chernobyl, he believed that the CEGB had whole-body radiation counters at both power stations. This proved to be inaccurate, and since none were available at Ysbyty Gwynedd, the regional hospital, there were insufficient monitoring preparations in place if a comparable accident emerged at either of the nuclear power stations.[13] FOE later disputed the accuracy of the data collected by these groups and presented their data to the Welsh Office. They claimed

[10] TNA, BD 119/32. 'Chernobyl Incident, Memorandum 26 September 1986.'
[11] *The Guardian*, 3 May 1986, 1.
[12] *Liverpool Daily Post Welsh Edition*, 5 May 1986, 5.
[13] TNA, BD 119/32. 'Memo from Dr J. A. V Pritchard, Scientific Adviser Welsh Office on Medical Physics North Wales: Post Chernobyl, August 1986.'

that despite a close agreement between their data and official data there were 'in several cases… discrepancies which raise questions about the sampling technique employed by the official monitoring organisations.'[14] They also claimed that they found high levels of contamination outside of restricted zones. However, the FOE did not support the claim that Trawsfynydd was a major source of contamination, they claimed that all their samples 'produced a Chernobyl 'signature.'[15]

Government reassurances failed to qualm the anxieties of the public, who, when looking at the wider international reaction, were frustrated by the inhibition of Thatcher's government on a matter that had greater ramifications than initially thought. For example, Poland had given out iodine tablets to children; countries including Germany, Italy and the Netherlands imposed restrictions on the sale of agricultural produce.[16] The actions of other countries were noticed by the national media and in some cases, the representatives from the UK industry questioned the actions of other countries. For example, John Dunster, director of the NRPB questioned the scientific usefulness of the images coming from the Soviet Union at the time showing Geiger counters being used to show vegetables having no radiation on them. He argued that this a poor way of showing radioactive contamination, if a counter could pick up radiation on the surface of a crop, then it 'was in serious trouble.'[17] Nonetheless, public information telephone lines set up in response to the crisis were 'inundated' which 'seriously hampered communications.' Internal memos presented to the Prime Ministers' Office claimed that 'ill-co-ordinated nature of the information and advice aroused rather than calmed public anxiety.'[18] Government scientists created further confusion on 6th May 1986, by advising the public not to drink rainwater. Dunster claimed that for those who did drink rainwater it would be 'not bad at all' and it was not 'very serious' but that they should still avoid doing so.[19] If rainwater was contaminated would other water sources not be contaminated as well? As time passed, monitoring of areas and foodstuffs impacted by the fallout continued to reveal high levels of radioactivity, seemingly confirming such anxiety, and it became clear to

[14] TNA, POWE 74/452. 'Correspondence with Friends of the Earth Ltd, Fallout over Chernobyl: A review of the official monitoring programme in the UK. 27th May 1987.'
[15] Ibid, 31.
[16] TNA, PREM 19/3656. 'Chernobyl-Soviet Nuclear Accident.' TNA, MAF 691/4. 'Sheep Compensation Scheme: Chernobyl compensation policy.'
[17] John Dunster, interviewed by Paul Maurice, 'John Dunster on Chernobyl fallout,' [Radio Broadcast], LBC, 6 May 1986. The NRPB would later produce several information leaflets on the issue of radiation protection and monitoring.
[18] TNA, PREM 19/3656.
[19] John Dunster, interviewed by Paul Maurice, 6 May 1986.

government ministers that they had underestimated the problem.[20] Action was urgently needed to counter the concern that had started to ferment around the country. On 20th June 1986, seven weeks after the accident, Michael Jopling, the Secretary of State for MAFF, announced that livestock with radiation levels over 1,000 Bq/Kg would be prevented from entering the food chain, and introduced restrictions on the movement and slaughter of sheep in regions that were registering a cluster of high measurements, such as Cumbria, North Wales and parts of Scotland. This move was portrayed as a short-term measure, and Jopling initially placed these restrictions for just 21 days, which would be 'reduced as soon as the monitoring results... confirm the expected fall in levels.'[21] However, these levels did not fall and the initial groundswell of concern was in part due to the government's complacency over, firstly, admitting there was a problem with radiation levels, and secondly identifying how to deal with it.[22] When radiation levels did not fall in these areas the need for a longer-term policy of restriction, monitoring and gradual derestriction, including a policy to reimburse farmers for the financial losses incurred, was identified as a necessary economic intervention. Thatcher complained in the margins of papers for the Prime Ministers' Office that her government had appeared complacent, and that action was required.[23]

As the radiation level did not decrease and fears over its longevity and impact on public health persisted, sheep became the embodiment of this fear of radioactivity and were portrayed as the British victim of Chernobyl, while farmers were the ones to carry the financial burden. This was reflected in an FUW press release saying that they were 'carrying the can for Chernobyl.'[24] One example of this can be seen in an illuminating letter to the MAFF. A Mr M. P. Watkins describes requesting New Zealand lamb in the knowledge that 'lamb from North Wales was not fit for consumption'.[25] However, Mr Watkins' butcher sought to refute this belief, claiming Welsh lamb was in excellent condition and increasingly cheap because of discriminatory consumption, and handed Mr Watkins an explanatory pamphlet detailing the quality and cheapness of Welsh lamb.[26] The existence of this pamphlet shows how local businesses thought it necessary to launch

[20] High in both the absolute sense, and high in relation to the national average and previous readings.
[21] HC Parliamentary Debates, 20 June 1986, 99, cols 1333-1338.
[22] TNA, BD 85/73. 'Welsh Office press statement 7th May 1986.'
Initially the government only advised against drinking rainwater and only began monitoring in Wales on the 16th May 1986.
[23] TNA, PREM 19/3656. 'Chernobyl-Soviet Nuclear Accident.'
[24] TNA, BD 85/45/2.
[25] TNA, MAF 298/190/1.
[26] Ibid, 'NFU pamphlet, no date given.'

their own information campaign to highlight that local sheep were safe for consumption and that the government was the regulatory body that ensured this safety. Keith Best, local Conservative MP, also called for the rehabilitation of Welsh lamb and argued that it was the responsibility of the government to do so.[27]

Sheep took the brunt of nuclear fear and consequently the character of Welsh lamb as high-quality meat suffered. The entire sheep population came to symbolize the failure and the threat of nuclear power and was thus disdained throughout the UK. This was the genesis of the Mark and Release scheme. Through this, the government could work with farmers to make visible to the public that the sheep were, in fact, safe to consume. The Welsh Office was in a conflicted position. On the one hand, it was responsible for implementing the restrictions on animals under the direction of MAFF out of a public health rationale. On the other, these measures were equally aimed at retaining and restoring market confidence in British agriculture after concerns were raised from producers.[28] Officials, therefore, needed to minimise fears about the impact of the Chernobyl fallout on the food supply. This thin line of communication would at times appear contradictory when in September 1986, a Welsh Office press statement announced that there was 'no hazard to the health of sheep and cattle grazing the most heavily contaminated pastures in the UK,' whilst simultaneously affirming the continuation of restrictions on the sales of sheep that had grazed over swathes of North Wales.[29] While farmers understood the necessity for the restrictions due to health concerns, the contradictory language at times caused some confusion. If the sheep themselves were safe, why was there a ban in the first place?[30] Welsh Office officials responded by saying that the limit of 1,000 Bq/Kg was a 'conservative figure' which 'incorporates a substantial safety margin.'[31] They argued that they were using the limit as a precautionary principle and went further than was necessary so that they might be seen as taking the situation seriously.

[27] NLW, Agriculture Keith Best 2. '1st July 1986 Letter to Nicholas Edwards MP regarding the local agriculture economy.'
[28] TNA, BD 85/53. 'Chernobyl nuclear incident, Soviet Union: telex messages received from agriculture regional offices.'
[29] TNA, BD 119/32. 'Chernobyl incident: monitoring of radiation levels in agricultural produce in North Wales; risks to public health – Welsh Office News, 26th September 1986.'
[30] NLW, Best Chernobyl Radioactivity Lamb 21. 'G. Moss Jones, letter to Keith Best, 7 July 1986.'
[31] TNA, BD 119/32.

The Mark and Release Scheme: Visualising Radioactive contamination

From the 20th June 1986, all movement of sheep beyond their home pasture was forbidden on irradiated farms in North Wales, Cumbria, and the Scottish Highlands. However, on discovering that irradiated sheep quickly became decontaminated after grazing on clean pastures, moving sheep to clean pastures became routine policy. Within this monitored movement to unpolluted pastures, sheep exceeding the Government prescribed irradiation limit were distinguished from those under the limit by green paint. These green marked sheep were identified as irradiated and unsuitable for slaughter, whilst unmarked sheep were deemed suitable for consumption. The government continued to monitor the sheep every three months. If a sheep exceeded the Government irradiation limit a second time it was marked with apricot paint, and thus the sheep marked green were no longer the contaminated bodies and were released from restrictions. This system of re-monitoring continued seasonally, working from green to apricot, apricot to blue, and blue back to green, to establish visually which sheep were supposedly unsuitable for human consumption.[32] Marked sheep could be sold but only for further feeding and not for slaughter outside of restricted areas, an action that some farmers hoped would be profitable. For example, David Ford, a former civil servant, mentions how sheep from the Lake District were sold to farmers at a 'knockdown price' in Devon in the hope that the sheep would become decontaminated to then be sold.[33]

The restricted areas were also divided into low (LDA) and high (HDA) deposit areas. These were initially identified by green and blue paint respectively. As sheep were not individually tagged for identification, so that their exact place of origin could not be determined, no sheep from any LDA or HDA could be slaughtered until the entire category was derestricted.[34] This decision not to identify the exact place of origin would have political ramifications as well. Dafydd Wigley, an MP for Plaid Cymru, questioned a press release from the Welsh Office over the location of flocks with the highest radiocaesium, as well as over an 'alleged delay' in obtaining samples of sheep meat in Wales. He also sought advice about the action level for contamination over 1000 Bg/KG. The first part of Wigley's question was problematic for Welsh Office officials who did

[32] TNA, MAF 298/190/1. 'Chernobyl nuclear accident: response of the Ministry of Agriculture, Fisheries and Food; radioactivity monitoring, sheep restrictions.'
[33] *London Review of Books*, 41, 1, (2019), 3.
[34] Sheep in all LDAs were derestricted on the 29th September 1986. Sheep in HDAs did not begin to be derestricted until 27th February 1987. After that, the rotational use of paints came into effect so blue to green, green to apricot and then apricot back to blue.

not want to identify individual farms and so only published results at a county level. They did this because they wanted to 'protect individual farmers and to ensure their continued cooperation in the monitoring programme.'[35] The implication here is that if people were able to pinpoint exactly which farms were the most contaminated, then those farms would be discriminated against when they took their produce to market. The government wanted to protect the livelihoods of farmers in contaminated areas, possibly because farmers in the region were a key Conservative voting demographic.[36] Yet, by doing this, the radiation within contaminated areas would be obscured and therefore, invisible at a detailed level. The Welsh Office believed that they could make the data 'more meaningful' by publishing it on a district level as well so that it was more precise. The data was published as just raw statistics with little to no scientific analysis attached. This gave the impression that there was an assumption people would be able to read and understand what these large datasets meant, although anti-nuclear groups such as the Welsh Green Party believed that 'most of what had been collected was being withheld from the public.'[37] This is why the colour coding scheme of the sheep is particularly significant as it created for farmers and the public a visual semi-catalogue of where the radiation was, and partially what it was impacting. They would not be able to recall which sheep were contaminated, when, by how much exactly, but what they could see was the numbers of contaminated sheep dropping as time went on.

There were two primary reasons why the Mark and Release system was introduced, precedent and consumer concern. Precedent can be split into precedent from overseas and precedent in the UK. I have already mentioned the actions of other countries, and this was one of the driving forces for implementing the policy. Although the memory of the Windscale fire in 1957 was distant for many, some would remember the images of milk being poured away in the aftermath of the fire as a health precaution. This was the other precedent that drove the Mark and Release scheme. However, this was not as strong a precedent as that which came from overseas. Mentions of the Windscale fire are notably absent from the archival records of the Welsh Office and MAFF which suggests that officials did not see the fire and the subsequent precautions that were taken, as important

[35] TNA, BD 85/72. 'Chernobyl nuclear incident, Soviet Union: ministerial correspondence. Letter from H. R. Bollington to Secretary of State providing advice on how to reply to a letter from Dafydd Wigley MP 23rd July 1986.'
[36] S. Martin & M. E. Williams, 'Politicising Chernobyl.'
[37] NLW, Welsh Green Party 4. 'Minutes 7 June 1986.'

to the creation and implantation of policy in 1986 hence its absence from the archive.[38] The Foot and Mouth outbreak of 1967 also provided some precedent for the restrictions that were put in place. During this outbreak, the movement of sheep and cattle were restricted if a farm was found to be infected with the disease, with regular monitoring from veterinary experts.[39] While there is a different scientific background behind the restrictions placed in 1967, what this shows is that in the UK there was a precedent for putting in place restrictions to maintain public confidence in the food supply in times of crisis. The government and businesses were aware of the concern in the British public over the safety of eating foodstuffs coming from areas where radiation was deposited. For example, South Caernarfon Creamery expressed concern about consumer reaction to milk and milk products and this concern was backed up by drops in sales when nurseries stopped purchasing milk, while other consumers switched from fresh bottled milk to alternative milk products, although in this case, this did not cause a drop in the overall sale of milk products.[40] Despite this stability in sales, anxiety over agricultural produce remained. As more information became available the concern shifted to focus solely on sheep as they grazed on high pasture grounds where most of the radiation was deposited.

This section has shown how the Mark and Release Scheme was set up to manage the restriction, movement and eventual derestriction of sheep that had grazed on contaminated grounds. The scheme was set up due to the rising anxieties from both the consumer in buying products that could have been potentially detrimental to their health and the producer who saw this anxiety impact the sale of their produce. This anxiety was initially not limited to sheep, but as more information became available and the extent of radioactive deposition became clear, the initial groundswell in concern focused on sheep.

Visualising the decontamination of sheep.

One potentially unintended, yet useful impact for the UK nuclear industry and government of the Mark and Release scheme was its ability to communicate visually, at

[38] Being 30 years from the fire the issue of what information to release to the public under the 30-year rule was of concern to the Prime Minister's office who looked into the matter PREM 19/2140.

[39] L. A. Reynolds & E. M. Tansey (ed.), *Foot and Mouth Disease: The 1967 Outbreak and its aftermath*, (London: Wellcome Trust, 2003), 3 & 74.

In the transcript of the discussion of an expert audience it was mentioned that 'the Government has said, through their Ministers this year, that regulations were relaxed too soon in the 1967–68 outbreak.' This was disputed by others in attendance. They also believed that restrictions lasted 'far longer than we would consider a veterinary necessity.'

[40] TNA, BD 85/53. 'Chernobyl nuclear incident, Soviet Union: telex messages received from agriculture regional offices.'

least to the farmers, the decontamination of sheep, and by association the decline of radioactive contamination. The marking of sheep acted as a very visible reminder to farmers of the amount of radiation the sheep had received, which was being monitored, but it also buried any question of how much radiation they themselves had been exposed to.[41] Across Wales, the number of sheep within contaminated zones and failing the 1000Bq limit fell each year after 1986. Radiation is invisible to the human senses; it cannot be seen by the human eye and does not give off any smell either. Therefore, what this scheme was able to do was to make the invisible, visible. Or at least partially visible, as the radiation in the ground was only represented indirectly by the markings on the sheep, while any other residual radiation that did not fall on the uplands would remain invisible. Olga Kuchinskaya postulates that

> the imperceptibility of Chernobyl radiation by the human senses means that individuals' experience of it is always highly mediated.

This meant that governments were able to limit public visibility of the Chernobyl radiation and were able to prevent the construction of links between radiation and its health effects. Kuchinskaya believes that this in turn can lead to 'the social construction of ignorance.'[42] As Table 6.1 shows, the number of sheep that were being tested and the percentage of sheep failing those tests was falling each year. For the people living in North Wales, they were able to visualise these statistics play out before them as the number of marked sheep dropped in restricted areas as they were moved out to be sold at market. Furthermore, marking the sheep in different colours allowed people to distinguish between those sheep that were irradiated in LDAs and HDAs and those that were safe under the regulations. Over time, this helped to demonstrate that the amount of radioactive contamination was dropping and that the concern for public health could

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[41] This was brought up in a documentary for HTV Wales where farmers knew about radiation in sheep but not in themselves. 'Wales this Week, Transmission table-1987-radiation tests in Trawsfynydd, 16 months on from the Chernobyl incident' *Wales This Week* [television programme], HTV Wales, 24 September 1987.

[42] O. Kuchinskaya, *The Politics of Invisibility*, 2. See also on the sociology of ignorance, R. Proctor, *Cancer wars : how politics shapes what we know and don't know about cancer* (New York: BasicBooks, 1995); L. Schiebinger, "Lost Knowledge, Bodies of Ignorance, and the Poverty of Taxonomy as Illustrated by the Curious Fate of Flos Pavonis, an Abortifacient," in Picturing Science, Producing Art, ed. C. Jones & P Galison (New York: Routledge, 1998), 125-44; R. Proctor & L. Schiebinger (eds.) *Agnotology*.

safely subside. However, what they were not able to see was how the impact it was having on their own health and the wider environment around them.

Table 6.1: Sheep Failing Live-Monitoring in Wales

Year	Tested	Failed	Percentage of failed tests
1987	175,454	943	0.5
1988	165,382	616	0.3
1989	158,896	233	0.1
1990	137,389	161	0.1

Source: TNA, BD 94/4. 'Sheep failing live-monitoring in Wales.'

On the 28th February 1987 sheep in HDAs that had kept their blue paint after the seasonal round of tests were to be derestricted. Farmers were given the choice of whether sheep marked with blue paint remained restricted or whether they would sell them to market. The official advice from the government was that if the farmer was in any doubt, then they should keep the sheep under restrictions.[43] However, this was not a choice for farmers as keeping them restricted meant keeping them from going to market. Therefore, by giving farmers the illusion of this choice it made it seem as though farmers had confidence in the government's Mark and Release scheme, that radiation levels were indeed coming down and that things were getting better. When people saw sheep returning to the market it would give the impression that things getting back to normal, the risk of nuclear power was being reduced in the public's imagination as they saw its worst impacts mitigated. This is just a snapshot of the process that farmers were faced with. It was not guaranteed that after each period of monitoring a noticeable number of sheep would be derestricted. While this does show that the Welsh Office were keen to reduce the number of restricted sheep, probably to show the decline in radiation and to reduce the number of claims, it is not the full picture of the approach that the Welsh Office took throughout this period.

In telex messages from regional offices in Wales to the central Welsh Office, we can see how civil servants were encouraged to push farmers towards derestricting sheep

[43] TNA, BD 85/59.

as quickly as possible.[44] This allowed MAFF and the Welsh Office to visualise the radioactive contamination in sheep was decreasing and that the lamb was safe to consume again. It also communicated to farmers that the harm caused by the radioactive fallout was not permanent and that the damage caused to their livelihoods would not last forever. Finally, it also reduced the financial costs to the government because the fewer sheep that was restricted, the fewer compensation claims there would be. This is another reason why this very visible method of communication was valuable to the government. Even though Chernobyl contaminated other areas, animals, objects, and people, by acting and visibly regulating just this one, notable, aspect of the life of local communities, the government could break the social construction of links between radiation and health problems, while also being seen to do something.

Shifting the narrative: Financial difficulties, compensation and the invisibility of radiation?

It was not until July 24th, 1986, that a compensation policy that covered the loss of income experienced by farmers, came into force.[45] There was a compensation policy in place before then due to the Nuclear Installation Act (1965) and the Wildlife and Countryside Act (1981). However, the National Farmers Union (NFU) complained in a press statement that the compensation policy was insufficient and that there was still a lot of uncertainty around the duration of the restrictions.[46] Keith Best's personal papers include numerous letters that he received from farmers on the extent of the financial damages caused by restrictions. For example, one farmer claimed to have lost a total of £1,646 as the restrictions entered their fourth week, while another more extreme case saw a farmer, who would have normally sold 200 lambs at £40 each but could not, lost £8,000.[47]

Additional pressure on the government came from the Farmers Union for Wales (FUW), in demanding a response.[48] A report evaluating the government's response to the Chernobyl accident, published by the FUW in 1988, recommended that the government

[44] TNA, BD 85/59.
[45] Farmers could also sell sheep at a loss to farmers in lowland areas.
H. Collins & T. Pinch, *The Golem at Large*, 119.
[46] NLW, Best 21. 'NFU press statement 7th July 1986.'
[47] Ibid. 'Chernobyl Radioactivity Lamb.'
[48] This is in addition to the pressure from the NFU, the FUW claimed and claims to this day to be 'the only agricultural union that exclusively represents the farmers of Wales.' While in other matters the FUW believed that the NFU policies were contrary to the interests of Welsh farmers in the response to Chernobyl they were aligned in their view.

stop the development of civil nuclear power in the UK and instead invest in alternate energy sources and energy conservation.[49] Martin's article on the politicisation of Chernobyl mentions that by the mid- 1980s there was already in Wales, a certain anti-nuclear Welsh pride. This was institutionalised by the existence of a decentralised Green Party in Wales, CND Cymru, as well as the anti-nuclear views of several Welsh Labour politicians, and by a left-leaning, environmentalist surge in Plaid Cymru.[50] The FUW were not the only organisation in Wales to prefer alternative energy sources and energy conservation with Plaid Cymru, the Welsh nationalist party, adopting this exact policy in their 1983 general election manifesto.[51]

This opposition to nuclear power in Wales was in contrast to government and nuclear industry policy which was to expand nuclear power in Wales. Therefore, compensation had two purposes. First, to cauterize the perceived political damage caused by the accident. This included the Anglesey Conservative Association writing to Nicholas Edwards and senior Conservative politician Norman Tebbit to express concern about the potential 'adverse political effects' to Best and the constituency.[52] Second, to quantify the economic costs of the risk of radioactive contamination to divert attention away from the cause of the risk, nuclear power. The policy ultimately cost the UK taxpayer up to £3 million.[53] However, the FUW report was published in 1988 which indicates that while the narrative was shifting to socio-economic concerns, nuclear power remained visible to farmers unions who traced their problems back to it. The length of time between the publication of the report and the updated policy suggests that the policy was not enough; either in terms that the money offered was not enough, or whether the policy being implemented was inadequate. However, the NFU were more positive regarding the compensation arrangements stating that 'the government got it right for nearly everybody,' and that it had worked effectively for those willing to engage with them.[54] However, there were other moments when farmers criticised the government's approach, depending on whether they were still facing restrictions. This reopened the debate on compensatory measures, which, when compounded by apparently 'unacceptable delays'

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[49] FUW, *Chernobyl-The Government Reaction* (FUW, 1988).
[50] S. Martin & M. E. Williams, 'Politicising Chernobyl.' 290.
[51] Plaid Cymru, *Plaid Cymru-the only alternative: General election manifesto 1983: agenda Wales, peace, jobs and justice* (Plaid Cymru, 1983).
[52] NLW, KB 21. 'M. H. Norris to Nicholas Edwards, 1 July 1986.'
[53] HC Parliamentary Debates, 6 November 1987, 122, cols 872.
[54] House of Commons Agriculture Committee, Second Report, *Chernobyl: The Government's Reaction*, Vol. 1-III (1988).

in meeting claims, led to further agitation from farmers. This culminated in a mass picket outside the Welsh Office in London in late September 1987 to show their continuing dissatisfaction at the government's response.[55] This suggests that the response to farmers was not consistent and that some continued to face significant financial difficulties. This led to an inconsistent message from farming unions, as they heard multiple viewpoints from different farmers, at different times. This inconsistency was due to those who accepted the restrictions but were initially confused by the advice, those who were derestricted after a shorter period than others, or those who would remain restricted for years and experience delays in compensation payments.

Best played a particularly key role in pressuring the government to extend its compensation policy. In a letter to the Secretary of State for Wales, Nicholas Edwards, Best detailed what the feeling was among local farmers:

> The situation is extremely serious and is the worst crisis yet to hit the sheep farmers… As far as Anglesey is concerned it could not have happened in a worse month when, because Anglesey sends its lambs to market at this time… Lambs become too fat, lose subsidy and become unsaleable… quite beyond any reluctance of the consumer to buy them when the ban is finally lifted. Welsh Office claimed that lambs would not be ready for market, yet the lambs are ready for market now and are rapidly putting on weight. Such statements have caused grave misgiving among my farmers as to whether Welsh Office officials have a true picture of the gravity of the situation on Anglesey.[56]

This letter illuminates the position that Best, the farmers, and the government was in. They felt that this was a serious situation and that farmers were not able to sustain financial losses. The timing made matters worse with restrictions occurring at a peak season for the selling of lamb. This led to significant political pressures giving the government the impression that it could not allow a major industry in the North Wales region to be irreparably damaged. This letter also shows the divergence between the view of the government and the view of the farmers over whether the lambs were ready for market. Here we can see evidence that supports Wynne's arguments made concerning

[55] *The Guardian*, 29 September 1987, 3.
[56] NLW, Best Agriculture 2. '1st July 1986 Letter to Nicholas Edwards MP regarding the local agriculture economy.'

Cumbria, that the government did not consider the farmers' own knowledge on the location their sheep would graze in.[57] However, what this chapter has shown is that regarding the methods by which the government communicated radioactivity and the implementation of the compensation policy I have been able to provide a more nuanced account of how the government saw farmers lay expertise. Nevertheless, the divergences of views of when lamb would be ready for market caused distrust between the farmers and the Welsh Office, who they believed were seeking to cover up the true position that farmers were facing. Farmers became quite cynical with some suggesting that the government was holding back on compensation because North Wales enjoyed a higher standard of living than the rest of the country and so the government was trying to bring it in line with the national average. However, what is significant is the line suggesting that people would be willing to buy the produce once the restrictions were lifted. However, Best went on to say further in the letter how;

> There will remain the need to rehabilitate Welsh lamb in the eyes of the consumer… I believe that there is a responsibility on the government to put the public mind at rest as to the safety of consuming Welsh lamb in the future.[58]

This suggests that there was some concern surrounding the future of consumer confidence in Welsh lamb. While Best did believe that people were initially willing to buy lamb, because of the prolonged restrictions consumer confidence in Welsh lamb had continued to drop. Therefore, Best believed that as the government was the ones responsible for the restrictions, they should be the ones to ensure the rehabilitation of Welsh lamb so that it might be competitively sold at market. The recognition here was that even when restrictions were lifted the damage would be long term. First, this helps to explain why the updated compensation policy to cover this was introduced. Second, although the public may not have fully grasped the differences between different kinds of radioactive isotopes, their half-lives or potential impact on the human or ovine body, they knew of their existence and that some will persist for a long time. This suggests that the updated compensation policy was first and foremost implemented to ensure the economic viability

[57] B. Wynne, 'May the Sheep Safely Graze? A Reflexive View of The Expert-Lay Knowledge Divide,' in S. M Lash, B. Szerszynski, and B. Wynne (eds.) *Risk, Environment and Modernity: Towards a New Ecology*.
[58] NLW, Best 2. '1st July 1986 Letter to Nicholas Edwards MP regarding the local agriculture economy.'

of the region, but it was also a means by which to focus the conversation on the economic hardships faced by farmers, rather than the origins of that economic hardship.

‘New words had to be learnt’ – The CEGB interacting with the local farming community around Wylfa and Trawsfynydd.

The compensation policy certainly helped the industry and government turn attention away from the potentially harmful effects of radiation on humans. Instead, the focus was on how it might contaminate agricultural foodstuffs and, in particular, how it might impact the livelihoods of the sheep farming community. This can be seen in different pieces of evidence. The first is that the stories regarding the impact of Chernobyl had shifted away from nuclear power, and the radioactive cloud, to farmers pleading with the government to allow for sheep to be sent to market.[59] Also, there is evidence of a fall in the number of calls and a change in the content of these calls in Welsh Office files. For example, questions over whether it was safe to drink fresh milk or consume fresh vegetables were replaced with farmers enquiring whether their sheep could be sent to market.[60] This is most evident in a documentary by HTV Wales 16 months on from the Chernobyl accident. The documentary looked at how much radiation farmers living in the immediate vicinity of Trawsfynydd had in their body and got their views on it. It started by explaining that people were content or apathetic towards the local nuclear power plants, but Chernobyl made people question the ethics of nuclear power. Crucially, the farmers that they tested all gave similar testimonies to the interviewers that they knew a fair amount about how the radiation was affecting their sheep but very little to nothing about how it was affecting them. During the documentary, the narrator talks about how ‘new words had to be learnt’ and that the amount of information given to them by the CEGB and Welsh Office officials was at times overwhelming.[61] This documentary is an important insight into how the farmers who lived right next to Trawsfynydd before Chernobyl knew very little regarding what was happening within the nuclear power plant but after were inundated with information over how nuclear reactors work, why

[59] *Liverpool Daily Post Welsh Edition,* 27 June 1986, 3*; Liverpool Daily Post Welsh Edition,* 30 June 1986, 3
[60] TNA, BD 85/53. TNA, BD 85/57.
[61] ‘Wales this Week, Transmission table-1987-radiation tests in Trawsfynydd, 16 months on from the Chernobyl incident’

Trawsfynydd was safe and why their sheep needed monitoring, and yet no information was given about potential health impacts they might encounter.

Local CEGB officials had to be proactive with their communication strategy because, in the aftermath of the Chernobyl accident, local media attention sharply turned against the industry with articles titled 'Nuclear plants gas leak panic' and another headline simply stating 'Shut Trawsfynydd.'[62] There were some other more alarmist articles and stories. One included an interview with Les Jenkins, a Greenpeace activist who believed his bone-marrow cancer was caused by radioactive leaks from Sellafield and that disaster was 'only a matter of time.'[63] As seen by the article on the former mayor of Builth Wells, there were claims that people felt ill as the radioactive cloud was overhead.[64] It is not clear whether these illnesses were caused by radiation, but the very existence of these articles illustrates the concerns over nuclear power and radiation and the need for industry and the government to act to alleviate concerns and draw attention to other things. Whether that be showcasing what the government believed to be an excellent safety record, that Chernobyl 'could not happen here', or that people should be more concerned about how the radiation is contaminating sheep, a major source of income for the region, rather than themselves. The fusion of Trawsfynydd and Chernobyl was made explicit in the 'Trawsfynydd Seminar', held in November 1986 by opponents of nuclear power in Wales. One speaker ridiculed the CEGB's assurance that Chernobyl 'could not happen here' by arguing that 'the poisonous finger of [Chernobyl's] radioactivity spread to the UK, it contaminated our crops, our livestock and our people, so in this respect, Chernobyl has happened here.'[65] This rhetoric inferred Trawsfynydd's potential as a site for an international calamity that could rival such disasters as Windscale, Three Mile Island, and Chernobyl, controversially linking these historical nuclear accidents with the dangers posed by the nuclear industry.

In North Wales, the CEGB were particularly active in coordinating with the government on monitoring radiation in the locality and communicating with the public that their nuclear power plants were not a risk to them and that any damage done was

[62] *Liverpool Daily Post Welsh Edition,* 15 May 1986, 5; *Liverpool Daily Post Welsh Edition,* 12 May 1986, 9.
[63] *Liverpool Daily Post Welsh Edition,* 13 May 1986, 14/15.
[64] *Liverpool Daily Post Welsh Edition,* 5 May 1986, 5.
[65] NLW, DET, C40. 'Trawsfynydd Seminar-R. Ross Mackay, 'Trawsfynydd-An Alternative Strategy', 19, November 1986.'

limited.[66] When it became clear that radiation from Chernobyl was over North Wales, the press turned to local station managers for comment. The station manager for Wylfa, Ray Razzel, insisted in the *Daily Post* that more radiation was outside 'his plant' than inside it.[67] The purpose of this statement was to show that this was an unusual circumstance as Wylfa contained all radiation within its building, but it did have an unfortunate effect that it also can be interpreted as suggesting that Wylfa was not containing its radioactive emissions. It is not clear if Razzel would have had any or much in the way of media training to help avoid unfortunate wording such as this. After all, in CEGB emergency plans for any major accident, there was a dedicated member of staff for dealing with the media and this was not the station manager.[68] However, this was not an accident that originated in the UK and therefore the information controller was not at hand to handle the media and so the station manager, as the perceived authority figure, would be the person engaging with the media.

The CEGB in North Wales had reason to actively monitor radiation, support government efforts and communicate with the public. It became apparent very quickly, as we have seen already, that attention turned away from Chernobyl to nuclear power plants at home. In Chapter Five I analysed the CEGB video, *Chernobyl: could it happen here?* Evidence from Best's papers shows that Best asked Donald Ratledge, Head of Public Affairs for the CEGB, for a copy of the video so that he could show it to constituents on request but also so that he could disseminate the information himself.[69] This also tells us a bit more about the audience of the CEGB video. Best did not ask for the more technical UKAEA equivalent. The CEGB argued that its video was more attuned to the level of understanding that the public had regarding nuclear power. As there were two CEGB-managed power stations in North Wales, it made sense to use their

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[66] 'Wales this Week, Transmission table-1987-radiation tests in Trawsfynydd, 16 months on from the Chernobyl incident' *Wales This Week* [television programme], HTV Wales, 24 September 1987. Trawsfynydd was responsible for the testing of the sheep within its locality and for monitoring radiation. The CEGB would have monitoring equipment on site at nuclear power plants and these were used to measure radioactive disposition after Chernobyl.

[67] *Liverpool Daily Post Welsh Edition,* 5 May 1986, 5.

[68] This role would be given to the 'information controller' who would 'support' the station manager (renamed in the event of an incident as the Emergency Controller) on communication to people on and off site.
NLW, CEGB Emergency Plan and Handbook (with memo from W. H. Morris Publications and publicity manager 8 September 1989), 3.36.

[69] NLW, Best 20. 'Keith Best letter to Donald Ratledge 14th Jan 1987.'

material to communicate what they had done and were doing to ensure their sites were safe.

Conclusion

This case study on North Wales has investigated how the government responded to concerns over the safety of foodstuffs being produced in the region through the rushed introduction of restrictions followed by the Mark and Release Scheme. It then analysed why the updated compensation policy was introduced, primarily it aimed to mitigate the financial damages that farmers faced because of the restrictions but also for political reasons. It acted as a form of communication to divert attention away from nuclear power and as an attempt to mitigate any damage that the Conservative government would face at the polls in constituencies in the region.

Anxieties over radiation became increasingly focused on sheep. As the title of an FUW press release used in the title of this chapter stated, sheep were 'carrying the "can" for Chernobyl,' they had become the British victim of the Chernobyl accident. To mitigate these anxieties the government adopted two primary styles of communication. By clearly marking the sheep with paint to indicate which sheep were safe for consumption and which were not, the government was able to visually communicate the level of radiation. This was a useful thing to do considering the invisible nature of radiation. This helped to calm public anxiety as these animals were visible to the local public and grazed in open fields and served as a constant reminder of the system in place to prevent contaminated sheep meat from entering the human food chain. The compensation policy, meanwhile, aimed to serve as a reminder of the government's commitment to the long-term future of the sheep-farming industry. Together, these measures can be seen as different forms of science communication, underpinned by the visual articulation of what was deemed safe and what was not as the government sought support for its policies from an anxious public.

I have been able to show how the government viewed the public in North Wales. How its original response deeply frustrated local farmers, through the introduction of restrictions and then through the set lines that Welsh Office officials gave in response to questions that were no different from the Welsh Office's press releases. However, the Welsh Office's response did change over time, considering specialised concerns that

farmers had with relation to the restrictions. I have also shown the significance of looking at communications with local communities, in this case, how the Welsh Office worked with local farmers to improve the policy it had introduced, the introduction of using paint was a method that farmers had been using before Chernobyl to demarcate sheep for various reasons. Crucially, I have been able to show through the evidence that the Mark and Release scheme and compensation policy had an additional effect of changing the conversation away from the debate over nuclear power to a debate over an agricultural policy that was introduced as a response to Chernobyl. It also had the impact of visually showing the decline of radioactive material in the environment, as the size of the restricted flock decreased, the perceived amount of radiation also decreased.

Finally, this chapter has shown how the CEGB worked with the local population around its plants to support the government's efforts in quelling public anxiety and in supporting its future viability as a means of producing electricity. Chernobyl for a time put nuclear power and its safety at the centre of British political discourse, and the public in North Wales temporarily became acutely aware of the existence of Wylfa and Trawsfynydd. While anti-nuclear activists were keen to highlight the ability of these plants to go the same way as Chernobyl did, on the other hand, the CEGB had become more aware of its own responsibility to regularly communicate to the public that its plants were safe and its role in the community as experts on and guardians against, radioactive contamination. Above all, Chernobyl changed the perceptions of how the public saw the geographical boundaries of nuclear power plants. If an accident at Chernobyl, over 1400 miles away could cause significant anxiety and disruption to communities in North Wales, what damage might a similar accident at Wylfa or Trawsfynydd cause?

Chapter Seven: Seeing it to believe it - Putting forward an emotional argument for nuclear power

This chapter further explores how the industry used visual communication techniques to explain itself to the diverse publics through demonstrations and lectures, while also bringing the public into closer contact with the industry through visitor centres. Together, these initiatives created an environment of experiential learning that would put forward an emotional argument, where nuclear science and policy were shared, rather than just communicated to, the public through joint experiences and observations rather than the opaque processes mentioned in Chapter Four.[1] The nuclear industry used this environment to communicate what it wanted the public to believe, and what it argued to be its impeccable safety record, positive social impact, and its vision for the future. The industry had a vested interest in promoting this image: by allowing the public to "see it to believe it", rather than just accept the word of "experts", the industry could counter some of the perceptions of the industry. These displays, designed to present an image of openness through exhibitions, locally-held meetings, large-scale demonstrations, lectures and visitor centres provide a counter-argument to the claim that the nuclear industry was secretive and had a tendency to 'ride roughshod' when seeking to achieve its nuclear goals.[2]

This chapter will explore three different aspects of the industry's direct interactions with three distinct groups: local populations around nuclear sites, policymakers in Westminster and the wider public. Through this, I will show how the industry put forward an emotional argument and attempted to domesticate its activities and associated risks. First, I examine Operation Smash Hit, probably the most lavish and widely viewed effort to gain public trust. This exercise, intended to demonstrate the safety of nuclear flasks being transported by rail, involved crashing a train at high speed into a carriage on which a flask was loaded. In this section, I will also look at how opposition groups responded to this demonstration and how the industry sought to maintain control of the narrative after this event. Second, I will analyse the 'Garden Lecture,' later known

[1] C. Langhamer, 'Astray in a dark forest? The emotional politics of reconstruction Britain'. In L. Noakes, C. Langhamer, C. Siebrecht, (eds.) *Total war: an emotional history. Proceedings of the British Academy*, (Oxford: Oxford University Press, 2020).
[2] I. Welsh, 'NIMBY', 27.

as the 'NIMBY Lecture', given by Walter Marshall. This case study will showcase how Marshall sought to normalise, or trivialise, the risks associated with nuclear waste through its comparisons with radiation found in a back garden.[3] Finally, I will look at the visitor centre at Sellafield, which will show how this helped to bring local policymakers, populations, and tourists as well, into the physical site of the industry so that they might understand the science and its benefits. Both the Garden lecture and the development of the visitor centre at Sellafield were new developments after the Chernobyl accident and the increasing challenges that it posed to public trust in nuclear power. Throughout this chapter, I will further highlight the focus on communicating the 'banality' and the benefits of nuclear power to the local populations around existing sites.

Operation Smash Hit

Planning for Operation Smash Hit started in 1980 and was the 'climax' of a four-year research programme.[4] It was envisaged by the CEGB as a response to the concerns over transportation of spent nuclear fuel that was presented before and during the Sizewell B inquiry, as well as the increase of cities such as Manchester, Leeds, Leicester, and even the entirety of Wales proclaiming themselves to be 'nuclear-free cities' or regions, who did not want nuclear waste travelling through their authorities. However, this was not just about the transportation of nuclear materials as this had been a feature of the industry since its inception. It was also in response to the intensified campaigning from anti-nuclear groups who became increasingly focused on this issue.[5]

John Baker, managing director of the CEGB, stated that part of the rationale for the train crash was Walter Marshall's strategy to get on the 'front foot' of the nuclear debate. Baker, says that the CEGB, BNFL and other nuclear scientists had typically produced long, scientific and detailed graphs, 'prosaic, stuck up, long-winded… which no one took any notice of.'[6] Some of the industry leaders, in this case, had recognised

[3] J. Sastre-Juan, J. Valentines-Álvarez, 'Fun and fear: The banalization of nuclear technologies through display.' 2-13.
[4] TV news reports of Nuclear flask test at Old Dalby 18th July 1984. https://www.youtube.com/watch?v=Byl_fTbsbjQ&t=4s [Accessed 13/05/2020]
[5] This was also an international problem with the transportation of nuclear material by air and sea creating a transnational risk. See A. M. Kirchhof & J-H. Meyer, 'Global Protest against Nuclear Power. Transfer and Transnational Exchange in the 1970s and 1980s'; J. D. Hamblin, *Poison in the Well: Radioactive Waste in the Oceans at the Dawn of the Nuclear Age* (Rutgers University Press, 2008).
[6] Baker, BL Sounds, track 7 C1495/14.

that the anti-nuclear movement had been putting forward an emotional argument against nuclear power which was resonating with people's fears over radiation and the unknown.[7] This often led anti-nuclear stories to be dominant in the news, so what the train crash managed to do, at least for a short while, was to usurp the opposition's dominance and take control of the narrative. The train crash was the CEGB's biggest demonstration to combat this fear of the unknown. Olga Kuchinskaya details how the public visibility of radiation from Chernobyl was concealed, preventing the construction of links between radiation and its health effects.[8] Here we can see the industry attempt to make visible its safety and technical competence through this demonstration. This in turn allowed for the risks presented by the transportation of nuclear material to be altered in the public mind. By presenting what it deemed to be 'worst-case scenario', the industry hoped it would minimise the perceived risk of transportation.

The demonstration, that cost £1.6 million, involved staging a train crash travelling at 100mph intended as a public demonstration of the integrity of a nuclear fuel flask weighing 239 tonnes. It took place on the former Melton Mowbray-Nottingham Midland line, at a test track near Old Dalby, Leicestershire, on the 17th July 1984. This was part of a series of tests to demonstrate that the flasks carrying nuclear fuel for reprocessing were safe, even in the event of a severe accident. Following an eight-mile run-up, the train hit the flask, which had been laid at an angle designed to replicate what the industry regarded as the 'worst-case scenario'. The impact caused significant damage to the train, along with its three carriages. Once the dust settled it appeared to observers that the flask remained completely intact. Further detailed measurements showed that the flask had lost just 0.29 of its 100 pounds of pressure.[9] In other words, the flask was intact and had lost very little integrity. The implication and the message promoted to the public was that if there had been any radioactive material inside, none of it would have escaped. From this spectacle, the industry could say that the public did not have to worry about the transportation of nuclear waste. However, the primary audience for this event was not the wider public, but particular groups, such as 150 MPs, journalists, opposition groups and police chiefs.[10] The industry was keen to give the press a good view of the demonstration

[7] R. Davies, 'The Effectiveness of the Sizewell B Public Inquiry'. 104.
[8] O. Kuchinskaya, *The Politics of Invisibility,* 4.
[9] CEGB, *The CEGB Proves its Point* (CEGB, 1984).
[10] TV news reports of Nuclear flask test at Old Dalby, July 1984. Available Online https://www.youtube.com/watch?v=Byl_fTbsbjQ&t=4s Accessed 13/05/2020.
Not clear why police constables were invited. Possibly to ease concerns over the risks of terrorism.

with them being a 'major presence' within the 1500 invited guests, with special areas designated for cameras to get the shots of the crash set up at the top of the stage built for the day.[11] It is obvious from oral history interviews that the audience who were present in the stands were made of a wide selection of people, including members of the general public. Within the total 4000 people in attendance, there were certainly people who the industry deemed to be more influential than others. John Baker called these people 'worthies' such as archbishops and government ministers, this is the clearest evidence in this thesis of the hierarchy of communication that I argue the industry had. Politicians, journalists and other public figures were seen as a more important audience than the general public.

The demonstration also allowed the industry to create publicity material so that the public could be reminded of the demonstration months or even years after the test occurred. One such piece that was produced was a video that goes through the events of the day. The video uses a multitude of different repeating shots from different angles to give the viewer a near-complete view of the crash. This reiterated not only the size of the crash but also highlighted that the flask survived it. However, the most crucial aspect that shows the reasoning behind the demonstration is after the train crash. At the press conference on-site, Marshall stated that 'the general public, made the point – well that's alright but we got to take the word of you experts on it, we're not going to believe that, we want to see you do it, so well now we've done it.'[12] This further reinforces the point made by Baker that the industry wanted to make visible the safety of this particular aspect of the nuclear industry. This also was part of the industry's strategy to be more proactive in controlling the narrative.

The demonstration has a unique place within the communication strategy of the industry not only because it was able to visualise the safety of nuclear transportation. It also allowed the industry to verify predictions within an acceptable margin of error about what would happen in the test. They predicted that the flask would have its lifting pintle removed and there was the potential for the lid bolt to be removed. It was also predicted that there would be no water leakage.[13] The results of the crash showed that there was no

[11] N. Harris 'It's a lovely day-bring a flask'. *Rail Magazine* 29/07/2009. Available Online: https://www.railmagazine.com/trains/heritage/it-s-a-lovely-day-bring-a-flask [Accessed 22/03/2020].
[12] CEGB, Operation Smash Hit 1984, https://www.youtube.com/watch?v=hTshPr2TogE Accessed 06/04/2020.
[13] TNA, EG 2/1165. 'The irradiated fuel flask train crash, 17 July 1984, 3.'

loss of any pintle or bolts, there was no leakage as the integrity of the flask remained intact. The flask only lost 0.29 psi out of its 100 psi and there was no further loss of pressure until the flask was intentionally depressurised the following day.[14] These exact details would not have been immediately known by those in the grandstand and would be a minor detail in new stories the following day. However, this detailed evidence was presented at the Sizewell B inquiry along with pictures and diagrams of the crash. By bringing it up at the inquiry it became part of the evidence that Layfield would have to consider. Therefore, while the train crash was unique in the context of the industry's wider public relations effort, it had a key role to play in communicating the safety of the industry within this formal arena. Harry Collins argued that Operation Smash Hit represented the 'paradoxical' nature of public experiments. He argued the public was expected to draw firm conclusions as a result of witnessing the experiment first-hand. However, sociological studies suggest that proximity to the seat of creation of scientific facts usually has the effect of creating uncertainty.[15] However, my argument here is different to Collins because the questions I am asking are different, the vast majority of the public did not see the crash in person, instead, they would see it on their televisions or in newspapers, that did draw firm conclusions. The demonstration also was not just about showing that flasks were safe, but that they were not inherently unsafe. While, the public, was one of the audiences the industry hoped this demonstration would communicate to, it was not the primary audience that the industry wished to focus on and shore up support with.

Baker also states that the video that was produced was sold to 'thousands of people.'[16] There is no archival evidence to indicate the exact figure or who was buying the video, the limited available evidence suggests several audiences might have brought the video. First, as he mentions the 'worthies', a large group of these people, particularly politicians likely brought the video, as we saw in Chapter Five this was not uncommon. Second, science teachers would appear to have been a large proportion of those who brought a copy. It is possible that members of the wider public would have brought the video as well for a multitude of purposes, including interest in the industry or because they were present at the actual demonstration.[17]The industry expected that the video

[14]TNA, EG 2/1165. 'The irradiated fuel flask train crash, 4.'
[15] H. M. Collins, 'Public Experiments and Displays of Virtuosity: The Core-Set Revisited.' 725.
[16] Baker, BL Sounds, track 7 C1495/14.
[17] S. Horrocks & T. Lean, 'Good Nuclear Neighbours'. 10.

would be brought primarily by educators. Most of the public who saw this crash would not see it in person or buy the edited video, but rather live footage broadcast on ITN or BBC News at One show.

ITN science editor, Lawrence McGinty, who watched the crash, noted how in the immediate moments after the crash it seemed as though the demonstration had worked because the flask itself was intact, but that they would not know for at least an hour whether there were any leaks. The Greenpeace representative, speaking to ITN, claimed that it was not a realistic test but Leonard Parkin from ITN stated that 'people can make up their own minds' after seeing the crash.[18] Collins is right that people are expected to make conclusions, and will make conclusions after seeing a demonstration.[19] However, this was the point of the demonstration. Anyone who viewed this demonstration would not sit down and view the entire spectrum of opinion on the crash. They would see the crash, perhaps multiple times, from different angles, and then might get thirty seconds of debate where the opposing side had just a few seconds to refute the very dramatic and visual demonstration. Nonetheless, while this demonstration might have received a wider audience than was typical of the industry, it was still primarily targeted at those who the industry deemed important to furthering its aims, such as parliamentarians and journalists, at maintaining and expanding the nuclear industry.

Operation Smash Hit was certainly a unique moment in the communication strategy of the UK nuclear industry. It provided a positive news story for the nuclear industry, where so many stories either negatively portrayed the industry or forced the industry to go on the defensive against claims it was unsafe. In an unusual moment, the industry had sought to be proactive rather than reactive by seeking to drive the news agenda rather than just reacting to stories it had no control over. It allowed the industry to communicate to a wide audience in a simple and extremely effective way. As we shall see in the responses to Operation Smash Hit, it was viewed as an effective means of communicating that the industry was indeed safe. Crucially, it allowed scientists to be presented as trustworthy, that they knew what they were doing and that their calculations could be trusted. Despite this, as we shall see in the next section, critics remained, not

[18] TV news reports of Nuclear flask test at Old Dalby, July 1984. Available Online https://www.youtube.com/watch?v=Byl_fTbsbjQ&t=4s Accessed 13/05/2020.
[19] H. M. Collins, 'Public Experiments and Displays of Virtuosity.' 725.

least because the CEGB had control over the staging of the event leading to questions over the validity of the demonstration.

Responses to Operation Smash Hit

In all the newspaper articles published the day after the demonstration, mentioned below all have several pictures detailing the crash, except for the *Financial Times*. These provided the reader with a clear perception of the size and dramatic nature of the crash. This has helped the event become so memorable that recollections persisted into the twenty-first century, including online blogs detailing the cultural artefacts produced from the accident, such as the pamphlet and videos, and from those who remember their attendance at the demonstration. [20]

The *Daily Mail* headline on the crash focused on the expenditure 'Bang goes £1½ million!' However, the sub-heading does not pull any punches on what the *Daily Mail* thought about the demonstration saying, 'Danger Flash is Big Hit Success.'[21] The article mentions how there was a wide audience with MPs and anti-nuclear campaigners in attendance, but while the *Daily Mail* insisted that 'like the flask, the CEGB's reputation remained intact.' It did also include quotes from anti-nuclear campaigners who doubted the validity of the demonstration with Peter Wilkinson, campaign director of Greenpeace believing that if 'there had been a fire for several hours following the crash it would have been a different matter.'[22] However, Greenpeace's position arguably fell short of making any impact on how the media responded to the demonstration. Compared to the actual demonstration, their claim was just theoretical, lacking the visuals to go with it, in comparison.[23] This interpretation, like many people's interpretation, revolved around confirmation bias. Those who supported the industry were convinced by the demonstration, those who were opposed would probably not be convinced by the demonstration and would seek to find flaws. Just like the public inquiries, they would not change the minds of those invested in the debate, however, what it could do was shift the narrative in the industry's favour.

[20] J. Gartside 'Operation Smash Hit'. *Railway Museum Blog* 5/11/2014. Available Online: https://blog.railwaymuseum.org.uk/operation-smash-hit/ Accessed 15/01/2020.
[21] *Daily Mail*, 18 July 1984, 14.
[22] Ibid.
[23] H. Collins & T. Pinch, *The Golem at Large*, 67.

Baker argued that after sending a strong visual message on the safety of nuclear transportation there was a notable change in the public narrative stating 'frankly, we never heard any issues around the transportation of nuclear power,' after the demonstration took place.[24] Baker also notes that it even became a joke featuring as a cartoon in the *Daily Mail* depicting a scene of a train carrying nuclear flasks travelling towards a small table with a sandwich on it with the caption 'this is the ultimate test – 100mph into a British Rail sandwich.'[25] *The Times* and the *Financial Times* took a similar approach by reporting that this was the CEGB testing its own confidence in its scientific and technical capabilities. *The Times* ran with the headline of 'How a 140-ton locomotive failed to crack the power men's confidence in nuclear safety.'[26] David Fishlock for the *Financial Times* wrote 'Train crash that tested CEGB's mettle.'[27] Just from these titles, we can see how these publications focused on this event as a boost for the industry's technical and scientific credibility, with *The Times* mentioning that the only damage to the flask container was a nine-inch gouge on the steel surface.[28] Fishlock stated that the very flask had gone through smaller tests and that the flask this time had 'emerged from the second ordeal soiled and a bit bent, but unscathed in terms of engineering integrity.[29] Finally, like in the *Daily Mail*, *The Time*s also brings in the views of an anti-nuclear voice, Dr William Cannell from FOE, who was quoted as saying that the demonstration was 'an expensive way of diverting attention from the real issues of nuclear waste management.'[30] By placing this demonstration in the larger debate around nuclear waste management, Cannell was attempting to bring the discussion back to what the FOE and other anti-nuclear groups saw as 'the real issue.' Even if the CEGB could transport nuclear waste safely, could BNFL then store it safely? However, the demonstration was, on face value, a success, and through this, the CEGB argued that on this one issue they would be able to show their technical and scientific expertise in keeping the public safe.

The *Daily Telegraph* was the only pro-nuclear paper that had the demonstration on its front cover. With the headline, 'A-Flask 'safe' in 100mph crash', the front cover splash emphasised the details of the crash: '2500 horsepower,' '100 mph,' '48-ton flask,'

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[24] Baker, BL Sounds, track 7 C1495/14.
[25] *Daily Mail*, 19 July 1984, 9. British Rail catering had a notorious reputation for being less than satisfactory.
[26] *The Times*, 18 July 1984, 3.
[27] *Financial Times*, 18 July 1984, 8.
[28] *The Times*, 18 July 1984, 3.
[29] *Financial Times*, 18 July 1984, 8.
[30] *The Times*, 18 July 1984, 3.

and 'only apparent damage was an inch-wide, 9-inch-long gouge on its lid.' One notable inclusion in the *Telegraph's* coverage was a quotation from Marshall who claimed that 'we have resisted doing this sort of demonstration because we felt it was expensive and somewhat extravagant.'[31] The industry anticipated that some would question the validity of the crash, not just on scientific grounds, but also on grounds that it was financially unsound to spend £1.6 million on such a demonstration, especially during a period of public spending cutbacks and austerity. However, the article on the following page mentioned how this demonstration was done in response to pressure from MPs, councillors, and trade unionists, 'who were concerned that the board's case about "the excellent safety" record of its nuclear fuel flasks was not being understood.'[32] This is further evidence that the demonstration was performative. A CEGB spokesperson also admitted that this demonstration was not 'essentially a scientific or engineering exercise' it was a 'dramatic demonstration of the board's total confidence in the immense strength of these containers.'[33] This shows that the industry accepted that this demonstration was not a scientific demonstration and that it was a PR exercise, but a PR exercise in demonstrating the confidence that the industry had in its own practices, staff and abilities to conduct such a demonstration.

The *Daily Mirror* did not take quite as positive a view as other newspapers. Running with the headline 'plain loco!', with an emphasis that the cost of the demonstration was just as spectacular as the demonstration itself. The article itself was shorter than others and presents the same information and quotes seen in other reports, with the one exception that it notes that the demonstration was designed particularly to reassure those living near railways, and yet those living near the track at Melton Mowbray were not invited.[34] This was potentially done by the CEGB as they rather would have had those influential 'worthies' viewing the demonstration in person to boost the legitimacy and authority of the demonstration.

Finally, *The Guardian's* reporting of the event, while acknowledging the success of the demonstration with the headline, 'Diesel 46009 proves a £1.6 million point,' gave 'the last word' to a representative from the Welsh anti-nuclear campaign, who quipped:

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[31] *Daily Telegraph,* 18 July 1984, 1.
[32] Ibid, 2.
[33] Ibid.
[34] *Daily Mirror,* 18 July 1984, 3.

> Why…if nuclear fuel was so safe on the railways, why did the board hand it over to Sellafield where it seemed to be spilt into the Irish Sea?

The CEGB spokesperson responded by saying it was an irrelevant question.[35] But it was not irrelevant and strikes at the heart of the problem facing the industry post-Operation Smash Hit. Yes, the demonstration was presented as having shown that the industry was right to have confidence in the flasks that they used to transport nuclear fuel and waste. Yes, the demonstration was visually effective at communicating this confidence. Yes, the demonstration helped to achieve a higher level of confidence within those groups that mattered, the MPs, the majority of the press, and other influential people. However, the problem of nuclear waste remained. You can transport it safely but can it be stored safely for the length of time that is required? Here the industry had demonstrated the ability to contain these materials in one context, but the problem with other contexts remained unresolved.

The response from politicians to Operation Smash Hit was notably muted. Only one direct reference to the demonstration in the House of Lords was made, in a written question from Lord Dunleath to the Parliamentary Under-Secretary of State, Department of the Environment, The Earl of Avon. Lord Dunleath asked:

> 'Whether they consider that expenditure of £1·6 million by the Central Electricity Generating Board in demonstrating that their nuclear waste skips could not be destroyed in a rail crash was a provident appropriation of public funds at a time of high unemployment and the national need for revenue-earning investment.'[36]

In his reply the Earl of Avon stated:

[35] *The Guardian*, 18 July 1984, 2.
[36] HL Parliamentary Debates, 16 October 1984, Vol 455, col 976.

> Yes. The safe transport by rail of irradiated nuclear fuel is an essential part of the Central Electricity Generating Board's nuclear-generating programme, which is a revenue-earning investment.[37]

The official government response we can see here was that this demonstration was vital to the industry. Primarily because the industry generated money for the Treasury, but there is also evidence here to suggest that the government was keen to ensure that the public felt 'safe' with the transportation of irradiated fuel by rail.

While direct references to the demonstration after the event are limited, we do see the tests before the train crash being mentioned in parliament. This was in response to an incident that took place on the 26th April 1984 where a train carrying a nuclear flask, struck a private car at Boarman's open level crossing, where a public road crosses the single goods line connecting Dungeness power station with the Hastings-Ashford line at Appledore.[38] While any incident of this kind can be extremely serious, there were attempts to provide context for the risk of damage to a nuclear flask during the incident. David Mitchell, the Parliamentary Under-Secretary of State for Transport, stated that:

> The flask is made of 14-in thick steel. Indeed, in a recent test, a flask was dropped 30 ft on to a solid platform, and there was no risk to the contents. I can reassure the House … that there was no risk whatever to any member of the public from contamination as a result of this minor accident.[39]

While Operation Smash Hit was the main public demonstration showcasing the resilience of the flasks, these smaller tests also could be used to show the versatility of the flasks used by the industry to transport nuclear material. This particular reference to the smaller demonstrations, such as setting the flask on fire or dropping it from a height, linked to Operation Smash Hit, shows that the government was able to use these demonstrations as evidence to not only point towards compliance with national and international

[37]HL Parliamentary Debates, 16 October 1984, Vol 455, col 976..
[38] HC Parliamentary Debates, 27 April 1984, Vol 58, cols 1018-1022.
[39] Ibid.

regulations stipulating that these flasks were safe, they also now had the dramatic visual evidence to support this.

While Operation Smash Hit was undoubtedly a successful demonstration and provided the industry with material for its communication strategy, anti-nuclear groups still retained their doubts. Greenpeace called the demonstration a 'scandal of huge proportions.' They claimed that the bolts and weights in the carriages changed how the train crashed into the flask meaning it did not buckle and so dissipated the energy throughout the train during the crash.[40] This initial claim was made in a press release on the 22nd October 1984, but they had no written evidence for this and so had to apologise. This did not stop them from making several other claims including the claim that the flask was laid down in such a way that it would reduce damage and protect the valve. However, John Baker in a CEGB press release, which was used as a reply to the apology, refuted these other claims for which Greenpeace did not apologise.[41] This particular copy of the press release was sent to Keith Best, the MP for Ynys Môn. He was a pro-nuclear MP; this suggests that the industry disseminated this information to its supporters in the hope that they would then act as conduits by which the message could be further communicated to his constituents. Whether Best subsequently shared this particular information with his constituents is unknown, but it is clear that the industry hoped that he would.[42] What this also suggests is the confidence that the industry had in being able to communicate to its supporters that not only had Greenpeace apologised for making unfounded claims, but that the other claims regarding the train crash were also seemingly easy to refute.

While Best became a mouthpiece for the industry, this was not replicated in every constituency that was located near such a site. Paddy Ashdown, MP for Yeovil, and spokesperson for the Liberal Party on Trade and Industry between 1983 and 1987 was a vocal critic of the industry.[43] His constituency was located near Hinkley Point nuclear power station, however, this did not mean many of his constituents worked at the plant. Ashdown's response to Operation Smash Hit was the opposite of Best, calling the demonstration a 'PR scam.'[44] Ashdown points towards a scientist who was

[40] NLW, Keith Best CEGB 20. 'CEGB Press release 28th May 1985.'
[41] Ibid.
[42] As seen in the chapter on Welsh sheep farming after Chernobyl Best certainly did share information between the farmers, government officials and the industry.
[43] Ashdown was also a member of the CND, often speaking at Liberal CND meetings.
[44] LSE, Ashdown 583 12/55. 'Nuclear Material Rail & Ground transportation note written by Ashdown titled the great PR game.'

commissioned by the CEGB who was alleged to have said that the demonstration was flawed stating:

> this superficial accident was as likely as a 'severe' accident such as a cask hitting a tunnel… grave doubt must be cast on the CEGB for choosing to stage this kind of accident.[45]

Ashdown also brought up the company Nuclear Transport Ltd, which BNFL was 'a major stakeholder' in. Ashdown recalls how the company stated that 'full-scale modelling is only carried out for public relations purposes for a non-scientific audience.'[46] Ashdown's use of industry voices that agree with his scepticism shows that the demonstration was not convincing to everyone. It might have swayed some of those who thought they did not know much about nuclear power, but Ashdown, who drew on a range of sources for his information on nuclear power, had a much more active and substantial interest and saw it one part of a much bigger and complex picture. What is more illuminating is that even with these detracting voices from the CEGB's narrative, it appears as though within the media these voices were not heard until sometime after the crash where the story retreated from the front pages. For instance, in the *Financial Times* on the 14th February 1988, nearly 4 years after Operation Smash Hit, Science Editor David Fishlock and Ralph Atkins penned an article titled 'nuclear flask safety challenged.' In the article, they mentioned Smash Hit, but their focus was on claims that the international standards used for the construction of steel flasks were inadequate. This claim had come from Large and Associates, who was well known in the nuclear community as an organisation that consistently disputed the industry's claims and commonly worked with anti-nuclear groups and MPs including Paddy Ashdown.[47] Large accused the CEGB of simply running 'an elaborate public relations act,' stating that the probability of such an event was 'crude and based on limited data.' The CEGB responded by claiming that Large's accusations were 'alarmist' and that 'it piled improbability on to improbability to make

[45] LSE, Ashdown 583 12/55.
[46] Ibid.
[47] Large and Associates, based in London are a nuclear engineering consulting firm. They offered their services to anti-nuclear groups and MPs including Ashdown, providing advice and acting on their behalf when interacting with the industry.

its case.'[48] Regardless of the merits of this argument, it mattered little to the industry whether this claim was true as they had the publicity material to promote that the demonstration had worked, and that the flask remained intact despite the high intensity of the crash and subsequent explosion.

Normalising Risk: Walter Marshall's Cosmic rays, Pebbles, Cigarettes & the Garden Lecture

Another development in the nuclear industry's evolving strategy in this period was to domesticate the risks relative to objects, practices, and places, that were far more common to the human experience than a nuclear power plant. Walter Marshall's 'Garden Lecture' as it came to be known, illuminates our understanding of how the industry continually sought to communicate the normality of radiation. It built on similar demonstrations given by Sir John Hill mentioned in Chapter Two.[49] In his lecture, which he first gave on the 6th February 1986 at the annual Tizard Lecture for Westminster School, Marshall spoke about nuclear waste and how the industry deals with it. Marshall believed that this was what he should give the lecture on because:

> The public understanding of this subject is so appalling and the past presentations of the nuclear industry on the matter have been so inadequate that I have put a great deal of time thinking out how a discussion of this really important subject should actually be made.[50]

Marshall went on to say how he intended to use samples of nuclear waste in the lecture and that he would 'hold those samples in my hand.' He stated that the risk to him was 'trivial.'[51] The purpose of this lecture was to show how there was equally as much

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[48] *Financial Times*, 24 February 1988, 6.
[49] CAC, B.112. 'UKAEA Press conference 15th September 1976.'
[50] CAC, Mrsl H.291. 'Letter to Headmaster of Westminster School from Walter Marshall 14th January 1986.'
[51] Ibid.
Similarities here with Jon Agar's article on ageing nuclear experts who felt that they could volunteer to sacrifice themselves in the event of a nuclear disaster. As they felt responsible and protective of their achievements and were willing to exchange physical jeopardy to secure its continuation.
J. Agar, 'Sacrificial Experts?'.

radioactivity coming from your own garden as there was from intermediate-level waste (ILW), by arguing that there were radioactive elements such as uranium, potassium and thorium and that 'everyone who owned a house and garden also "owned" radioactivity.'[52] One of the crucial messages that Marshall sought to put across in this lecture was to 'respect not fear' radiation. Marshall also argued that through science and technical expertise the industry was able to keep those present safe by showing that through proper protection, excess radiation could be 'easily isolated' to keep the public safe.[53] This attempt at articulating that through 'respect' and technical expertise the environment around us can be mastered to keep us safe from potentially harmful substances, was similar to the other communication practices we have seen in this thesis. The underlying message was consistent in this period, but the rhetorical strategy to deliver it had changed. From the claims that Three Mile Island or Chernobyl 'could not happen here,' or Operation Smash Hit, we have seen how the basis of the industry's message was that the public should trust them because they understood the science behind nuclear power. In the transcript of the speech, there is further evidence of Marshall's attempt to minimise any potential for alarm from bringing nuclear waste into proximity to the public. He states that there was no risk to the attendees, even those in the front row of the audience, but that there was a very small risk to him. He asserted that:

> I can put that risk in a proper perspective by telling you in advance, that as a radiation worker the regulations of this land would permit me to give this lecture only 250 times this year.[54]

Here we can see a reliance on regulations and processes, to create a sense of perspective for the audience. Saying he could 'only' do it 250 times means that Marshall could spend most of his year travelling around the country giving this lecture with radioactive waste in his hand, and still be within the regulations. By holding the waste, he was seemingly putting himself in harm's way. But, as Marshall would have you believe, the danger was minuscule and that because of his understanding of the science and regulations he would

[52] CAC, Mrsl H.291. CEGB press statement 'Nuclear waste and the radioactivity in your back garden' 6th February 1986.
[53] Ibid. 'CEGB press release 'Nuclear waste and the radioactivity in your garden' 6th February 1986.'
[54] Ibid. 'Rough transcript of Tizard Lecture, 3.'

be fine. Marshall also used a Geiger counter to demonstrate background radiation and the radiation given off by other objects such as pebbles from Cornwall and cigarettes to further normalise the risk of radiation from intermediate nuclear waste. The pebble provided Marshall with a particularly pertinent claim that there would be more radiation on a beach in Cornwall than on a beach in Cumbria where Sellafield is located.[55] The lecture used these "natural" sources of radiation and compared them to the risks of cigarette smoking because 'there are many similarities between the effects of radiation and the effects of smoking.'[56] He claimed that the research showed that background radiation has the same health hazard as five puffs of a cigarette every week. Marshall equated this to what the average non-smoker might receive via passive smoking if they were in the proximity of someone smoking. The use of smoking as a comparison was not accidental. Smoking is not harmless, and Marshall makes it clear that he does not believe radiation is harmless either, stating:

> I have simply said that it does not matter very much compared to all the other hazards that faces us in our everyday life and that gives you a valid and proper feel of the risks of radiation in everything you do.[57]

The purposes of this lecture are clear. First, not just to normalise, but to naturalise radiation as something that just exists around us. But, secondly, to assure the audience that scientists do understand and can control it through proper 'respect' and technical expertise.

The first place Marshall gave this lecture was at Westminster school, a public school right next to the palaces of Westminster, invited by headmaster and historian Dr John Rae. In his letter to Marshall, Rae said that:

> the lecture is to an invited audience, the great majority of whom are "scientifically and mathematically literate." Most are adult including schoolteachers, but there

[55] CAC, Mrsl H.291. '5.'
[56] Ibid. '6.'
[57] Ibid.

is also a number of boys and girls from the Sixth Forms of Westminster and other schools in London.[58]

Marshall invited to this lecture the Undersecretary of State for Energy Alistair Goodlad, the Permanent Secretary to the Treasury Sir Peter Middleton and *Financial Times* Science journalist David Fishlock.[59] Notable student guests might have included journalist Louis Theroux, journalist Giles Coren, former cabinet minister Ruth Kelly and former deputy Prime Minister Sir Nick Clegg.[60] These influential people, as well as the privately-educated children, can hardly be called a representative demographic of British society. Highlighting again the argument this thesis presents: that the industry tended to focus its communication towards influential figures who were part of or could influence the decision-making process.

The use of personal gardens as a comparison was not an accidental choice. The key aspect here is the personal; a significant number of families across the country 'owned' a garden and, by association 'owned' radioactive materials. It attempted to relativize the dangers of intermediate nuclear waste to an everyday place. Many in the audience would either have or at least, recognise it as a place that exists for many households, a safe place that they and their families can relax in. David Fishlock called the lecture an 'imaginative new way of discussing nuclear wastes in homely terms' and provides a snapshot of what Marshall covered in the lecture.[61] Fishlock being one of the few journalists invited to this also tells us that the industry was primarily interested in communicating to those who supported the industry or in the case of the students, were presumed to have not yet formed an opinion on. This also denied the opportunity for groups like Greenpeace and CND the chance to respond to the lecture. This represents a shift in the rhetorical strategy of the nuclear industry and one that would begin the process of shifting the narrative that nuclear power was unreasonably unsafe, to one where its dangers were normalised and domesticated.[62] The lecture also attempts to differentiate

[58] CAC, Mrsl H.291. 'Letter from Headmaster John Rae to Walter Marshall 39th April 1985.'
[59] Ibid, 'internal CEGB memo from J.E. Gower to Mrs M Brown regarding Marshall invitees to Tizard lecture, 29th January 1986.'
[60] Of course, at the time these people were just students, but they were privileged students and would have been expected to go on to become opinion formers.
[61] *Financial Times*, 7 February 1986, 8.
[62] This rhetorical strategy is now commonplace when communicating nuclear science online courses on the science of nuclear energy relativize the amounts of radiation coming from nuclear power to the

between different kinds of nuclear waste by focusing on ILW and low-level waste (LLW) rather than high-level waste (HLW). While this reflects how the industry defined waste, these distinctions were difficult ones for a lay audience and potentially would not mean much to the general public. As mentioned earlier, Marshall believed that the public did not understand the subject of nuclear waste and that previous attempts to communicate this were inadequate. While this lecture may have educated some and may give the CEGB more publicity material, it does not give us a sense of whether the industry was reflective of the effort required to spread this message to the wider public.

Walter Marshall worked on the lecture himself with the assistance of other CEGB employees and the UKAEA and to 'expose it informally to NRPB comment.' It was rehearsed in front of an invited audience at Harwell on the 31st January 1986, further suggesting the significance of this speech as Marshall wanted it to be agreed upon by the various organisations that make up the industry.[63] A letter from John Gower, of the CEGB's policy support unit, to Marshall, reveals how Marshall was assisted in his preparation for the lecture with biographical material on Tizard himself to be used 'well in advance' as background reading for his introduction at the lecture.[64] After the lecture was given, Marshall and Peter Vey discussed the possibility of producing a video but agreed that the lecture at Eton College to be given on the 30th April 1986 was a better location. This video would only be 30 minutes long as:

> people have a different set of expectations when they sit down to watch a video as opposed to going to attend a live lecture; an hour is a long time to watch a video, especially if the intended audience is non-specialist and consists, in many cases, of school children.[65]

This lecture was delivered again on future occasions under the title given by Marshall, the 'NIMBY lecture.'[66] This hints at the attitudes some were assumed to have, that while

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radiation emitted from a banana. One example of this can be seen in FutureLearn course 'The Science of Nuclear Energy' Available online: https://www.futurelearn.com/courses/the-science-of-nuclear-energy Accessed 15/02/2021.

[63] CAC Mrsl H. 291. 'Letter from Ron Flowers UKAEA to Roger Clarke NRPB, 20th January 1986.'

[64] Ibid, 'letter to Walter Marshall from J. E Gower, Policy Support Unit CEGB, 7th June 1985.'

[65] CAC, Mrsl H. 303. 'Memorandum to Mr L M Davies from P. C. Dunston. 13th March 1986.'

[66] CAC, Mrsl H.306. 'Notes on updated NIMBY lecture 1 March 1988.'

it was okay to have a nuclear industry, they did not want it anywhere near them and also to represent that radiation is all around us despite the immediate association with the nuclear industry. While the premise of the lecture stayed the same, the calculations and risk comparisons highlighted in it evolved to recognise new guidelines from the NRPB. The 'garden unit,' a term that indicated how much radiation you would get through 'inhalation' or 'ingestion' compared to different forms of radioactive waste. The changes indicated that ILW was compared to 1/20 deep garden units through ingestion, presumably through the consumption of food. While LLW was 1/10,000 shallow garden units through inhalation and 1/1,000,000 deep garden units through ingestion. However, the ratio between HLW and a garden unit was 4 garden units compared to a 'lifetime's waste.'[67] This further indicates why Marshall and the CEGB were keen not to mention HLW in much detail. Beyond the immediate danger to Marshall and the audience if a sample was brought in. It would also show the challenge that HLW posed to the industry and that the process for dealing with it safely required extensive planning and scientific and technical knowledge.

Visitor Centres: Bringing people closer to the industry

In the following section, I investigate the role and development of visitor centres at nuclear power stations. To do this I use the case study of the Sellafield Visitor Centre to examine the reasoning behind its creation and how it evolved across the 1990s. The purpose of visitor centres was not significantly different from the earlier atomic exhibitions other academics have explored, but there are a few notable differences that show a shift over time in how the industry communicated its message.[68] The primary purpose was stated as being to 'educate the public' about the nuclear industry. However, in the case of visitor centres, the industry, BNFL and the CEGB wanted to have 'an "open door policy" to be open and transparent.'[69] Bringing people onto the site of the industry allowed the public to 'see for themselves' but also showcase itself in a '"high tech", state-of-the-art visitors' centre,' to create a feeling of awe and wonder, rather than of fear. Or

[67] CAC, Mrsl H.306.
[68] See J-B, Gouyon, 'Making science at home: visual displays of space science and nuclear physics at the Science Museum and on television in postwar Britain'; 37-60; H. Trischler & R. Bud 'Public technology: nuclear energy in Europe'; C. Laucht, 'Atoms for the people: The Atomic Scientists' Assoication, the British state and nuclear education in the Atom Train exhibition, 1947-1948'; S. Forgan, 'Atoms in wonderland'.
[69] Author's collection, 'C. Harding, 'A welcoming approach to winning support.'

at least it gave people the sense that they were seeing the nuclear industry for themselves, even if when they saw was controlled by the nuclear industry who curated what the public could see.[70]

HRH Prince Philip, Duke of Edinburgh, officially opened the visitor centre at Sellafield in 1988. In his speech, the Duke called for open-mindedness when it came to the nuclear debate stating,

> I don't think anybody can come to a reasonable judgement about nuclear power unless they know the case for both sides.[71]

As a member of the royal family, the Duke's words were carefully chosen to suggest neutrality.[72] However, they were a challenge to the opponents to listen to the industry, which was a similar argument used by the industry as to why people should come to the visitor centre. The Duke was also a prime mover in the establishment of the Royal Academy of Engineering and his remarks should be seen in this context. The industry had a turbulent decade with three public inquiries and another one starting, two major nuclear accidents at TMI and Chernobyl, one resulting in radioactive contamination being spread across the UK, and the economic case for nuclear power under serious scrutiny. Therefore, this statement was not neutral, but rather comes with the expectation that once people understand nuclear power they might see it as acceptable or even support further expansion.

While this was the official opening of the visitor centre at Sellafield, there was previously a smaller temporary centre created in 1986. Other nuclear sites had similar centres or would host open days, which made nuclear power stations 'visitor attractions more or less by accident.'[73] Hartlepool nuclear power station opened up an 'energy information centre' in 1986 and saw 10,000 visitors by the summer and in 1989 the FBR at Dounreay was open to public tours and more than 2,000 people went to see it, despite

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[70] T. Lee & N. Balchin, 'Learning and attitude change at British Nuclear Fuel's Sellafield visitors centre.' *Journal of Environmental Psychology*, 15, 4, (1995), 283-298, 284.
[71] Author's collection, 'BNFL, Media Brief 'Sellafield Visitors Centre-The Story So Far June 2002.'
[72] This was not the first time that the nuclear industry had been able harness the royal family as a powerful symbol. I. Welsh, *Mobilising Modernity*, 41.
[73] T. Lean & S. Horrocks, 'Good nuclear neighbours.' 6.

its remote location.[74] However, while Sellafield was not unique in that it had a visitor centre and its purpose and aim was the same as other sites, it does have several characteristics that differentiate it from other visitor centres. The first is that while other sites were run by the UKAEA or CEGB this site was run by BNFL who previous to 1986 had been highly criticised by the NII, anti-nuclear groups and the media. It had been accused of poor management, 'taking a passive approach to health and safety and required to be told how to be safe.'[75] It had an even more challenging task than the rest of the industry, not only as a safe organisation but a responsible one. In the *New Scientist* article that discusses this, it does state that there were signs that BNFL was changing and that this was 'partly down to the arrival of Christopher Harding as part-time chairman' in 1986. It mentioned how it was Harding who personally got George Pritchard, the spokesperson for Greenpeace, to admit 'Sellafield might not be as dangerous as some chemical plants around Britain.'[76] While this claim does suggest that Sellafield was dangerous, having someone from an anti-nuclear group like Greenpeace say this was still a public relations gift. Harding has established a legacy from his time at BNFL as being the key figure behind the visitor centre with an information sheet claiming that the centre was his idea.[77] While there is no evidence to validate or counter this claim, in a paper authored by Harding we can see how he sought to approach public relations to win over support. The paper was titled 'A welcoming approach to winning support', written in 1987, one year before the official opening. Harding wrote that:

> Until the public was prepared to trust us and to believe what we had to say, it would simply be a waste of time to devote expensive airtime and advertising space to any attempt to tackle head-on the basic issues of health and safety and the economics of nuclear power. Indeed, such efforts could be counterproductive. If people were not disposed to trust BNFL and did not believe what we had to say, then they might well be driven to conclusions the exact opposite of what we were telling them.[78]

[74] *The Guardian*, 27 August 1986 2; HL Parliamentary Debates, 28 February 1980, 405, cols 1627-1669.
[75] *New Scientist,* 18 December 1986, 10.
[76] Ibid, 2.
[77] Author's collection. 'Sellafield LtD, Visitor Centre information sheet.'
[78] Author's collection. ''C. Harding, 'A welcoming approach to winning support.' Restoring Credibility.'

This was the basis for Harding's strategy to 'restore the company's credibility.' By 'opening the doors to Sellafield to as many people as possible' Harding believed that this would allow BNFL to bridge this gap in trust between the plant and the public. To start this process BNFL printed eight million invitations to Sellafield and placed them in weekend leisure magazines that were published alongside national Sunday papers. They also ran a 50-second commercial featuring Sellafield and a busy exhibition centre on every British commercial television station at peak viewing times. Harding believed that this advertising campaign was 'novel' and that it attracted significant editorial coverage in the media.[79] It was itself novel not because of the actual means used to advertise this opening up but rather the act of opening Sellafield to the public. Regardless, the advertising campaign, along with expanding capacity at the centre, proved to be a success in terms of getting people to come to the site. Harding mentions how 'the number of visitors to this industrial site in a remote corner of England doubled to over 65,000 in 1986' two years before its official opening.[80] However, Harding stated that getting people to come to the site was just one of their objectives to change their public trust issue:

> Much more important was the message conveyed to the millions of people who did not come but were made very aware that they could come if they wanted, and that a welcome awaited them. This was clearly the reverse of secretiveness.[81]

Under the heading of 'BNFL'S "glasnost"' we can further see how openness, or a greater degree of openness, was seen as crucial to redefining how the public viewed BNFL and Sellafield. Harding called for a 'head-on assault on our reputation for secrecy' and having a policy of 'full disclosure of information.' This was seen to be especially important in the wake of the Chernobyl accident that had 'aroused tremendous awareness and concern about nuclear matters.'[82] BNFL hoped that by removing the accusation of being overly secretive it would foster trust with the local public as they hoped it would show that they

[79] Author's collection. ''C. Harding, 'A welcoming approach to winning support.' Restoring Credibility.'
[80] Ibid.
[81] Ibid.
[82] Author's collection. 'C. Harding, BNFL's 'glasnost.'

have nothing to hide. Of course, the view the public got would be a curated one controlled by BNFL but this initiative to rebuild trust by reversing secretiveness was certainly seen as new by the BNFL. These changes to BNFL's communication strategy were already underway before the Chernobyl accident. What could be the case is that because of the increased awareness caused by Chernobyl also increased attention on what Sellafield and other sites were doing. Harding himself believes this, stating that 'Chernobyl created a very receptive climate for our new-style information programmes. In particular, it represented what I believe was a turning point in our relations with the media.'[83]

The centre was originally built in 1986, however, most of the information available pertains to its redevelopment in 1988, when it had 'no fewer' than ten different zones. According to a press statement released in 2002, had a 'host of hands-on interactive gadgets using the latest computerised technology, making it especially appealing to children.'[84] These interactive devices included computer games that would explain the concepts of energy, radiation, nuclear fission and the work of BNFL. While life-size models included a walk-in-model of a reactor core and a tunnel where visitors would have a visual experience of a simulated fission chain reaction. The Sellafield visitor centre brochure claimed that this was 'both guaranteed to inform and enthral.'[85] The idea was that by entertaining and making an association between nuclear power and entertainment then people would go away feeling more positive about nuclear power. However, an unpublished BNFL study, and a study published in 1992 from polling company MORI, found that a small percentage of those who already held strong anti-nuclear views further reinforced their beliefs after a visit to Sellafield.[86] The study does not explain why this might be the case. However, Terence Lee and Nicholas Balchin argued that the methodology used in these surveys was poor as it simply asked whether people 'felt' more "pro" or "anti" nuclear after their visit while it reflects the fluidity of public opinion, it does not show any nuance.[87] Lee's and Balchin's 1995 study, seven years after its official opening also found that:

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[83] Author's collection. 'C. Harding, 'A welcoming approach to winning support.' BNFL's 'glasnost.''
[84] Author's collection. 'BNFL Press statement 25th June 2002 'Sellafield Visitor Centre – The Story So Far.''
[85] Author's collection. 'BNFL Sellafield Brochure, 4.'
[86]Author's collection. 'BNFL. 'The Visitors Centre at Sellafield: Survey Analysis (unpublished report). Risley, Lancs: BNFL 1993.'; Author's collection, MORI. 'Attitudes Towards Sellafield Visitor centre Research study conducted for British Nuclear fuels plc, 1992.'
[87] T. Lee & N. Balchin, 'Learning and attitude change at British Nuclear Fuel's Sellafield visitors centre.' 284.

> the centre as a whole is effective at using multimedia displays to communicate knowledge to the whole population, although concept acquisition remains a somewhat open question.[88]

This analysis suggested that the industry was communicating with the public, but the impact of that effort was unclear. One point that Lee and Balchin identify is the:

> problem with the emotional effect of the visit, with no impact on the majority but with younger and less well-educated people becoming relatively more negative or anxious about the industry as a whole.

Lee and Balchin suggested that this might be down to the fact that the visitor centre exists in the first place, raising scepticism over why the industry feels the need to persuade.[89] However, they note how the limited emotional impact does assist learning on the reactor core model; through the use of music, moving parts and lighting changes and a double video screen.[90] What this shows us is that while the centre showcases that the industry's efforts to communicate science was evolving in seemingly a more effective way, the industry was still failing to grasp the importance of communicating an emotional argument for its existence. People might have been brought into the site of the industry, but they still did not feel a part of it.

There is also the matter of who visited these sites? While the numbers going to them certainly increased post-Chernobyl, this does not necessarily mean that the industry was communicating with a more diverse audience. An internal survey found that just 22% of the 160,945 visitors in the summer of 1992 were from over 100 miles away and that the majority of these came from northern cities such as Liverpool, Manchester, York, Leeds, and Newcastle. Out of these visitors, 62.57% held a positive view of the industry

[88] T. Lee & N. Balchin, 'Learning and attitude change at British Nuclear Fuel's Sellafield visitors centre.' 296.
[89] Ibid, 295.
[90] Ibid, 294.

before visiting the site, there is no dataset to see what exactly the opinions of the remaining percentage of people were.[91] This suggests that, first, the industry was able to expand its reach beyond its immediate locality and communicate with people in urban centres like Manchester, Liverpool, and Leeds but the majority were still locals. Second, it indicates that they mainly attracted those who already held a positive view of the industry, however, that 37.43% who did not hold a positive view is still a sizeable amount. While 40% of those who did hold a negative view did go away feeling more positive, only 19.53% out of those who answered 'very negative' felt that their opinion of the industry was more positive.[92] The evidence suggests that the centre was having some success. However, when you consider that in 1992 160,945 people came to the centre; if the numbers were similar throughout the year below 25,000 people would go away feeling more positive about the industry.[93] However, it is not just about this number, it is the number of people they might talk to, therefore creating a snowball effect where the message spreads further than just those who visit the centre.

It is no coincidence that visitor centres became integral to the industry's communication strategy after 1986. The Chernobyl accident drew intense attention from the public, likewise, the lengthy Sizewell B inquiry also contributed to this significant change in approach. The industry could not afford to just respond to criticism when it inevitably came with statistics, regulations and a record that meant little to a public that was more concerned with what could happen, rather than what has happened. These visitor centres allowed the industry to communicate to the public on the industry's own terms. People would have to come into the industry, they would see it first-hand but the message here was unchallenged by journalists, anti-nuclear spokespersons, or sceptical politicians. However, visitor centres were not the only communication method that received an "improvement." The evolution and expansion of visitor centres marked a new phase in science communication for the industry and how it approached local communities in particular.

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[91] Author's collection, J. Foreman & J. Watson, BNFL Assistant Information Officers Visitors Centre, 'Summer Report for Questionnaire Survey' (July-August 1992).
[92] Ibid.
[93] Author's collection. 'BNFL, 'Visitors to Sellafield 1957-1990.' There is no breakdown of the polling data in the previous source. The number of 25,000 is a maximum estimate based on 40% of the 37.52% of people who did not arrive with a positive view already. Therefore, the actual number is probably lower.

Conclusion

This chapter has presented three case studies that detail direct communication which either showcased, engaged, demonstrated, or lectured the publics about the nuclear industry. After Chernobyl, the industry developed direct engagement strategies, both with the high levels of government through inviting them to large scale demonstrations like Operation Smash Hit or targeted lectures as seen in Walter Marshall's 'Garden Lecture,' As well as the wider population through media reporting of Operation Smash Hit and crucially the development of visitor centres at nuclear sites around the country. Operation Smash Hit was a unique event and so facilities like visitor centres came to the fore as a primary means of communicating what the industry did, does, and wants to do. Visitor centres were incorporated into ordinary activities such as school trips and family days out. The lectures given by Sir Walter Marshall would not be as accessible as these visitor centres, as they were given to invited audiences of privately educated children and influential individuals, involved directly or indirectly in the decision-making processes. The information contained in these lectures were then available to the wider public through videos and industry promotional material but the exact circulation of these is currently unknown and potentially limited. While events like Operation Smash Hit show us a more direct, eye-catching, and memorable approach to communicating not just the scientific and engineering capabilities of the industry but also the credibility of those involved.

All these case studies were aimed to play on different emotions and in the process to provide the public with an experience through which they would have a greater understanding of how nuclear power worked. The industry hoped they would then better appreciate the industry and its role in British society and the economy. Whether through seeing the spectacle of a train crash to believe statements on the integrity of nuclear flasks, hearing an authoritative voice like Walter Marshall's, and seeing real samples of radioactive material in his lectures or through the public being able to interact with exhibitions at visitor centres, using sight, sound, and touch to learn more about the science behind nuclear power and the benefits of the industry. Radiation's lack of sensory impact on humans makes this process more difficult but what the industry did was to use the tools at its disposal to visualise its safety, its technical expertise, and crucially its normality. The Royal Commission's Sixth Report on nuclear power asked the industry to demonstrate its claims. These case studies show the industry's attempts to do this by

putting forward an emotional argument through demonstration and interaction rather than just the presentation of statistics.

Chapter Eight: Conclusion - Communicating with the public?

This thesis changes our understanding of the history of science communication through the examination of the UK nuclear industry between 1975 to 1990. I have shown how we should view the industry as an innovative communicator of science, but also as a technocratic organisation seeking to lobby decision-makers for resources to expand and maintain nuclear power. It is too simplistic to summarise the nuclear debate as being a division between nuclear industry 'experts' and an emotional public.[1] Public opinion polling from the 1980s has also shown that it is too simplistic to say that the public was for, against or even apathetic towards nuclear power. It does not recognise the changing developments across the period in question and sees the debate as a stagnant, binary process and does not acknowledge the reactive nature of public opinion to major events.[2] As I have shown in this thesis, public education was indeed seen as important to win over support, but it was not the only way. Narrative control, maintaining networks of influential people, and using quasi-scientific demonstrations like Operation Smash Hit, showcasing the technical and scientific mastery of the industry, was also crucial to the evolving communication strategy of the industry. Furthermore, the nuclear industry or "lobby" had enjoyed unparalleled access to the heart of government since its inception, and particularly during the Thatcher years. The key research question I have addressed was: How did different branches of the British state communicate with the public about nuclear energy, and how and why did this change over time? This generated a series of related questions: How did the sector plan and respond to hypothetical and actual nuclear accidents domestically and overseas, particularly Three Mile Island and Chernobyl? In what ways did the reinvigoration of nuclear opposition and anxiety affect communication strategies and lead to both collaboration and confrontation? How did state organisations collaborate with each other and the wider industry, including private companies, trade unions and political parties, to build and sustain trust? How did advocates of nuclear

[1] This has been a critique of the industry from many science and technology scholars as seen in A. Irwin & B. Wynne (eds.) *Misunderstanding Science? The public reconstruction of science and technology,* 1-17.

[2] As shown by the polling data in Chapter Two. Events like Chernobyl would see public opinion temporarily shift against nuclear power but would gradually shift back to where it started after a few months.

energy respond to challenges from within government, notably the Royal Commission on Environmental Pollution?

By addressing these questions, I have shed light on a range of broader issues around the role of public opinion in policymaking, public perceptions of risk, the role of experts in communicating complex scientific and technological subjects, how policymakers conceptualised the public, the emergence of new techniques in science communication and the extent to which strategies were, or were not, influenced by the emergence of scholarly analyses of science communication.

Hierarchies and target audiences

The Royal Commission on Environmental Pollution reinvigorated anti-nuclear groups, with the political legitimacy to question the actions of the nuclear industry. The report asked for the nuclear industry not just to say that it was safe but to demonstrate it. For the next fourteen years, the industry found itself responding to this report and subsequently altered how it communicated with the public. I have shown how Operation Smash Hit and Walter Marshall's Garden Lecture were the most visible manifestations of this policy. However, this was not their only means of responding to this report. I have shown examples of industry leaders making the case that the risk of radiation coming from a nuclear plant should be compared with other, more trivial, sources of risk. While this is best emphasised in Walter Marshall's garden lecture, we have seen how John Hill made similar attempts to relativize the risk of radiation. In terms of other, internal challenges within government, including meeting scepticism from government ministers and maintaining good relations with pro-nuclear backbenchers, the industry maintained an extensive lobbying effort within both the corridors of Whitehall and Westminster, utilising existing forums such as APPGs and using their established position as a public body to lobby government ministers. This was particularly useful between 1975 to 1979, when Tony Benn was the Secretary of State for Energy, where his increasing scepticism towards the nuclear lobby, as well as the internal debates over which kind of nuclear reactor to build, threatened to halt the development of the industry.

I have shown that the cornerstone of the industry's public relations strategy was the maintenance of its networks between the organisations that made up the industry, journalists, parliamentarians, and trade unions. This is shown best in Chapter Four and

Chapter Seven, where I have shown how special attention was paid by the senior officials of the industry towards those within positions of power or influence. The industry used existing forums within Westminster to shore up support with potential supporters in relevant APPGs. Select Committees held the government and the industry to account, but they also provided the industry with a forum to test their arguments before public inquiries. Outside of Westminster, parliamentarians, journalists and other such 'worthies', as John Baker put it, were still the primary audiences for the industry's public relations strategy. These 'worthies' were not only the focus of the industry's efforts because of their high public profiles, and their potential to influence public debate in favour of the industry. Many were also decision-makers, or in positions of power to influence decision-makers, particularly journalists such as David Fishlock, whose columns in *The Financial Times* would be read by the kind of people the industry wanted to communicate with. This is not to say that the industry did not communicate to the wider public, but throughout we have seen a hierarchy of communication, where information was more readily available to decision-makers and journalists, or those who live in the immediacy of nuclear plants, through the mediation of visitor centres. Anyone outside of these categories might only hear from the industry through the media, where they might read brief outtakes of industry press releases contained in newspaper articles, and occasional televised or radio debates or interviews that took place. Rarely would the wider public be offered the opportunity of an actual dialogue that had been afforded to the 'worthies,' in the form of in-person lectures and subsequent question and answer sessions. Unlike Welsh, who presents the image of men in light grey suits speaking at public meetings, this thesis has shown that it would be just as accurate to summarise the public relations as men in black ties at dinners courting politicians and journalists.[3] However, this does not reflect the nuance of the industry's communication strategy. It was both the men in light grey suits and black ties, but it was also through surrogates such as journalists, politicians and the local workforce and populations around nuclear plants.

The reinvigoration of the anti-nuclear movement, caused by the sixth report of the Royal Commission on Environmental Pollution, the accidents at TMI and Chernobyl, as well as intensified Cold War tensions, led to an increased confrontation at drawn-out public inquiries, as well a debate within the national newspapers over whether nuclear power was worth the risks associated with it. There was a debate where the two sides

[3] I. Welsh, *Mobilising Modernity: The Nuclear Moment*, 185.

could not agree on the terms of the debate and the values that were being measured and how they should be measured. Although the opposing arguments were talking past, rather than at, each other, the increased intensity of opposition helped drive the collaboration within the nuclear industry and alter how they approached communicating with the public. These confrontations primarily took place at the public inquiries held for THORP, Sizewell B, and Hinkley Point C.

The nuclear debate also took place within the nation's newspapers, and on occasion within more informal settings, such as university debates and at meetings of APPGs. However, for most of this period, it would be more accurate to describe the opposing sides as talking past each other to their supporters, rather than to each other. In line with previous analyses, I too agree that the public inquiries were an insufficient means for public engagement in the decision-making process.[4] However, I have also shown how these forums between pro- and anti-nuclear groups, were more about giving the government of the day the political legitimacy to implement policy, rather than as a fact-finding investigation. As part of the establishment, the nuclear industry was in a better position to understand this and so did not see the purpose of public inquiries as a means to convince the public that nuclear power was safe and economically sound, but rather presented arguments most likely to ensure their case was supported by those who held sway in the corridors of power. However, the intensity of opposition towards nuclear power and a perception that public opinion was turning against nuclear power generated narratives that the industry found itself forced to counter. As with the response to the report of the Royal Commission on Environmental Pollution, the focus of this effort was to demonstrate, rather than just say, that nuclear power was safe.

In Chapter Three, I showed how the accident at TMI further upset the plans of the industry and that its initial procedures to deal with a potential nuclear accident had little consideration for how it would communicate with the public. Changes were made to how the information would be disseminated, and a case was built up that an accident like what happened at TMI could not happen in the UK. This same hubris was replicated in the wake of the Chernobyl accident. However, Chernobyl drastically changed contingency plans, and crucially how information about the dangers of radioactivity would be communicated. Again, I have exhibited how there existed a hierarchy of communication.

[4] See B. Wynne, *Rationality and Ritual*; C Aubrey, *THORP*; I. Welsh, *Mobilising Modernity*; R. Davies, 'The Sizewell B Nuclear Inquiry'; R. Davies, 'The Effectiveness of the Sizewell B Public Inquiry'.

However, this time the difference was not based on whether the information was available but rather what kind of information was available as exemplified by the differences between the UKAEA and CEGB videos covering Chernobyl. These videos also remind us that the industry was not a homogenous body. The various branches that made it up would play different roles depending on what the situation was and, more importantly, who led these separate branches and what kind of public profile they maintained. As the primary nuclear research institution, the UKAEA saw itself as providing the technical response to the accident, to be seen and understood by nuclear operators and scientists, while the CEGB, who operated the commercial nuclear reactors, defended their continued operation by aiming its material at the wider "lay" public.

Chernobyl presented a different challenge to the UK government and industry, in addition to the concerns over whether such an accident could happen at a UK reactor. The disposition of radioactive material over swathes of the country required a concerted effort from the industry and government to mitigate the anxiety that emanated as a result of this. Chapter Six examined these efforts through the case study of North Wales, around the Wylfa and Trawsfynydd nuclear plants, and showed how the government communicated the scientific data they had gathered on radioactive deposition by making visible the radioactive contamination and its gradual decline through the coloured marking of sheep. This local perspective also reinforces the argument that both the industry and the government was focusing their communicative efforts on the localities around nuclear plants. Both the chapters on Chernobyl also show how it was politicised by both anti-nuclear activists and political parties wishing to see an end to the nuclear industry, but also the government as well, who sought to use the accident as an example of the follies of the Soviet state.

Through these answers, the most significant argument I make is the existence of a hierarchy of communication that the industry created. While the information was publicly available in the sense that it was accessible via news reports, newspapers and publications placed within local libraries, this does not mean that all the public saw all or even much of what the industry put out. This is because much of the information communicated, either by the industry itself or by the government, was to a selective group of audiences. Newspapers like *The Financial Times* or *The Guardian* had audiences which the industry wanted to communicate with. Most of the public lectures given by the senior officials of the industry, like Hill and Marshall, were given at public schools like

Eton or Westminster, or universities like Cambridge and Oxford. Parliamentarians would benefit from direct correspondence or in-person dialogue with these officials at APPGs or Select Committee hearings. When Marshall was made a crossbench peer of the House of Lords, the industry benefitted from having its figurehead physically within one of the UK's legislatures.[5] This raises a very important point, the industry was a lobbying group first and a science communicator second.

I am not arguing that the communication of science was not important to the industry or the government. It was, after all, one of the best-resourced efforts to communicate science at the time. The public lectures and the visitor centres using innovative and interactive technologies clearly show they saw it as important to "educate" the public, particularly on matters such as nuclear waste which had dominated the nuclear narrative since the mid-1970s. Events like Operation Smash Hit, while not a scientific experiment, utilised the industry's scientific and technical expertise in an attempt to demonstrate to the public that the industry could be trusted. Nevertheless, the industry did lobby the influential audiences on issues like the economics of nuclear power, and how nuclear power fits into the wider UK energy mix and policy. They argued that, without nuclear, the UK would not be able to meet future energy needs. However, because of the nuclear narrative focusing on issues like nuclear waste, safety, and the potential for nuclear accidents, this pushed the industry to focus its outputs on showing that it was indeed safe. Ironically, this focus on safety potentially contributed to the stagnation of the industry as it put off potential investors, although the discovery of North Sea oil and gas probably ensured that nuclear energy never became the dominant form of energy production in the UK.[6]

Further research

Several avenues of research that can be explored further are opened up by this thesis. The privatisation of the industry is a relatively understudied area, and this thesis has only been able to briefly mention its impacts in passing. Having looked at how the industry communicated the science of nuclear power to the public and how it lobbied parliamentarians, looking at how the industry sought to attract potential investors would

[5] Christopher Hinton also sat in the Lords from 1965, but only after his retirement from the CEGB.
[6] D. Helm, *Energy, State and the Market*, 190.

further expand the field of historical knowledge of how the industry operated in the 1980s. Crucially, it could also help to expand our understanding of why the privatisation of the nuclear industry had to be initially withdrawn from the privatisation plans and then subsequently why British Energy failed. This could be expanded further to look over a longer period, rather than just the late 1980s onwards. Looking at the role of businesses and business forums, such as the Federation of British Industry, later the Confederation of British Industry, would allow us to see how businesses interacted with the nuclear industry, what opportunities did they see and push for? How were they lobbied by the UKAEA and CEGB and in particular, did these two organisations push different agendas when it came to the choice of the AGR or PWR reactor?

There is also an international dimension to this thesis that I have been unable to explore due to the limitations imposed upon me. Bilateral and multilateral collaboration between the UK nuclear industry, its counterparts in places like the USA, France, and Canada, and through the IAEA, would indicate to what extent was the UK industry influenced by its international partners in its messaging. This would be particularly useful around events such as TMI and Chernobyl, this thesis has already indicated that after TMI the US NRC supplied the UKAEA with its reports and gave senior officials such as Walter Marshall briefings on what caused the accident. Likewise, in Chapter Five and Six, the lack of information initially from the Soviets hindered the initial response to the Chernobyl accident. Looking in particular at how the lines of communication change and whether states and nuclear industries around the world coalesce around a single message would allow us to see to what extent were these transnational forums and agreements important to these industries and also to the communication of nuclear science.

Why this thesis matters

This thesis provides new insights into how nuclear science was communicated to the government and how the government formed policy as a result. It shows us that there was a significant divide in the information available between those who the industry deemed important and everyone else. This is important because if nuclear power is to be back on the policy agenda lessons must be learnt to avoid repeating previous mistakes. A reflective industry and government are needed that maintain a dialogue with local communities and to remove the idea that just because they can do something, does not

mean they should. Given the current debates over climate change and how governments should proceed with reducing greenhouse gas emissions, then if governments want a reliable and independent supply of electricity, nuclear may have to be maintained as part of the energy mix. In other spheres, the government's response to the COVID-19 pandemic raises similar salient issues of trust, transparency, and scientific credibility.

This does not mean that nuclear must be a part of the energy mix. However, if the UK government wishes, as of 2020, to build a new generation of nuclear reactors similar to Hinkley Point C, as well as experimental Small Modular Reactors, then it should expect similar questions that faced the CEGB, UKAEA and BNFL to be asked again.[7] Is it safe, is it economical and how will nuclear waste be transported and safely stored? This thesis is also salient for the age of social media communication, controlling the narrative in the fast-paced world of twenty-four-hour rolling news coverage, Twitter, and extreme polarization will be significantly more difficult than it was in the 1980s. The COVID-19 pandemic has also raised the possibility of virtual public inquiries or similar public forums, such as so-called citizen assemblies. Will the government be able to replicate the strategy from the 1980s within a virtual forum? For example, will a focus on the locality of nuclear sites work within these forums that will be easier to attend? My thesis cannot fully answer these questions that it raises, but the study of this period of intense public debate of the nuclear industry provides insights into what another intense period of public debate might look like as we seek to deal with climate change. Even if the government decides not to build new nuclear reactors beyond Hinkley Point C, the issues around decommissioning will remain and the waste from that process, as well as the waste from a reactor's nuclear operating lifetime, will also need to be processed and stored somewhere.[8] Regardless of whether you believe that the nuclear industry has been and is beneficial to the UK, its legacy will, in some form, be here to stay.

[7] Hinkley Point C, the only nuclear power station currently being built in Britain.

[8] As evidenced by the recent Public Accounts Committee report which estimates the cost to the taxpayer of cleaning up Magnox nuclear power plants to be £132 billion. See Public Accounts Committee, '"Sorry saga" of disused nuclear sites will cost generations of UK taxpayer'. Available online https://committees.parliament.uk/committee/127/public-accounts-committee/news/136734/sorry-saga-of-disused-nuclear-sites-will-cost-generations-of-uk-taxpayer/ Accessed 26/01/2021.

Appendix A

Brief biography of industry officials named within the thesis.

Name	**Job history between 1975 to 1990 within the nuclear industry**
Sir John Baker	CEGB Company Secretary 1979, later led the CEGBs case for Sizewell B and managing director during the inquiry. A senior official in National Power post-privatisation of CEGB.
John Dunster	Deputy-Director General NII 1976 to 1982. Director of the NRPB 1982 to 1987.
Glyn England	Chair of CEGB 1977 to 1982. Previously chair of South West Electricity Board 1973 to 1977.
Prof. John Gittus	Held numerous positions at the UKAEA across the period. Including, director of research for the PWR programme 1982, Science and Safety Director 1986, wrote the report on the failure of consequences of the Chernobyl accident published in 1987.
Sir John Hill	Chair of the UKAEA 1967 to 1981. Chair of BNFL 1971 to 1983.
Lord Walter Marshall	Chief Scientist for Department for Energy, 1974 to 1977. Dismissed after a disagreement with Tony Benn. Deputy chair of UKAEA 1975 to 1981. Chair of UKAEA 1981 to 1982. Chair of CEGB 1982 to 1988.
Peter Vey	Public Relations Director 1979 to 1982 Moved with Walter Marshall to CEGB as and later National Power post-privatisation public relations director 1982 to 1992.

Appendix B

Lead minister for Department of Energy, Department of the Environment, and MAFF.

Lead minister for Department for Energy 1974 to 1992.

Government in power	**Name of minister and period in office**
Labour government, 1974-1979	Eric Varley, from March 1974 to June 1975. Tony Benn, from June 1975 to May 1979.
Conservative government, 1979-1997	David Howell, from May 1979 to September 1981. Nigel Lawson, from September 1981 to June 1983. Peter Walker, from June 1983 to June 1987. Cecil Parkinson, from June 1987 to July 1989. John Wakeham, from July 1989 to April 1992.

Leading minister for Department for the Environment

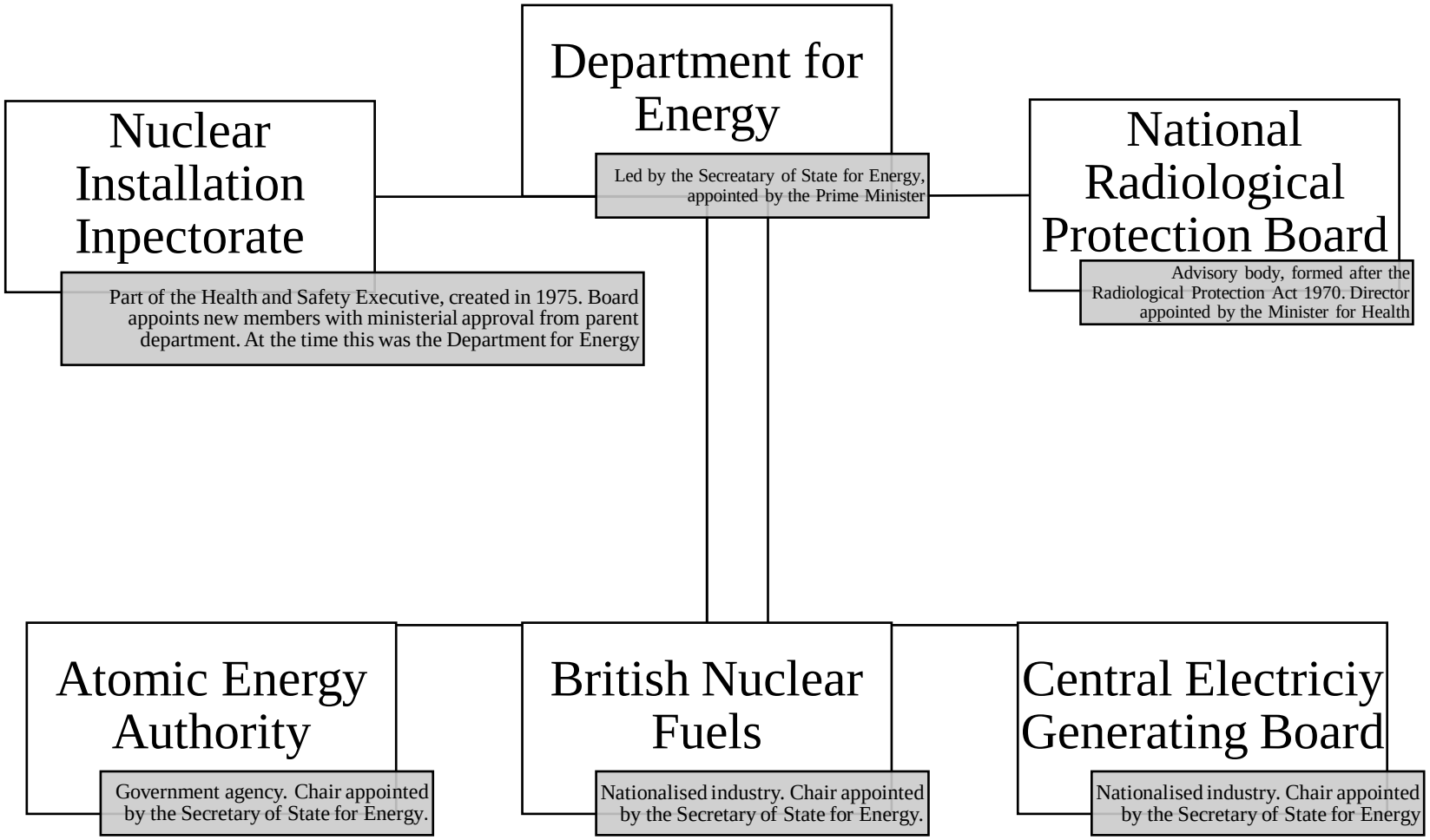
Government in power	**Name of minister and period in office**
Labour government, 1974-1979	Anthony Crosland, from March 1974 to April 1976. Peter Shore, from April 1976 to May 1979.
Conservative government, 1979-1997	Michael Heseltine, from May 1979 to January 1983. Tom King, from January 1983 to June 1983 Patrick Jenkin, from June 1983 to September 1985. Kenneth Baker, from September 1985 to May 1986. Nicholas Ridley, from May 1986 to July 1989. Chris Patten, from July 1989 to November 1990.

Leading minister for MAFF

Government in power	**Name of minister and period in office**
Labour government, 1974-1979	Fred Peart, from March 1974 to September 1976. John Silkin, from September 1976 to May 1979.
Conservative government, 1979-1997	Peter Walker, from May 1979 to June 1983. Michael Jopling, from June 1983 to June 1987. John MacGregor, from June 1987 to July 1989. John Gummer, from July 1989 to May 1993.

Appendix C

Simplified structure for the UK nuclear industry and regulators



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