THE BRITISH STATE AND THE NATURAL ENVIRONMENT: WITH SPECIAL REFERENCE TO THE ALKALI INSPECTORATE, circa 1860-1906

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Abstract

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The British State and the Natural Environment: With Special Reference to the Alkali Inspectorate, circa 1860-1906

The central intention of this thesis is to analyse a body of Victorian legislation, which was enacted to control atmospheric pollution by the chemical industry. Its concern is predominately with enforcement, and the principal aim is to assess the role and effectiveness of the British State and its agencies in this respect. The major focus is a somewhat neglected body of legislation - the Alkali Acts of 1863-1906. These initiated the State regulation of noxious emissions from the early heavy chemical (alkali) industry, and set up a central government body, the Alkali Inspectorate, to this end.

The major focus is the ability of Victorian institutions to formulate and implement environmental reforms, especially those which necessitated the increased control of industrial behaviour. It will explore the enforcement and decision making processes, assessing how priorities were set and whose interests were served. Furthermore, it examines the influence of economic, legislative, social, ideological and political factors upon inspection and prosecution. This study also assess whether the control of industrial atmospheric pollution was the consequence of a Victorian regulationist fervour or an example of utilitarian concern with environmental degradation.

The main body of the thesis is constituted by chapters on biography, the fiscal context and enforcement. These themes are drawn together by an assessment of the extent and effect of various constraints upon the Alkali Inspectorate. Throughout, some vital comparisons and contrasts with the inspectorates of factories and mines are made, in order to gauge State support for the Alkali Inspectorate. This assessment of the effectiveness of the Alkali Inspectorate and the legislation which created it, facilitates broader insights into the relationship between the State and industry and the extent of State intervention in nineteenth-century Britain.

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List of Abbreviations used in the Footnotes

B.A.S - Bury Archive Service

C.R.O - Cheshire Record Office

L.G.B - Local Government Board

U.C.L - University College, London

M.C.L - Manchester Central Library

P.R.O - Public Record Office

R.A.I - Report of the Alkali Inspector

R.C.N.V - Report of the Royal Commission on Noxious Vapours (1878)

S.C.I - Society of Chemical Industry

S.M.L - Science Museum Library

U.A.C - United Alkali Company

W.D.A - Wakefield District Archive

Glossary of Technical Terms used in the Thesis[1]

Alkali: A hydroxide which dissolves in water to form an alkaline or base solution which has pH>7.

Alkali industry: The production of sodium carbonate (soda alkali) by the Leblanc process, which formed the nucleus of the British heavy chemical industry during the nineteenth century.

Alkali waste: Also known as tank waste or galligu. For every ton of Leblanc soda ash, about 1.4 tons of noxious alkali waste was produced, of which the main constituent was calcium sulphide.

Ammonia: (NH_3). A colourless, pungent gas. Forms salts with most acids and nitrides with metals.

Aniline dye: A general term for all synthetic dyes having aniline as their base.

Anemometer: A device for measuring the speed of currents of air in the chimneys of chemical works.

Antimony: (Sb). Metallic element.

Arsenic: (As). A highly poisonous element, which occurs free and combined in many minerals. An impurity of several commercial metals and of the dye industry.

Aspiration: The removal of fluids or gases by suction.

Aspirator: A device for drawing a stream of air or oxygen or liquid through an apparatus by suction.

Benzene: A highly inflammable, colourless liquid. Produced from coal-tar and coke-oven gas.

Carbonic acid: A weak acid derived when carbon dioxide is dissolved in water.

Catalytic/Contact process: A process for the manufacture of sulphuric acid.

Chance-Claus process: A process, introduced in 1888, by which sulphur was recovered from alkali waste. Alkali waste was made into a slurry and passed through an arrangement of cylinders where it came into contact with carbon dioxide. Sulphuretted hydrogen (hydrogen sulphide) of the desired concentration was evolved in the last

[1]See the *Wordsworth Dictionary of Science and Technology* (Ware: Wordsworths Editions, 1995).

cylinder and transferred to the Claus kiln, in which the catalytic action of ferric oxide liberated sulphur. Between 65% and 80% of the sulphur in alkali waste could be recovered by this method.

Chlorine: (Cl). A greenish yellow gas, with an irritating smell and a destructive effect on the respiratory tract. Produced by the oxidation of hydrochloric acid and is widely used in bleaching powder and disinfectants.

Condenser: Apparatus used for condensing vapours obtained in distillation, using water.

Cyanogen: (C_2N_2). A very poisonous acid gas, with the smell of bitter almonds.

Flue: A passage or chamber through which the products of combustion of a domestic fire, boiler, furnace etc., are taken to the chimney.

Fluorine: (F). Pale greenish yellow gas. The most non-metallic of the elements. Chemically highly corrosive and never found free.

Gay-Lussac tower: Invented in 1835, but not introduced into this country until 1870, this enabled the recovery of the greater part of the oxides of nitrogen used in acid production.

Hydrochloric acid: (HCl). An aqueous solution of hydrogen chloride gas. Used extensively in industry for many purposes, including the manufacture of chlorine.

Hydrogen fluoride: (HF). A liquid which fumes strongly in air. Dissolves in water to form hydrofluoric acid. Produced by the action of sulphuric acid on fluorides. Used as a catalyst in organic reactions, the preparation of uranium, fluorides and hydrofluoric acids.

Hydrogen sulphide: (H_2S). May be prepared by the direct combination of the two elements, or by the action of dilute hydrochloric or sulphuric acid on iron sulphide. Poisonous, with a characteristic smell of rotten eggs. Also known as sulphuretted hydrogen.

Lead: (Pb). A metallic element, used in X-ray and nuclear work, for ammunition and as a constituent of bearing metals, solder and type metal. Lead can be hardened by the addition of arsenic or antimony.

Leblanc process: A now obsolete process for the manufacture of sodium carbonate and intermediate products from common salt, coal, limestone, and sulphuric acid. Sulphuric acid was reacted with salt in furnaces to produce sodium sulphate (saltcake). This was

reacted with limestone and coal in Le Blanc furnaces to produce 'black ash' from which soda was extracted. Soda was utilised in the production of soap, glass and fertilisers.

Minimetric analysis: A method for estimating the amount of carbonic or hydrochloric acid in the air, by use of a finger pump.

Muriatic acid: Hydrochloric acid.

Nitric acid: (HNO_3). A fuming, unstable liquid. Prepared on a large scale by the oxidation of nitrogen or ammonia. An important intermediate of fertilisers, explosives, organic synthesis, metal extraction and sulphuric acid manufacture.

Nitrogen: (N_2). Gaseous element which is colourless, odourless and constitutes approximately 80% of the normal atmosphere.

Roasting furnace: A furnace in which finely ground ores and concentrates are roasted to eliminate sulphur. Part or all of the necessary heat may be provided by the burning sulphur. The essential feature is the free access of air to the charge.

Rock salt: Halite, common salt.

Solvay process: This method was introduced into this country by the Brunner, Mond partnership in 1872. It is also known as the ammonia soda process, and enables the large scale conversion of salt to soda (sodium carbonate), by using ammonia. This process is based on the fact that when a concentrated solution of sodium chloride is saturated with ammonia, and carbon dioxide is passed through, sodium hydrogen carbonate is precipitated and ammonium chloride remains in solution. The Solvay process was more economical in both fuel and labour costs, and this led to the gradual demise of the Le Blanc process.

Still: Apparatus for the distillation of liquids.

Sulphate of ammonia: ($(NH_4)_2SO_4$). Commercially the most important of the ammonium salts, particularly for use as fertiliser. Produced partly as a by-product of gas works and coke ovens.

Sulphate of iron: Also called copperas. It usually results from the decomposition of iron pyrites.

Sulphur dioxide: (SO_2). A colourless gas formed when sulphur burns in air. Dissolves in water to give sulphurous acid.

Sulphuric acid: (H_2SO_4). A strong dibasic acid, which dissolves in water with the evolution of heat and is very corrosive. It is manufactured by sulphur dioxide, obtained by burning either pyrites or sulphur, by the contact process. It is an important heavy chemical, used extensively in dyestuffs and explosives industries, in the manufacture of other acids, such as hydrochloric acid, and in fertlisers.

Sulphuric anhydride: (SO_3). Sulphur trioxide; dissolves in water to give sulphuric acid.

Sulphurous acid: (H_2SO_3). An aqueous solution of sulphur dioxide.

Sulphuretted hydrogen: Hydrogen sulphide.

Vitriol: Sulphuric acid.

Wet copper process: An adjunct of the chemical industry, which involved the extraction of metals from pyrites. The wet copper process involved leaching and precipitating copper onto scrap iron from calcined ores soaked in water. Burnt ores, having been calcined with salt, were dumped into lixiviating tanks where cupric acid and sodium sulphate were filtered off; iron filings then precipitated pure copper from the filtrate. The residue in the filtration tanks contained 90%-95% iron oxide, and was sold onto iron smelters.

Zinc: (Zn). A hard white metallic element with a bluish tinge. Due to its good resistance to atmospheric corrosion, zinc is used for protecting steel.

Chapter One: Environmental Protectionism in Nineteenth-Century Britain

1.1: Introduction

The central intention of this thesis is to analyse a body of Victorian legislation, which was enacted to control atmospheric pollution by the chemical industry. Its concern is predominately with enforcement, and the principal aim is to assess the role and effectiveness of the British State and its agencies in this initiative. The major focus is a somewhat neglected body of legislation - the Alkali Acts of 1863-1906.[1] These initiated the State regulation of noxious emissions from the early heavy chemical (alkali) industry, introduced statutory emissions standards for selected chemical processes, and set up a central government body, the Alkali Inspectorate, to oversee implementation. The Alkali Act, 1906, formed the basis for twentieth-century pollution control in Britain.[2] It remained in place, except for additions by provisional order, until the Control of Pollution Act, 1974.[3] The study of the formulation and implementation of this anti-pollution legislation is a particularly enlightening aspect of nineteenth-century history, which will encompass and reveal assorted underlying political, economic and social features of the late Victorian era. This introduction will place this thesis within its historiographical context, and highlight the major issues that underpin it.

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[1]There were five enactments in this series -1863, 1874, 1881, 1892 and 1906. In addition, a Provisional Order was passed for salt and cement works in 1884. The most comprehensive treatment of the Alkali Acts has come from Roy M. MacLeod. See the case study in his thesis *Specialist Policy in Government Growth* (Unpublished Doctoral Thesis: University of Cambridge, 1967), and the article taken therefrom, 'The Alkali Acts Administration, 1863-1884: The Emergence of the Civil Scientist', *Victorian Studies*, 9 (1965-6), 85-113. However, it should be noted that these studies are relatively brief, dated and do not cover the field.

[2]The enforcement procedures that had become established by the Alkali Inspectorate by 1906 laid the foundations for the current pollution control strategies utilised in this country. See Vogel, D., *National Styles of Regulation: Environmental Policy in Great Britain and the United States* (Ithaca: Cornell University Press, 1986).

[3]Ashby, E., and Anderson, M., *The Politics of Clean Air* (Oxford: Clarendon Press, 1981), p.75.

1.2: Environmental History

This thesis has been informed by several types of literature. The first of these is recent work on environmental history, a new distinct sub-discipline which has evolved over the last two decades. At the most basic level this is history from 'the bottom up'; one could not get much lower down than the earth itself.[4] Barbara Liebhart has noted that at the heart of environmental history lies the observation that human beings, like other living organisms, share relationships with their natural environment that change over time.[5] For environmental historians, nature is neither something that is merely acted upon by human beings nor the theatre in which historical action occurs. Environmental history allows nature to become an actor in its own right. In her article 'The Theoretical Structure of Ecological Revolutions', Carolyn Merchant has illustrated this point,

> An ecological approach to history asserts the idea of nature as a historical actor. It challenges the mechanistic tradition by focusing on the interchange of energy, materials, and information among living and non-living beings in the natural environment. Non-human nature is not passive, but an active complex that participates in change over time and responds to human-induced change. Nature is a whole of which humans are only one part.[6]

One may follow William Cronon in questioning the uses of environmental history.[7] For Donald Worster the principal goal of environmental history is to deepen our understanding of how humans have been affected by their natural environment

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[4]Worster, D., *The Ends of the Earth: Perspectives on Modern Environmental History* (Cambridge: Cambridge University Press, 1988).
[5]Liebhart, B., 'Interpretation and Causal Analysis: Theories in Environmental History', *Environmental Review*, 12 (1988), 23-36 (p.23).
[6]Merchant, C., 'The Theoretical Structure of Ecological Revolutions', *Environmental Review*, 11 (1987), 265-274 (p.267).
[7]Cronon, W., 'The Uses of Environmental History', *Environmental History Review,* 17 (1993), 1-22.

through time and, conversely, how they have affected that environment and with what results. It is about 'the role and place of nature in human life'.[8] This new breed of historian has contended that their discipline has previously suffered from an excessively anthropocentric approach. Environmental history is rooted within a different set of assumptions. It does not deal exclusively with human interaction, but aims to uncover the various reciprocal relationships that have existed between humans and nature over time.

Methodological issues have risen to the forefront of debate within this new sub-discipline. Which areas should form the major focus for environmental historians? Worster has offered a conceptual model made up of three groups of issues and questions which form a basis from which enquiry could proceed.[9] Firstly, the environmental historian should attempt to gain an understanding of nature itself, to ascertain how nature is organised and the ways in which it functions. The second line of inquiry within this model is concerned with how the socio-economic realm interacts with natural environment. How do people define and use nature and its resources?[10] The third level on which this sub-discipline could operate is somewhat vague, focusing upon attitudes towards nature. In what ways have humans had a changing dialogue with nature? Such attitudes are evident through social myths, laws,

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[8]Worster, *The Ends of the Earth*, p.290.
[9]ibid., pp.292-3.
[10]An example of work which has utilised the three part model of ecological, economic and cognitive processes is Donald Worster's *Dust Bowl: The Southern Plains in the 1930s* (New York: Oxford University Press, 1979). This study has argued that the dust bowl in the American West of the 1930s was the logical result of the capitalist system, 'the dust-bowl...was the inevitable outcome of a culture that deliberately, self-consciously, set itself that task of dominating and exploiting the land for all it was worth'(p.64). The widespread drought which beset the same area at that time is illustrated as a secondary factor in shaping the landscape. Further attempts to link the historical interaction between the natural environment and economic/social life are evident in Bilsky, L.J. (ed.), *Historical Ecology: Essays on the Environment and Social Change* (London: Kennikat Press, 1980).

ethics, perceptions, and other structures of meaning.[11] Worster argues that these three approaches to the historical study of the environment are not separate or distinct, rather they should in unison constitute 'a single dynamic enquiry'.[12] Overall, as one commentator has maintained, 'it is our task...to pull nature itself into human history.'[13]

Constructing a methodology for identifying patterns and models of interaction between humans and their environment has been a controversial process.[14] Several problematic issues have been highlighted within the historiography of environmental history. A fundamental question concerns the concept of nature itself: how is it to be defined? Duncan has asked whether environmental history, like labour history and women's history, 'is to be the story of a victim, one bereft of rights?'[15] How is the environmental historian to avoid normative assumptions and the creation of a 'presentist' history that is little more than a reproach of past environmentally unfriendly behaviour ?[16] Environmental historians have frequently focused upon identifying thresholds when, once crossed, society began to violate nature.[17] However,

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[11]See Carolyn Merchant's eco-feminist critique *The Death of Nature: Women, Ecology and the Scientific Revolution* (San Francisco: Harper & Row, 1980), in which Merchant traces the triumph of patriarchal, materialist and pragmatic values over feminine and idealistic attitudes towards nature during the early modern period.
[12]Worster, *The Ends of the Earth*, pp.292-293.
[13]Cronon, 'The Uses of Environmental History', p.11.
[14]Liebhart, 'Interpretation and Causal Analysis', p.23. The probelms of definition have been more recently discussed by Rajan, S.R., 'Three Issues for Environmental Historians', *Environment and History*, 3 (1997), 245-252.
[15]Duncan, C.A.M., 'On Identifying a sound Environmental Ethic in History: Prolegomena to any Future Environmental History', *Environmental History Review*, 15 (1991), 5-30 (p.5).
[16]White, R., 'American Environmental History: The Development of a New Historical Field', *Pacific Historical Review*, 54 (1985), 297-335 (p.334).
[17]The most popular threshold identified by historians is the industrial revolution. However, Lynn White Jnr. has placed the origins of our ecological crisis in the Western Judeo-Christian tradition, see 'The Historical Roots of our Historical Crisis', *Science*, 155 (1967), 1203-1207. In contrast, in *The Death of Nature*, Carolyn Merchant has identified the scientific revolution of the 16th and 17th centuries as the catalyst for environmental degradation.

if the concept of 'Nature' is a time specific and socially constructed phenomenon,[18] how does one make definite judgements about what constitutes environmental harmony and degradation ?[19] Merchant has asserted that like science, history is a socially constructed discipline, with research questions being informed by contemporary concerns.[20] The rejection of anthropocentrism is also problematic. Can historians oust individuals and their actions from centre-stage if history is the discipline which records and interprets the past from a human perspective?

Despite such difficulties, this under-developed sub-discipline remains a vital subject for British research. William Cronon has asserted that environmental history offers an unusual opportunity for synthesis across historical sub-disciplines, offering four unique possibilities.[21] In the first instance all human history has a natural context. Man and nature are locked in a mutually reliant relationship, which has been overlooked by much traditional historical research. Secondly, neither nature nor culture are static. The interactions of environment, economy, political institutions, social norms, cultural values and natural processes are endlessly complicated, and certainly require greater systematic analysis. Thirdly, all environmental knowledge is culturally constructed and historically contingent. There are no decontextualised laws or truths. Environmental history can unravel such constructions. Lastly, environmental history differs from other disciplines that study the natural world, which aim to produce objective, precise predictions for the future. A historical study

[18]See Bird, E.A.R., 'The Social Construction of Nature: Theoretical Approaches to the History of Environmental Problems', *Environmental Review*, 11(1987), 255-264.
[19]For a discussion of this issue see White, 'American Environmental History', p.335.
[20]Merchant, 'The Theoretical Structure of Ecological Revolutions', p.266.
[21]Cronon, 'The Uses of Environmental History'.

of man's interaction with his environment can act as an antidote and complement to scientific certainty, by offering parables about past successes and failures.[22]

The environmental historian is in a position both to draw on insights and to contextualise the findings of many diverse fields, from anthropology to economics. [23] This perception of an inter-disciplinary, topic-led approach to history is one that found expression in the *Annales* school and its journal *Annales D'histoire Économique et Sociale*, founded in 1929. Marc Bloch and Lucien Febvre were advocates of de-compartmentalised 'Total' History,[24]contending that fields such as the history of philosophy and literary history are non-existent. Malcolm Chase has recognised that the various sectors of historical research that do consider environmental issues have so far remained mutually exclusive. Chase has listed four developed disciplines that study the natural world, which can be linked and unified by environmental history; these are historical ecology and the history of nature conservation, environmental politics, environmental issues, and agricultural history.[25]

Environmental history is reliant upon an inter-disciplinary approach, due to the fundamental role of the natural sciences in any study of the environment. However, as John Hassan has contended,

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[22]ibid., p.13.

[23]John Hassan has outlined the close relationship between economic and environmental history. Traditional economic analysis can explain the misuse of environmental common resources, because the origins of our ecological crisis lie in the historical processes which concern economic historians. See John Hassan, *Prospects for Economic and Environmental History* (Manchester: Manchester Metropolitan University, 1995), p.3.

[24]See Peter Burke's preface in Bloch, M., *The Historian's Craft*, 7th edn (Manchester: Manchester University Press, 1992), pp.ix-x. Marc Bloch's *French Rural History: An Essay on its Basic Characteristics* (London: Routledge and Kegan Paul, 1966) also makes relevant comments about this inter-disciplinary approach to history.

[25]For comment on the relationship between environmental history and historical geography see Williams, M., 'The Relations of Environmental History and Historical Geography', *Journal of Historical Geography*, 20 (1994), 3-21.

> Few scholars have followed in the footsteps of Wohl, Glick and Luckin in seeking to break down the disciplinary barriers which historical study touching on ecosystems requires.[26]

One commentator has called environmental history a 'multi-disciplinary minefield.'[27] Donald Worster has maintained that the new field of environmental history presents a welcome opportunity to bridge the gap between the sciences and the humanities that persists in intellectual life.[28] Nature has always been seen as the province of the natural sciences (and theology), yet this approach does not usually recognise individuals as integral to the eco-systems in which they exist and on which they depend. In contrast, the concern of the historian has been identified as solely cultural, focusing exclusively on man and social action. However as many have noted,[29]scientific knowledge itself is created out of social experience. Worster has argued that 'it is cultural forces which explain why we have become so out of synch with the rest of nature.'[30] Environmental problems may actually be represented not as a scientific misunderstanding of nature, but rather as the result of morally and politically mistaken social practices.[31] In this way, science and the humanities have

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[26]Hassan, *Prospects for Economic and Environmental History*, p.8. The principal work by A.S. Wohl is *Endangered Lives: Public Health in Victorian Britain* (London: Methuen, 1983). Glick is the author of 'Science, Technology and the Urban Environment: The Great Stink of 1858' in L.J. Bilsky (ed.), *Historical Ecology: Essays on the Environment and Social Change* (London: Kennikat Press, 1980), pp.122-139. Bill Luckin has published several inter-disciplinary accounts. See, for example, *Pollution and Control: A Social History of the Thames in the Nineteenth-Century* (Bristol: Adam Hilger, 1986) and *Questions of Power: Electricity and the Environment in Inter-War Britain* (Manchester: Manchester University Press, 1990).

[27]Wall, D., *Green History: A Reader in Environmental Literature, Philosophy and Politics* (London: Routledge, 1994).

[28]ibid., p.245. Donald Worster's call for strengthened links between science and history has been repeated in *Nature's Economy: A History of Ecological Ideas* (Cambridge: Cambridge University Press, 1985), and his article 'History as Natural History', *Pacific Historical Review*, 53 (1984), 1-19.

[29]See Bird, 'The Social Construction of Nature', p.255. The definitive work on the nature of scientific revolutions and normal science is Kuhn, T.S., *The Structure of Scientific Revolutions* (Chicago: Chicago University Press, 1968).

[30]Worster, D., 'The Two Cultures Revisited: Environmental History and the Environmental Sciences', *Environment and History*, 2 (1996), 3-14.

[31]Bird, 'The Social Construction of Nature', p.261.

something to offer each other. The integrating sub-discipline of environmental history can initiate new understanding, questions and approaches relating to environmental issues.[32]

Such a pursuit contributes not only to intellectual enlightenment, but could also be founded upon a moralistic rationale. Environmental history has the potential to feed into strategies for the improvement of our quality of life and the avoidance of the environmental nemesis anticipated by many. For Liebhart this attempt to inform and influence scientists and policy makers is the most controversial aspect of environmental history.[33] Stephen Dovers has talked of a 'pragmatic' environmental history that would offer a solid contribution to the resolution of modern environmental issues by keeping a firm grasp on pragmatism. Environmental history would not only serve to advance knowledge, but would also become a more focused and practical tool for contemporary policy considerations.[34] Many commentators have indeed approached their subjects with explicitly present day concerns.[35] The work of environmental historians such Worster and Tarr, who have provided parables of past successes and failures, obviously intends to contribute to environmental politics and to influence policymakers and activists.[36]

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[32]Worster, 'The Two Cultures Revisited'.
[33]Liebhart, 'Interpretation and Causal Analysis', p.24.
[34]Dovers, S., 'Sustainability and 'Pragmatic' Environmental History: A Note from Australia', *Environmental History Review*, Fall (1994), 21-36.
[35]A purely descriptive environmental history has been seen by many as redundant, serving only to normalise environmental problems rather than offer 'parables' for solution, see Blaschke, K., 'Environmental History: Some Questions for a New Sub-Discipline of History', in Brimblecombe, P. and Pfister, C. (eds.), *The Silent Countdown: Essays in European Environmental History* (London: Springer Verlag, 1990), pp.68-80 (p. 69).
[36]Cronon, 'The Uses of Environmental History', p.3. See also the publications of Joel Arthur Tarr on the contentious issue of water pollution, such as 'Water and Wastes: A Retrospective Assessment of Wastewater Technology in the United States, 1800-1932', *Technology and Culture*, 28 (1984), 226-263 and 'Historical Perspectives on Hazardous Wastes in the United States', *Waste Management and Research*, 3 (1985), 95-102.

The roots of environmental history lie in North American conservation and intellectual history.[37] For Roderick Nash, author of *Wilderness and the American Mind* (1967), the landscape itself forms a historical document, which can be read to uncover deep-seated cultural values.[38] The preoccupation with wilderness evident in the literature of early American environmental history, has recently been remedied by the work of Martin Melosi, Joel Tarr and William Cronon, who have focused upon man's conflict with the natural environment within the urban context.[39] However, in his article 'Transformations of the Earth: Toward an Agroecological Perspective in History', Donald Worster has contended that the study of the role and place of nature in human life should exclude the urban environment.[40] In the appendix to *The Ends of the Earth* he has expanded upon this argument, alleging that the built environment is expressive of culture, rather than nature, and is therefore separate from what should be the environmental historian's major concern. He further states that the study of the built environment is already well advanced in other fields of study.[41] These points have become the centre of debate. Martin Melosi has declared that it is illogical for Worster to concentrate upon 'human intrusion into the natural world in farming and not in the building of cities and towns.'[42] Meisner-Rosen and Tarr have offered a

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[37]See Walter Prescott Webb, *The Great Plains* (Boston: Ginn, 1931); James Malin, *The Grassland of North America* (Gloucester: Peter Smith, 1947); Samuel Hays, *Conservation and the Gospel of Efficiency* (Cambridge: Harvard University Press, 1959), and Clarence Glacken, *Traces on the Rhodian Shore: Nature and Culture in Western Thought from Ancient Times to the End of the Eighteenth Century* (Berkeley: University of California Press, 1967).
[38]Nash, R., *Wilderness and the American Mind* (New Haven: Yale University Press, 1967).
[39]Cronon, W., *Nature's Metropolis: Chicago and the Great West* (New York: W.W. Norton, 1991), Melosi, M. (ed.), *Pollution and Reform in American Cities 1870-1930* (Austin: Texas University Press, 1980); *idem*, *Garbage in the Cities: Refuse, Reform, and the Urban Environment, 1880-1980* (College Station: Texas A & M University Press, 1981).
[40]Worster, D., 'Transformations of the Earth: Toward an Agroecological Perspective in History', *Journal of American History,* 76 (1990), 1087-1106.
[41]Worster, *The Ends of the Earth*, pp. 289-307.
[42]See Meisner-Rosen, C. and Tarr, J.A., 'The Importance of an Urban Perspective in Environmental History', *Journal of Urban History*, 20 (1994), 299-310 (p.300).

conceptual model to be utilised for the study of the reciprocal relationship between urban and natural environments. This analysis is constituted of four elements, similar to the three clusters of issues outlined by Worster (see p.3). These are the analysis of the effects of cities on the natural environment over time and the analysis of the impact of the natural environment on cities. Further areas for consideration are the study of societal response to these impacts and efforts to alleviate environmental problems, and lastly the examination of the built environment and its role and place in human life as part of the physical context in which society evolves. Meisner-Rosen and Tarr have justified the consideration of built environments by the environmental historian on several grounds. The natural and built environment in which we exist evolved in dialectical inter-dependence and tension. Furthermore, the built environment covers a significant amount of the earth's surface and both seriously affects, and is affected by, the natural environment. Importantly, the urban defines the context in which most people and many organisms live. For these reasons urban historians have as much to contribute to a history of the interaction between man and the environment as historians of agriculture and wilderness.[43]It is with the urban/industrial context that this thesis is mainly concerned.

1.3 British Research

We live in an age where environmental concern is uppermost and the fear of an imminent environmental crisis is ever-present. Yet these factors have not been translated into widespread British historical research focused upon man's interaction with the natural environment. As Keith Thomas states in his seminal intellectual

[43]ibid., pp.301-7.

history of English attitudes towards nature, *Man and the Natural World: Changing Attitudes in England 1500-1800* (1984),

> By the later seventeenth century the anthropocentric tradition itself was being eroded. The explicit acceptance of the view that the world does not exist for man alone can be fairly regarded as one of the great revolutions in modern western thought, though it is one to which historians have scarcely done justice.[44]

Bill Luckin has noted that at the time of the explosion of interest of the social sciences in ecological issues, British historical research remained preoccupied with quantitative rather than qualitative and environmental matters.[45]Malcolm Chase has suggested four factors which have conspired against the development of environmental history in Britain. Firstly, the expectation of an environmental crisis is a recent phenomenon, secondly British social history is compartmentalised, thirdly historians are fearful of the vocabulary of science,[46]and lastly they possess a determinedly anti-global perspective.[47] Donald Worster has criticised British environmental history on the grounds that it is,

> Usually a history without general ideas, without theories or modes of explanation that can be applied to other, non-British settings. The particular,

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[44]Thomas, K., *Man and the Natural World: Changing Attitudes in England 1500-1800* (London: Penguin, 1983), p.166.

[45]Luckin, B., *Pollution and Control: A Social History of the Thames in the Nineteenth-Century* (Bristol: Adam Hilger, 1986), p.1.

[46]Donald Worster has commented that the language of science is 'as foreign to the historian as Chinese was to Marco Polo', *The Ends of the Earth*, p.294. The assertion that historians should understand and utilise scientific data has also been made by in Worster, D., 'History as Natural History', and Pfister and Brimblecombe (eds.), *The Silent Countdown*, p.2.

[47]Chase, M., 'Can History be Green? A Prognosis', *Rural History*, 3 (1992), 243-51 (p.246). See also Worster, D., 'World Without Borders: The Internationalising of Environmental History', *Environmental Review*, 6 (1982), 8-13, for an attack on the primacy of the nation-state in historical study. It is argued that environmental history should be placed within a more global framework.

the insular, and sometimes the antiquarian have come to typify environmental history there.[48]

British historiography on environmental history may be divided into four major approaches. These are the history of environmental policy, the history of green thought, the history of natural ecosystems - the attempt to reconstruct environments as they existed in the past and the study of the varying interaction between ecology and society.[49] The remainder of this chapter is predominately concerned with the first two areas of research.

Mieck has created a typology of environmental pollution constituted by six elements, three of which provide a useful framework for an analysis of literature focusing upon historical anti-pollution legislation.[50] The first type of pollution outlined by Mieck is *Pollution Microbienne* or *Pollution Bacterielle*.[51] It is caused by bacteria living and developing in decaying materials and stagnant water, and by a lack of sanitation. This type includes pollution from refuse, from dirty or polluted water, and contamination from human sewage.

Sewage pollution has long been a concern of historians of public health.[52] It seems that sewage pollution formed a concern for contemporaries too. In his article

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[48]Worster, 'World without Borders', p.11.
[49]Massa, 'The Paradox of Insignificant Change: Perspectives on Environmental History', *Environmental History Newsletter*, 5 (1993), 3-14.
[50]Mieck's categorisation is based on the work of Emmanuel Le Roy Ladurie (1973), see Mieck, I., 'Reflections on a Typology of Historical Pollution: Complementary Conceptions', in Brimblecombe and Pfister (eds.), *The Silent Countdown*, pp.73-80. Mieck's other categories of pollution not utilised in this historiographical survey are i. *Pollution Fondamentalle*, the extension of *Pollution Industrielle* which detrimentally affects not only regions, but whole countries or parts of continents; ii. *Pollution Foncire*, this includes the destruction of soil by intense agricultural and industrial practices; iii. *Pollution Accidentalle*, where the result of accidents have caused immediate environmental damage over large geographical areas.
[51]Mieck, 'Reflections on a Typology of Historical Pollution: Complementary Conceptions', pp.73-80.
[52]See Frazer, W.M., *A History of Public Health* (London: Bailliere, 1950), and Finer, S.E., *The Life and Times of Edwin Chadwick* (London: Methuen, 1952). As Luckin has noted, the lack of research on environmental history has been supplemented by research in the allied sub-discipline, the history of Public Health. Pollution issues have been integrated into general public health surveys. See Smith,

on the Victorian agricultural recycling of sewage, Goddard has contended that the efficient and healthy disposal of sewage was a focal point for public health and economic concern in the period 1840-1900.[53] This issue is presented by the author as highlighting the conflict between town and country in a rapidly urbanising nation. He traces the variety of methods and schemes suggested for the utilisation of town sewage by farmers, and the role of greater technical and scientific knowledge.

Recently the control of river pollution in Victorian Britain has become a popular focus for British environmental history, and this research has explored themes that are of relevance to this thesis. Lawrence Breeze has provided an overview of the local and national scientific and political contexts of water pollution control in mid-nineteenth-century Britain, discovering that the desire to protect trade outweighed environmental imperatives.[54]In addition, P.J. Smith has analysed the implementation and failure of the Rivers Pollution (Prevention) Act, 1876 within the Scottish context.[55] Crucially, for Smith the failure of this legislation in practice stemmed from the ideological failure of central government 'to reconcile the conflict between its desire to prevent pollution and its commitment to *laissez-faire* principles'.[56] This study of the politics of pollution control in its local context has highlighted the discrepancy between the national and local frameworks, revealing that local authorities were, for various reasons, incapable of enforcing this legislation.[57] In the

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F.B., *The People's Health* (London: Croom Helm, 1979) and Wohl, A.S., *Endangered Lives: Public Health in Victorian Britain* (London: Methuen, 1983).

[53]Goddard, N., 'Nineteenth-Century Recycling: The Victorians and the Agricultural Utilisation of Sewage', *History Today,* June (1981), 32-36.

[54]Breeze, L.E., *The British Experience with River Pollution 1865-1876* (San Francisco: Peter Lang,1993).

[55]Smith, P.J., 'The Legislated Control of River Pollution in Victorian Scotland', *Scottish Geographical Magazine*, 98 (1982), 66-76.

[56]ibid., p.66.

[57]Two recent doctoral theses have assessed the control of industrial water pollution in the local context. See Richards, T., *River Pollution Control in Industrial Lancashire 1848-1939* (University of Lancaster: Unpublished Doctoral Thesis, 1982) and Walklett, H.J., *The Pollution of the Rivers of*

late nineteenth-century, river pollution control usually amounted to the displacement of the problem to another geographical area. Luckin's interdisciplinary study *Pollution and Control: A Social History of the Thames in the Nineteenth-Century* (1986) has attempted to link social and political history, historical demography and social history of disease within a history of pollution of the river Thames during the nineteenth and twentieth centuries. Luckin has traced changing perceptions of pollution levels, the incidence of water-borne disease in the capital, and the politics of pollution control. Coastal pollution has also received attention. This issue has been presented by Hassan as a classic example of resource over-use and pollution displacement.[58] His analysis has highlighted an idea central to the MacDonagh thesis of nineteenth-century government growth-the concept of 'intolerability'. For Hassan, when the old-established practice of sewage disposal at sea became defined as 'intolerable' during the 1950s, government action resulted.[59] These issues of 'intolerability' and 'risk selection' are vital in any study of anti-pollution legislation. Scholars must question why some environmental risks were defined as 'intolerable' and selected for government action, while others were ignored. Douglas and Wildavsky have contended that the risks selected are a reflection of the society where choices are made, rather than a reflection of the character of the risk itself.[60] This has

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South-East Lancashire by Industrial Waste between c.1860-1900 (University of Lancaster: Unpublished Doctoral Thesis, 1993).

[58]Hassan, J., *Environmental and Economic History: Lessons from the Beaches* (Unpublished Paper: Manchester Metropolitan University, 1995), p.1.

[59]For Oliver MacDonagh, the definition of a problem as 'intolerable' by contemporaries was the key factor which kickstarted the regulatory process. However, this explanation can be criticised on the grounds that it is a tautology, a post-hoc rationalisation and a negation of explanation. See MacDonagh, O.O.G.M., 'The Nineteenth-Century Revolution in Government: A Reappraisal', *Historical Journal,* 1 (1958), 52-67, and Jennifer Hart's critique, 'Nineteenth-Century Social Reform: A Tory Interpretation of History', *Past and Present*, 31 (1965) 39-61 (pp.49-51).

[60]See the anthropological study by Mary Douglas and Aaron Wildavsky, *Risk and Culture: An Essay on the Selection of Technological and Environmental Dangers* (Berkeley: University of California Press, 1983). Also of relevance is Douglas, M., *Purity and Danger: An Analysis of Concepts of Pollution and Taboo* (London: Routledge, 1966). The concept of 'risk selection' has been criticised by

great relevance within an analysis of nineteenth-century anti-pollution policy. The risk of air pollution caused by the chemical industry was perceived as 'intolerable' and subjected to control under the Alkali Acts, yet pollution from coal smoke was relatively overlooked for another century, arguably due to the technically problematic and exhorbitant cost of abatement.

The second type of historical pollution defined by Mieck is *Pollution Artisanale* and is 'closely connected with human activities in economics.' The cause was pre-industrial workshops of artisans, such as potteries. The result was usually localised pollution of natural resources of water and air.[61] In the British context a study of air pollution in London from the medieval era has been provided by Peter Brimblecombe.[62] Both industrial and domestic pollution are analysed, incorporating the era from John Evelyn's *Fumifugium* (1661) to the Clean Air Act (1956), and beyond. Briblecombe has successfully utilised a wide range of sources from scientific data to literary sources. Te Brake has also provided an interesting study of pre-industrial London, focusing on air pollution and resource depletion.[63] Demographic factors (population growth), economic factors and environmental factors (deforestation) caused the widespread transfer, during late thirteenth and early

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Richard White on the grounds that it masks the serious nature of pollution problems in themselves, casting them as mere creations of the societies which they affect. See White, 'American Environmental History', p.334. However, the cases of localised pollution from 'noxious vapours' and the widespread effects of coal smoke support the thesis of 'risk selection'. Remedial government action was only taken to control chemical pollution, indicating that legislative reaction was not linked to the scale of the problem.

[61]Mieck, 'Reflections on a Typology of Historical Pollution: Complementary Conceptions', pp.73-80.

[62]Brimblecombe, P., *The Big Smoke*, and *idem*, 'Attitudes and Responses Towards Air Pollution in Medieval England', *Journal of the Air Pollution Control Association*, 26 (1976), 941-5. Also recently published is Jenner, M., 'The Politics of London Air: John Evelyn's *Fumifugium* and the Restoration', *The Historical Journal*, 38 (1995), 535-551. This is an interdisciplinary study, which incorporates the histories of public health, the urban environment and scientific ideas. The author has contended that *Fumifugium* illustrates a seventeenth-century environmental concern, but also had a broader social and political purpose.

[63]Te Brake, W.H., 'Air Pollution and Fuel Crisis in Preindustrial London, 1250-1650', *Technology and Culture*, 16 (1975), 337-59.

fourteenth centuries and the late sixteenth century, to the use of sea-coal rather than wood as a fuel source. However, the high sulphur content and impurities of sea-coal had detrimental effects on the atmospheric environment.

The third type of historical pollution identified by Mieck's model is *Pollution Industrielle*. Unlike *Pollution Artisanale* this type of pollution is characterised by the wide extension of environmental damage from industrial sources. *Pollution Industrielle* appeared at the beginning of the nineteenth-century with the development of industries, particularly those producing iron and chemicals.[64] In many countries increased pollution resulted in national strategies to prevent environmental damage. For example in France a decree to control environmental damage from industrial sources was passed as early as 1810. This was matched by legislation in Prussia in 1845 and England in 1863, the aforementioned Alkali Acts,[65] which form the focus of this thesis.

In Britain during the later part of the nineteenth-century, environmental protection emerged as an acceptable facet of public policy and State intervention. The Alkali Acts were a prime example of this, and were enacted to tackle large scale pollution from the alkali industry. This was the nucleus of the heavy chemical industry, and had its centres in South Lancashire, Tyneside and the Central Valley of Scotland. It produced soda alkali (sodium carbonate) which was used by the soap, glass and textile industries and for fertiliser and gunpowder. The alkali trade was properous; by 1862, the year of the first government investigation into pollution from

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[64]Mieck , 'Reflections on a Typology of Historical Pollution: Complementary Conceptions'.
[65]For an analysis of the reaction toward *pollution industrielle* in pre-unified Germany see Schramm, E., 'Experts in the Smelter Smoke Debate', in Brimblecombe and Pfister (eds.), *The Silent Countdown*, pp.196-209. For work on French environmental history, see Georges, B., 'Pour une Histoire Ecologique de la France Rurale', in Ruby, G. (ed.), *Histoire de la France Rurale* (Paris: Sevil, 1975), pp.32-113.

this source, it generated £2 million a year and employed over 19,000 men.[66] From the mid 1820s, soda alkali was produced by the Leblanc process, the first stage of which revolved around the treatment of salt with sulphuric acid. This created hydrogen chloride, a noxious, corrosive gas which destroyed vegetation, corroded metalwork, damaged buildings, and injured cattle.[67] For every ton of soda produced, nearly two tons of alkali waste was made, and the surroundings of towns such as St. Helens and Widnes were allegedly reduced to grim industrial wastelands.[68]

The legislative response to this environmental risk was the Alkali legislation of 1863-1906, which set statutory limits for the emission of certain noxious by-products of the alkali industry. The first emission to be controlled was hydrochloric acid in 1863. However, a technological solution had existed since the 1830s, when William Gossage discovered that hydrochloric acid could be absorbed if it were passed through water in a tower filled with a porous material, such as coke. The Gossage tower became the technological basis of the Alkali Acts.[69]

The most comprehensive study of the Alkali Acts administration is that by Roy MacLeod.[70] MacLeod's work, from the perspective of administrative rather than environmental history, considers the Alkali Acts in the context of the MacDonagh model of government growth. This is the so-called nineteenth-century revolution in government, wherein an individualist, contractualist, *laissez-faire* government increasingly intervened in different areas, and became tied up in a momentum of

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[66]*Chemical News*, 6 (1862), p.208.
[67]Kargon, R.H., *Science in Victorian Manchester: Enterprise and Expertise* (Manchester: Manchester University Press, 1977), p.126. The devastating effiects of the alkali industry on the environment are detailed by the *Select Committee of the House of Lords on Injury from Noxious Vapours*, PP.1862.xiv.1.
[68]Matthews, M.H., 'The Decline of the British Leblanc Industry in the Nineteenth-Century: A Spatial Perspective', *Cambria*, 5 (1978), 46-68.
[69]Kargon, *Science in Victorian Manchester*, p.126.
[70]MacLeod, *Specialist Policy in Government Growth*, and 'The Alkali Acts Administration.'

reform.[71] MacLeod has focused primarily upon the role of the scientific expert in the formulation and implementation of a rapidly changing type of public policy. He has utilised six case studies, of which the Alkali Acts form one, to explore the policies influenced by the new scientific, medical, technical and sociological knowledge at the command of Victorian government departments, in order to make generalised and substantial conclusions about the role of specialised policy in the transformation of Victorian government.[72] Hence, central civil administration is the primary concern of this study. The politics of pollution, the evolution of enforcement strategies, the nature and actions of scientific civil agencies and the operation of legislation in the day to day context do not fall within the parameters of MacLeod's work.

A second study of the Alkali Acts in their national context is A.E Dingle's '"The Monster Nuisance of All": Landowners, Alkali Manufacturers and Air Pollution, 1828-1864.'[73] The author focuses particularly upon the conflicting interests of landowners and alkali manufacturers in the evolution and formulation of this 'restrictive and sectional' legislation. Dingle has asserted that these statutes represented the State supervision of the chemical manufacturing interest, in order to protect the property of landowners.[74] He has questioned why:

> ...a measure which not only imposed State supervision on the property of manufacturers, but also interferred with the ways in which the processes of

[71]MacDonagh, 'The Nineteenth-Century Revolution in Government: A Reappraisal'. Also important is Henry Parris's riposte, 'The Nineteenth-Century Revolution in Government: A Reappraisal Reappraised', *Historical Journal*, 3 (1960), 17-37, in which Parris had criticised MacDonagh for under-estimating the influence of Benthamite imperatives upon policy, and for portraying the momentum of reform as an inevitable process.
[72]MacLeod, *Specialist Policy in Government Growth*, p.ii.
[73]Dingle, A.E., '"The Monster Nuisance of All": Landowners, Alkali Manufacturers and Air Pollution, 1828-1864', *Economic History Review*, 35 (1982), 529-548.
[74]ibid., p.529.

production were organised, [was passed] through a parliament where industrial interests were in the ascendant?[75]

In the final analysis Dingle has agreed with MacLeod that the alkali legislation 'did not represent any general move away from the philosophy of *laissez-faire*. It was simply a pragmatic response to a peculiar set of circumstances.'[76] Dingle has also criticised the first Alkali Act (1863) as too narrowly conceived and implemented. This is an assertion which remains to be tested and is a central concern of this thesis. Of particular interest to the environmental historian is Dingle's discussion of the issue of environmental property rights. The absence of individual property rights to common resources such as the air makes it possible for manufacturers to pollute the atmosphere, as the cheapest available option.[77]

An investigation of the operation of the Alkali Acts in the local context has recently been published by Richard Hawes,[78] who has commented upon the effectiveness of this anti-pollution legislation in the local context. He has concentrated on St. Helens, a centre of the chemical industry in the North West of England. Although Hawes has agreed with MacLeod's conclusion that the Alkali Inspectorate succeeded in limiting the release of hydrochloric acid gas, like Dingle he recognises that other noxious industrial emissions, notably hydrogen sulphide, were

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[75]ibid., p.540.
[76]ibid., p.546.
[77]ibid, p.535. The concept of 'the tragedy of the commons' was first evident in the thought of the Scottish philosopher and historian David Hume (1711-1776). This concept has been more recently explored by Garrett Hardin, see 'The Tragedy of the Commons', *Science*, 162 (1968), 127-151. In his study of the California fisheries, *The Fisherman's Problem: Ecology and the Law in the California Fisheries, 1850-1980* (Cambridge: Cambridge University Press, 1986), Arthur McEvoy utilises this idea to argue that within a competitive economic climate there existed no reward for an individuals use of shared resources, so environmental degradation resulted and the government was eventually forced to intervene with legislation (p.10).
[78]Hawes, R.A., 'The Control of Alkali Pollution in St. Helens 1862-1890', *Environment and History*, 1 (1995), 159-171. This consideration of the pollution issue forms one chapter in this author's broader survey of public health in nineteenth-century St. Helens See *idem*, *A History of Public Health in St. Helens* (Unpublished Doctoral Thesis, University of Liverpool, 1991).

not controlled. Hawes has ascribed this failure to the local economic importance of the alkali industry 'which was powerful enough to deflect regulation from any source.'[79] This thesis will further analyse the relationship between environmental protectionism and economic factors, and assess which took precedence in the enforcement of the Alkali Acts.

The failure of pollution law to control *Pollution Industrielle* in the local context has been further illustrated by several commentators. In a study of late nineteenth-century York, Brimblecombe and Bowler discovered that weak legislative backing and limited technology undermined serious attempts to abate commercial smoke.[80] Neither the Sanitary Committee of York City Council, its inspectors, nor the local residents were able to force the North Eastern Railway Company to control emissions from its carriage workshops in a residential area of Holgate, York. In the Welsh context, Ronald Rees has uncovered ongoing conflict in the area surrounding the Swansea copper industry.[81] The waste heaps and sulphur and arsenic smoke produced by local copper smelters resulted in the 'Great Copper Trials' where local landowners sued manufacturers for causing a public nuisance. For Rees, this action was founded on a concern with the value of property rather than altruistic green attitudes, and was the result of conflict between two incompatible land uses. The arguments revealed during the Carmarthen trial of 1833 and the Swansea Rio Tinto

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[79]ibid., p.159.
[80]Brimblecombe, P. and Bowler, C., 'The Difficulties of Abating Smoke in Late Victorian York', *Atmospheric Environment*, 24 (1990), 49-55.
[81]Rees, R., 'The Great Copper Trials', *History Today*, December (1993), 38-44; *idem*, 'The South Wales Copper Dispute', *Welsh History Review*, 10 (1981), 480-496. In addition, on litigation in this gepgraohical area see Newell, E.,'Atmospheric Pollution and the British Copper Industry, 1690-1920', *Technology and Culture*, 38 (1997), 655-689. For further in-depth discussion about the industrial pollution levels in South Wales during the late nineteenth-century see, Newell, E. and Watts, S., 'The Environmental Impact of Industrialisation in South Wales in the Nineteenth-Century: 'Copper Smoke' and the Llanelli Copper Company', *Environment and History*, 2 (1996), 309-36.

trial of 1895 illustrate, as Hawes found in St. Helens, that local economic importance predominated over environmental or health considerations in the nineteenth-century context. Pollution was viewed as the acceptable price of prosperity.[82]

Historians have not merely focused upon anti-pollution legislation, but have also analysed legislation to conserve resources and to protect species. Peter Bartrip, in an article on the regulation of freshwater fisheries in the 1870s,[83] found that the introduction of a three month closed season for the capture of coarse fish was focused on the conservation of food resources and encouragment of leisure pursuits rather than on river pollution or a purely green concern. In the same way as the Alkali Act, freshwater fisheries legislation did infringe upon property rights and the *laissez-faire* ethos. Collective environmental needs were protected, but this was a by-product of legislation that was framed in terms of leisure and food issues.[84]

The second approach to environmental history evident in the British literature is the history of environmentalism. This is the study of the historical antecedents of contemporary green thought and focuses on changing perceptions of the natural environment in individual and group consciousness. The most well known study of this type in the English context[85] is that by Keith Thomas.[86] The author aims not just

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[82]ibid., pp.41-2. In 'Differing Perceptions of the Value of Pollution Abatement across Time and Place: Balancing Doctrine in Pollution Nuisance Law, 1840-1906', *Law and History Review*, 11 (1993), 303-381, Christine Rosen has provided an interesting analysis of the decision making process in pollution cases in nineteenth-century America. Balancing doctrine allowed judges to weigh the costs of imposing an injunction on a polluter against the benefits of abating the pollution. This case study of cost-benefit analysis by judges in New York, New Jersey and Pennsylvania varied sharply according to place and time. The attitudes of juries and judiciary towards chemical pollution will be scrutinised in chapter seven of this thesis.

[83]Bartrip, P.W.J., 'Food for the Body and Food for the Mind: The Regulation of Freshwater Fisheries in the 1870s', *Victorian Studies*, 28 (1985), 285-304.

[84]ibid., p.304.

[85]For a global focus on the origins of Western Environmentalism see the work of Richard Grove, particularly 'The Origins of Environmentalism', *Nature,* 345 (1990), 11-14, and 'The Origins of Western Environmentalism', *Scientific American,* July (1992), pp.22-7, in which Grove maintains that 'in truth, the roots of Western conservationism are at least two hundred years old and grew in the tropics.' (p.2). Many of Groves articles have been brought together in the publication *Ecology, Climate and Empire: Colonialism and Global Environmental History* (Cambridge: White Horse Press, 1997).

to explain the present; he also attempts to 'reconstruct an earlier mental world in its own right'.[87] For Thomas, the early modern period was formative in shaping man's perception and classification of the natural world. During this period new sensibilities arose towards animals, plants and landscape, resulting in a shift from exploitative to conservationist attitudes towards the natural world. In this way anthropocentric ideas were eroded, and man's relationship with other species was redefined. General social histories have uncovered the growing importance of outdoor pursuits and environmentally friendly leisure activity in Victorian Britain. Several commentators have highlighted the heightened interest in rural pursuits such as mountaineering, fishing and rambling, and the increasing investment in holiday retreats by the urban elite.[88] It has been argued that the function of the countryside was redefined as a necessary urban amenity, an antidote to town life,[89] and furthermore, rural leisure activities for the industrial working classes were actively encouraged by State agencies, as a form of social control.[90]

Several studies have placed this late nineteenth-century environmental concern within the framework of a broader contemporary social criticism.[91] For example, in *Early Green Politics: Back to Nature, Back to the Land, and Socialism in*

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[86]Thomas, *Man and the Natural World.*
[87]ibid., pp.15-16.
[88]Allen, D., *The Naturalist in Britain: A Social History* (London: Allen Lane, 1976). On the Victorian glorification of rural life and pastimes, see Wiener, M.J., *English Culture and the Decline of the Industrial Spirit* (Cambridge: Cambridge University Press, 1981). See also Prince, H., 'Victorian Rural Landscapes', in Mingay, G.E. (ed.), *The Victorian Countryside* (London: Routledge and Kegan Paul, 1981), pp.17-29.
[89]Gould, P., *Early Green Politics: Back to Nature, Back to the Land, and Socialism in Britain 1880-1900* (Brighton: Harvester Press, 1988), p.117.
[90]Storch, R.D.,'The Policeman as Domestic Missionary: Urban Discipline and Popular Culture in Northern England, 1850-1880', in Morris, R.J. and Rodger, R. (eds.), *The Victorian City 1820-1914* (London: Longman, 1993), pp.281-306. Also of relevance is Bartrip, 'Food for the Body and Food for the Mind: The Regulation of Freshwater Fisheries in the 1870s'.
[91]With reference to John Evelyn's seventeenth-century anti-pollution tract *Fumifugium*, Mark Jenner has contended that writing on pollution is often intrinsically linked to wider social and political criticism. See Jenner,'The Politics of London Air: John Evelyn's *Fumifugium* and the Restoration', p.551.

Britain 1880-1900 (1988), Peter Gould has argued that the 'back to nature writers of the last century...shared all but two of the twenty nine features that Jonathon Porritt has seen as distinguishing the politics of ecology from the politics of industrialism, and these two are the outcome of technological developments out of reach of nineteenth-century theorists.'[92] Hence,

> The most fecund and important period of green politics before 1980 lay between 1880 and 1900. During that period the philosophy of industrialism, the relationship between the individual and the social and physical environment, and the functions and successes of the city received an extraordinary degree of critical examination. That took place against a background of rising levels of unemployment and fears for its social consequences, the decline of rural society and culture, and concern at the role of Britain in the world economy and politics.[93]

Manifestations of a British environmental concern during the late nineteenth-century have also been perceived by David Pepper.[94] Pepper, a geographer, provides a historical, philosophical and ideological background to the development of 'green' thought. Pepper has identified four main periods when environmental concern was being articulated in the Western world. These were the 1890s, mid-1920s, late 1950s and early 1970s, 'all of them at the end of periods of sustained economic expansion, when people were more inclined to react against highly materialistic values.'[95] Again,

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[92]ibid., p.161. For an outline of Jonathan Porritt's typology see *Seeing Green* (Oxford: Blackwell, 1984). Further discussion is provided in Wall, *Green History*, pp.5-9.
[93]Gould, *Early Green Politics*. See also Alasdair Clayre's anthology *Nature and Industrialisation* (Oxford: Oxford University Press, 1977), which is a collection of contemporary views and criticisms of the effects of the industrial revolution, urbanisation, transport and technology upon Britain's landscape.
[94]Pepper, D., *The Roots of Modern Environmentalism* (London: Croom Helm, 1984).
[95]ibid., p.15. Lowe has also placed this value shift within the context of wider social criticism. The 'crisis of the city' and their destructive effects upon social harmony and health, the rapid transformation from an agricultural to an industrial economy and the post-Darwinian intellectual crisis.

environmental concern underpinned wider social criticism.[96] To what extent environmental concern underpinned the enforcement approach adopted by the Alkali Inspectorate will be revealed by this thesis.

A second approach to the study of the history of green thought evident in the literature has focused upon the actions of past environmental pressure groups.[97] The most comprehensive general overview is provided by John Ranlett.[98] As with Gould and Pepper, the author has uncovered evidence of a late-Victorian environmental concern. Ranlett has traced the establishment and operation of groups such as the Commons Preservation Society (1865), the Society for the Protection of Ancient Buildings (1877), the Metropolitan Public Gardens Association (1882), the Lake District Defence Society (1883), the Plumage League (1885), the Selbourne Society for the Preservation of Birds, Plants and Pleasant Places (1886), the National Trust (1895), and the Coal Smoke Abatement Society (1898). This study has uncovered an inter-twining network of organisations and individuals that attained mixed success. Ranlett has concluded,

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In 'The Rural Idyll Defended: From Preservation to Conservation' in Mingay, G.E. (ed.), *The Rural Idyll* (London: Routledge, 1989), pp.113-131 (p.114), Lowe has argued that, 'this preservationist concern was an integral part of the late Victorian intellectual reaction to many of the tenets of economic liberalism, including a reversal of the rationalist, progressivist outlook deriving from the Enlightenment, which...had looked always to the improvement of nature and society through the exercise of human reason'. For Lowe this preservationist concern was a progressivist rather than a reactionary, irrational or escapist trend.

[96]In the introduction to his anthology of 'green' historical writing, *Green History*, Wall has contended that academics should focus more directly upon the reasons for the rapid growth and sudden decline of environmental concern.

[97]See Lowe, P. and Goyder, J., *Environmental Groups in Politics* (London: George Allen & Unwin, 1983).

[98]Ranlett, J., 'Checking Nature's Desecration: Late-Victorian Environmental Organisation', *Victorian Studies*, 26 (1983), 197-222.

> The effectiveness of the organisations may be questioned, but the fact of their existence means at the least that Victorians who encountered in their path the deterioration of their natural environment did not pass by the other side.[99]

The detection of a Victorian environmental concern illustrated by the preceding literature has become a subject for debate. Ranlett has himself admitted the small numerical and narrow class basis of environmental interest groups. John Hassan has noted that environmentalism:

> ...was rarely seen as a major issue or point of social conflict in the nineteenth-century. Nor was environmental protection viewed as a component of 'progress' in the way that even the provision of public parks and washhouses might be.[100]

The most substantial body of literature on a late Victorian environmental concern and pressure group activity is that concerned with coal smoke abatement. This differs from the category *pollution industrielle*, because coal smoke pollution often stemmed from domestic sources. The work of Ashby and Anderson is most notable in this area, recording the historical roots of the British Clean Air Act of 1956.[101] Pressure group activity,[102] technological development,[103] and medical knowledge in relation to coal smoke pollution are analysed.[104]

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[99]ibid., p.222; see Huch, R.K., 'The National Association for the Promotion of Social Science: Its Contribution to Victorian Health Reform, 1857-1886', *Albion*, 17 (1985), 279-300, for observations on late Victorian research into pollution problems.

[100]Hassan, *Prospects for Economic and Environmental History*, p.13.

[101]Ashby and Anderson's *The Politics of Clean Air* also focuses upon the parliamentary context of the alkali legislation, during the period 1862-1906. There is a series of articles on the evolution of air pollution law by the same authors; see 'Studies in the Politics of Environmental Protection: The Historical Roots of the British Clean Air Act, 1956: I - The Awakening of Public Opinion over Industrial Smoke, 1843-1853', *Interdisciplinary Science Reviews*, 1 (1976), 279-90; 'II - The Appeal to Public Opinion over Domestic Smoke, 1880-1892', *Interdisciplinary Science Reviews*, 2 (1977), 9-26; 'III - The Ripening of Public Opinion, 1898-1952', *Interdisciplinary Science Reviews*, 2 (1977), 190-206.

[102]A useful, albeit brief, discussion of pressure group activity in this area is provided by John Ranlett in 'The Smoke Abatement Exhibition of 1881', *History Today*, November (1981), 10-13.

1.4: Aims and Objectives of the Thesis

The preceding discussion has illustrated the historical tradition in which this thesis is placed. It now becomes necessary to comment upon its focus, method and concerns, and to expand upon its original contribution to scholarship. This thesis has an established historiographical focus, as administrative historians have long exhibited an interest in the operation of State agencies such as central government inspectorates. However, this study will utilise more recent perspectives, that is to say, the ideas and approaches of environmental history and the sociology of law, in order to fully explore the Alkali Acts administration.

One early commentator has asserted that 'a study of nineteenth-century trends in British anti-pollution legislation is of minor importance within the framework of the history of Victorian England.'[105] However, this view must be disputed on several grounds. There are several omissions evident within current literature on nineteenth-century pollution policy that this thesis aims to rectify. The central aim is to discover the capability of Victorian institutions to formulate and implement environmental reforms, especially those which necessitated the increased control of industrial behaviour. More specifically, this thesis will reveal the effectiveness of the early

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[103]For in-depth descriptions of the use of coal and household technology see Ravetz, A., 'The Victorian Coal Kitchen and its Reformers', *Victorian Studies*, 2 (1968), 435-460. A description of three types of nineteenth-century commercial smoke abatement technology is given in Flick, C., 'The Movement for Smoke Abatement in Nineteenth-Century Britain', *Technology and Culture*, 21 (1980), 29-50 (pp.39-46).

[104]Whilst this work focuses upon the national perspective, Carlos Flick has provided an introduction to this issue within its local context. In his article 'The Movement for Smoke Abatement in Nineteenth-Century Britain', he has traced the evolution and effectiveness of local improvement acts with provisions for smoke abatement, reaching similar conclusions to studies of local water pollution control in this era. Flick has argued that 'parliament passed laws giving local authorities the power to act; the local authorities, forced to confront the polluters at close quarters in the councils and courts, wavered and passed the responsibility back to the central government. In the end little abatement was achieved (p.50).

[105]Beck, A., 'Some Aspects of the History of Anti-Pollution Legislation in England, 1819-1954', *Journal of the History of Medicine and Allied Sciences*, 14 (1959), 475-489 (p.475). This article provides a comparison of nineteenth and twentieth century parliamentary reports on air pollution.

Alkali Inspectorate, and analyse the political, cultural and economic contexts in which the actions and policies that influenced the environment were shaped. As one commentator has argued, it is particularly vital in an area so connected with the public interest to explore how priorities were set, and whose interests were served.[106] In the context of this thesis, the extent of State involvement and the role of economic, environmental and class factors in that involvement will be analysed. Did the alkali legislation protect private interests in their exploitation of common property, or was it altruistic legislation on behalf of collective interests?

The existing historiography has illustrated the 'noxious vapours' question as merely a concern of State agencies, landowners and manufacturers. However, to what extent was there a conflict of interests between these groups, and what were the attitudes of local sanitary authorities, manufacturers' associations and local environmental societies? A reconstruction of a past mental world can uncover whether the working classes also expressed environmental concern, or conversely, was alkali pollution merely a concern for the middle and upper classes? One should question whether Dingle and MacLeod are correct in emphasising the pragmatic nature of the Alkali Acts. Do they in fact represent a subtle ideological shift during the late nineteenth-century, and were the alkali inspectors actually early 'green' crusaders ?

The enforcement of the Alkali Acts is currently obscure.[107]However, the day to day and small scale enforcement decisions taken by the Alkali Inspectorate are particularly revealing, not only of attitudes towards industrial air pollution, but also of the broader social, political and economic context within which this body operated.

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[106]White, 'American Environmental History', p. 334.
[107]Hawes, R.A., 'The Control of Alkali Pollution in St. Helens', 159-171 (p.160).

There has been a lack of scholarly investigation into these issues, which is puzzling for several reasons. Firstly, there is an impressive body of historical research which focuses on nineteenth-century inspectorates.[108] In particular, discussion and debate has surrounded Her Majesty's Inspectorates of education[109], mines[110] and factories.[111] A vast amount of this work has attempted to re-analyse MacDonagh's conclusions about the nature and extent of government growth and State intervention in practice during the nineteenth-century. This study of the Alkali Inspectorate also falls into this theoretical framework. In addition, there is also a strong body of work within the social sciences, particularly in the sociology of law, which has highlighted the enforcement of contemporary environmental regulation.[112] Such work has raised

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[108]General overviews are provided in Harris, J.S., *British Government Inspection: The Local Services and the Central Departments* (London: Stevens & Sons, 1955), and Rhodes, G., *Inspectorates in British Government* (London: George Allen & Unwin, 1981). A useful categorisation of inspectorates has been presented in Hartley, O.A., 'Inspectorates in British Central Government', *Public Administration*, 50 (1972), 447-466. The nature and effectiveness of nineteenth-century government inspectorates has been questioned by Peter Bartrip in, 'British Government Inspection 1832-1875: Some Observations, *Historical Journal*, 25 (1980), 605-626, and *idem*, 'State Intervention in Mid-Nineteenth-Century Britain: Fact or Fiction?', *Journal of British Studies*, 23 (1983), 63-83.
[109]A useful account is provided in Ball, N., *Her Majesty's Inspectorate, 1839-1849* (Birmingham: University of Birmingham Institute of Education, 1963).
[110]See MacDonagh, O.O.G.M., 'Coal Mines Regulation: The First Decade', in Robson, R. (ed.), *Ideas and Institutions of Victorian Britain* (London: 1967), pp.58-86; Job, B., *The British Mines Inspectorate from 1851-1913: Its Development and Effectiveness with Particular Reference to Colliery Explosions* (University of Keele: Unpublished Doctoral Thesis, 1993).
[111]Of particular relevance to this thesis is work on the enforcement of the Factory Acts. See Bartrip, P.W.J., 'Success or Failure? The Prosecution of the Early Factory Acts', *Economic History Review*, 38 (1985), 423-427; Bartrip, P.W.J. and Fenn, P.T., 'The Evolution of Regulatory Style in the Nineteenth-Century Factory Inspectorate', *Journal of Law and Society*, 10 (1983), 201-222. Bartrip, P.W.J & Fenn, P.T.,'The Administration of Safety: The Enforcement Policy of the Early Factory Inspectorate, 1844-64', *Public Administration*, 58 (1980), 87-102; *idem*, 'The Measurement of Safety: Factory Accident Statistics in Victorian and Edwardian Britain', *Historical Research*, 63 (1990), 58-72 and *idem*, 'The Conventionalisation of Factory Crime - A Re-assessment', *International Journal of the Sociology of Law*, 8 (1980), 175-286. A contrasting perspective on enforcement has been provided by the sociologist W.G. Carson. See Carson, W.G.,'White-Collar Crime and the Institutionalisation of Ambiguity: The Case of the Early Factory Acts' in *Crime and Society: Readings in History and Theory* (London: Routledge, 1981), pp.134-147; *idem.*,'White-Collar Crime and the Enforcement of Factory Legislation', *British Journal of Criminology*, 10 (1970), 383-398, and *idem.*,'The Conventionalisation of Early Factory Crime', *International Journal of the Sociology of Law*, 7 (1979), 37-60.
[112]Gunningham, N., *Pollution Social Interest and the Law* (London: Robertson, 1974); Hawkins, K., *Environment and Enforcement: Regulation and the Social Definition of Pollution* (Oxford: Clarendon Press, 1984); McLoughlin, J., *The Law Relating to Pollution* (Manchester: Manchester University Press, 1972); Richardson, G. *et al*, *Policing Pollution: A Study of Regulation and Enforcement* (Oxford: Clarendon Press, 1982)

many issues which have not been fully explored in the historical context; such as formal and informal enforcement strategies, 'white collar' crime and the nature of State regulation of economically beneficial industrial activities.[113] This thesis will serve to bridge the gap between these two groups of research - environmental history and the sociology of law, by discovering to what extent economic, social and political factors influenced alkali inspection and enforcement procedures.

This study will facilitate a re-evaluation of the extent and effectiveness of State intervention in practice during the nineteenth-century.[114] MacLeod's optimistic conclusions about the ability of Victorian government to formulate and implement effective environmental reforms will be tested. John Sheail has already implied that the MacDonagh thesis, to which MacLeod's study of the Alkali Acts adheres, 'may exaggerate the capacity of government to impose regulation.'[115] This was due to three

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[113]However, there are several studies of the modern Alkali Inspectorate. For example, see Damon, A.I., 'The Alkali Act and the Work of the Alkali Inspectors', *Royal Society of Health Journal*, 76 (1956), 566-75; Frankel, M., 'The Alkali Inspectorate: The Control of Industrial Air Pollution', *Social Audit Special Report* (London: Social Audit Ltd., 1974); Weait, M., 'The Letter of the Law? An Enquiry into Reasoning and Formal Enforcement in the Industrial Air Pollution Inspectorate', *British Journal of Criminology*, 29 (1989), 57-70; Hutter, B.M., *Compliance: Regulation and Environment* (Oxford: Oxford University Press, 1997); O'Riordan, T. & Weale, A.,'Administrative Reorganisation and Policy Change: The Case of her Majesty's Inspectorate of Pollution', *Public Administration*, 67 (1989), 277-294.

[114]To what extent the mid-nineteenth-century was an age of *laissez-faire* or an age of collectivism has been the subject of fierce historical debate. For Holmes, '*laissez-faire* did not constitute a dominant force in the making of government policy', see Holmes, C.J.,'*Laissez-faire* in Theory and Practice: Britain, 1800-1875', *Journal of European Economic History*, 5 (1976), 671-688 (p.688). In addition, Brebner has argued that *laissez-faire* was no more than a myth, see Brebner, J.B., 'Laissez-Faire and State Intervention in Nineteenth-Century Britain', *Journal of Economic History*, 8 (1948), 59-73 (p.60). In contrast, Taylor, Crouch, Hobsbawm and Hartwell have all argued in favour of the existence and practice of *laissez-faire* ethic. See Taylor, A.J., *Laissez-faire and State Intervention in Nineteenth-Century Britain* (London: Macmillan, 1972); Crouch, R.L., '*Laissez-faire* in Nineteenth-Century Britain: Myth or Reality', *The Manchester School*, 35 (1967), 199-215; Hobsbawm, E., *Industry and Empire* (London: Weidenfeld and Nicolson, 1968); Hartwell, R.M., 'Entrepreneurship and Public Inquiry: The Growth of Government in Nineteenth-Century Britain', in Thompson, F.M.L., *Landowners, Capitalists and Entrepreneurs* (Oxford: Clarendon Press, 1994), pp.193-211. The debate has been further complicated by Harold Perkin's assertions that in reality *laissez-faire* and State intervention are not polar extremes. See Perkin, H.,'Individualism versus Collectivism in Nineteenth-Century Britain: A False Antithesis', *Journal of British Studies*, 17 (1977), 105-118.

[115]Sheail, J., 'Public Interest and Self Interest: The Disposal of Trade Effluent in Interwar England', *Twentieth Century British History*, 4 (1993), 149-170 (p.168). This commentator has produced a body of work which is of interest to environmental historians. For example, see *Nature in Trust: The History of Nature Conservation in Britain* (London: Blackie, 1976), and the articles, 'Never Again: Pollution

factors; the lack of scientific data, the importance of advice supplied by self-interested and powerful bodies, and the scope offered by enforcement bodies, which served to weaken anti-pollution legislation. This thesis will discuss whether the Alkali Acts were an administrative and an environmental success; or, alternatively, were environmental problems being transported to another locality, region or generation?

The following chapters will reveal the complex relationship between the British State and the natural environment, assessing whether the control of industrial atmospheric pollution was the consequence of a late Victorian regulationist fervour or an example of utilitarian concern with environmental protection. Throughout this thesis, some vital comparisons and contrasts with the factories, explosives and mines inspectorates will be made, in order to gauge the extent of State support for the Alkali Inspectorate. The thesis is organised as follows. Chapter two is a prosopographical study which explores issues such as the alkali inspectors' qualifications, expertise, social status and attitude towards environmental protection and State intervention. This will remedy the fact that, to date, the alkali inspectors are obscure figures, despite the fact that these individuals possessed the discretionary power which shaped the enforcement of environmental law. The third chapter is primarily concerned with the fiscal context within which the State regulation of noxious vapours occurred. It focuses particularly upon salaries, expenses and external funding, and the attitude of certain government departments towards expenditure on environmental protection. The enforcement approach adopted by the Alkali Inspectorate will be analysed in chapter four, and the subsequent chapter will focus in-depth upon the role of

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and the Management of Watercourses in Postwar Britain', *Journal of Contemporary History*, 33 (1998), 117-133; 'Wildlife Conservation: A Historical Perspective', *Geography*, 69 (1984), 119-127, and 'The Concept of National Parks in Great Britain, 1900-1950', *Transactions of the Institute of British Geographers*, 66 (1975), 41-56.

prosecution in the enforcement process. The themes explored in chapters two-five will be drawn together by chapter six, which will assess the extent and effect of various constraints on the enforcement of the Alkali Acts. What were the roles of personality, education, social class, finance, technological factors, workload and travel in shaping the development of pollution law in this country? The concluding chapter is entitled 'The Impact of Late Victorian Environmental Regulation', and forms an overall assessment of the effectiveness of the Alkali Inspectorate and the legislation which created it.

Chapter Two: The Alkali Inspectors, 1864-1906

2.1: Introduction

The following chapter explores the identity, background and beliefs of the first alkali inspectors. It will be indicated in later chapters that the education, experiences and work histories of the inspectors is central to a thorough consideration of salary, status and discretionary policy implementation.

It must be admitted that the role of the individual has often been a matter of contention amongst historians, and this remains the case for those who have debated the causes and nature of the growth of government during the nineteenth-century. Oliver MacDonagh has argued that the office of central government inspector was a vital ingredient which facilitated and perpetuated the 'nineteenth-century revolution in government.' Following the identification of a social problem that required resolution, remedial legislation was passed by the State, which employed agents to ensure efficient enforcement. These inspectors drew attention to the full extent of the social/economic or political problem in their field of inquiry with their annual reports, and often pressed for further legislative amendments. MacDonagh has contended that,

> The appointment of executive officers was a step of immense, if unforeseen, consequence. Indeed we might almost say that it was this which brought the process into life. There was now for the first time a body of persons, however few, professionally charged with carrying the statute into effect. As a rule, this meant some measure of regulation where before there had been none.[1]

[1]MacDonagh, 'The Nineteenth-Century Revolution in Government', p.59. See also MacDonagh's work on the Passenger Acts, in *A Pattern of Government Growth, 1800-1860* (London: MacGibbon and Kee, 1961).

Several commentators have agreed with this viewpoint. Roy MacLeod has contended that central government inspectors were part of a group of men who secured the administrative revolution, and furthermore, that these men held an increasing amount of power as the Victorian era progressed,

> Parliament remained the 'grand inquest of the nation', but outside purely political matters, its competence was no longer supreme. Power had passed to the executive, thence to administrators, thence to men of specialised knowledge.[2]

Kitson Clark has maintained that central government inspectors, along with civil service administrators, were nineteenth-century 'statesmen in disguise', and Harold Perkin has argued that the reports, minutes, memoranda of these inspectors were a series of closer approximations to the solution of a variety of social problems. In fact, central government inspectors were the 'vital x-ingredient' in the enforcement of nineteenth-century legislation.[3]

Even those who have underplayed the contribution of central government inspectors to the growth of government, have not denied these enforcement agents an important place in the administrative history of the nineteenth-century. For example, Peter Bartrip has argued that although the expertise and successes of the early factory inspectorate is debatable, there can be no doubt that individual personalities influenced the enforcement of legislation. Individual inspectors possessed the discretionary power to influence both the path that policy developments took, and the

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[2]MacLeod, R.M, (ed.), *Government and Expertise:Specialists, Administrators and Professionals, 1860-1919* (Cambridge: Cambridge University Press, 1988), p.2.
[3]Kitson Clark, G.S.R, 'Statesmen in Disguise: Reflections on the History of the Neutrality of the Civil Service', *Historical Journal*, 2 (1959), 19-39; Perkin, H., 'Individualism versus Collectivism in Nineteenth-Century Britain: A False Antithesis', *Journal of British Studies*, 17 (1977), 105-118 (p.107).

nature of the enforcement strategies selected.[4] Bartrip and Fenn have contended that Victorian government inspectors possessed the power and ability to vary policy in their respective districts:

> ...the law cannot be divorced or viewed in isolation from those who hold the official power to administer it. Force of personality was an important factor in the implementation of industrial regulations.[5]

The use of discretion was widespread in the regulatory process and the factory inspectors were not simply the agents of the economic, social and legal forces under which they operated. In fact, they were 'autonomous policy-forming agents', who had diverse principles and practices.[6] Under these circumstances, the background of the inspectors can give a vital insight into discretionary decision-making.

Although, nineteenth-century central government inspectorates have been a subject of scrutiny for several decades, little is known about these men. As Bartrip has contended:

> ...in many cases we know remarkably little about these officials before they took office. Even after appointment they often remain shadowy figures outside the pages of official reports and correspondence.[7]

There has been little consideration of the characters behind the Alkali Acts[8] and as Bartrip and Fenn have contended,

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[4]Bartrip, P.W.J, 'British Government Inspection', 1832-1875: Some Observations', *Historical Journal*, 25 (1980), p.622. Bartrip discussues the differing enforcement policies of the two joint Chief Inspectors (1852-1878), Robert Baker and Alexander Redgrave. Apparently, Baker often pursued the prosecution of offenders, whereas Redgrave viewed prosecution as a last resort measure. See pp.624-26.

[5]Bartrip, P.W.J and Fenn, P.T, 'The Administration of Safety: The Enforcement Policy of the Early Factory Inspectorate, 1844-1864', *Public Administration*, 58 (1980), 87-102 (p.88).

[6]Bartrip and Fenn, 'Administration of Safety', p.88. Peter Bartrip has further contended that we should discriminate between inspectors, even if they did serve in the same government department. See Bartrip, 'British Government Inspection', p.62.

[7]Bartrip, 'British Government Inspection', p.619.

> ...there is a tendency to lump inspectorates together even though they were responsible to different government departments, acted within constraining legal and industrial frameworks, had varying levels of qualifications, social status, and remuneration, and went about their work in differing ways.[9]

Therefore, as discretionary policy is forged by individuals, the background and beliefs of the early Alkali Inspectorate demands greater scrutiny.

This biographical study of the alkali inspectors is organised in the following way. The next section (2.2) will reveal the standard of qualifications and expertise required of these officials. This study will be divided into first generation, until the death of Angus Smith, the first Chief Inspector (1864-1884), and second generation (1884-1906). Section 2.3 will provide a comparison with other central government inspectors, particularly those concerned with the regulation of industrial behaviour, or those who required scientific or technical training to fulfill their role. Issues such as social class of the alkali inspectors and the social networks with which they associated, will be brought to the forefront in section 2.4. This will provide essential information about this supposedly unbiased inspectorate, that mediated between the interests of landowners and manufacturers. Section 2.5 will focus upon two subjects that have long been of interest to historians, recruitment and patronage. The last section of this chapter will assess the attitude of inspectors towards their role as enforcers of environmental legislation. An examination of the dedication of inspectors

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[8]With the possible exception of Robert Angus Smith. See, for example the short biographies provided in Ashby and Anderson, *The Politics of Clean Air* and Brimblecombe, P., '*The Big Smoke: A History of Air Pollution in London since Medieval Times* (London: Routledge, 1987).

[9]Bartrip and Fenn, 'Administration of Safety', p.99. Richard Johnson has also argued that 'the character of the service will depend, in large part, on the types of men recruited-on their predispositions and the social, educational and experiential forces which shaped them. Johnson, R., 'Administrators in Education', in Sutherland, G. (ed.), *Studies in the Growth of Nineteenth-Century Government* (London: Routledge, 1972), pp.110-139 (p.137).

to the cause of pollution control and their belief in collectivist justifications for State intervention in the chemical industry will reveal whether the inspectors were zealots, early 'green' crusaders, or disinterested government servants.

2.2: Biographical Study of the Alkali Inspectors 1864-1906

Robert Angus Smith

The first Chief Alkali Inspector, Angus Smith, has been credited with moulding 'the Alkali Inspectorate into the shape it still possesses today', and so his character, qualifications and background are central to this study.[10] Robert Angus Smith (1817-1884) was born on the 15th February 1817, the twelfth child and seventh son of John Smith, an unsuccessful millowner and calvinistic lay preacher.[11] At the age of nine, Angus Smith began attendance of Glasgow Grammar School, and at thirteen, he went to Glasgow University, where he took particular interest in the classics. [12] After leaving university, Smith became a tutor, and in 1839 went to Germany as tutor to the family of the Reverend and Honorable H.E. Bridgeman, who encouraged him to pursue the study of chemistry.[13] From 1839-1841, Smith studied for his Ph.D., at the Giessen research school established by Justus Liebig, one of the founders of organic chemistry.[14] Among Smith's fellow students in Germany were Henry Edward Schunck, the future Manchester chemist and manufacturer, and Lyon Playfair, the

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[10]Ashby and Anderson, *The Politics of Clean Air*, p.24.
[11]Hartog, P.J., 'Dr. Robert Angus Smith', *The Dictionary of National Biography*, xviii, pp.520-522 (p.520); Smith, W.A, *'Shepherd Smith' The Universalist* (London: Sampson Low, Marston and Company, 1892) p.16. This is a biography of Smith's elder brother, the Reverend James E. Smith.
[12]Smith, R.A, 'Dr. Angus Smith', *Biograph and Review*, V (1884), 142-152, (p.143). In 1836, his brother James wrote that .'..poor Robert seems to have been brought up in a balloon or a coal-pit, or some other place out of the world altogether. I advised him to endeavour to pick him a little more information respecting the daily occurrences of society.' Smith, *Shepherd Smith*, p.150.
[13]Schunck, H.E, ' Memoir of Robert Angus Smith', *Memoirs of the Manchester Literary and Philosophical Society*, 10 (1887), 90-102 (p.92).
[14]Hartog, 'Dr. Robert Angus Smith', p.520. In addition, Smith was awarded honorary degrees by Glasgow University (1881) and the University of Edinburgh (1882).

future chemist of national repute.[15] On Smith's return to England in 1842, he settled as a consultant chemist in Manchester, supplementing his income by lecturing at New College and Mechanics' Institution.[16] His Giessen colleague, Lyon Playfair, was by then Professor of Chemistry at the Royal Manchester Institution, a privately funded research institution. Smith became he lecture assistant, and in 1843 was invited to become assistant commissioner to Playfair on the Health of Towns Commission (1843-1848). This was set up under Edwin Chadwick to investigate the technical and administrative details of possible public health legislation. Smith and Playfair had special responsibility for the towns of South Lancashire.[17]

Smith was to continue to apply chemistry to government research and public health issues throughout his life. He investigated the chemical composition and microscopic life of the Thames for the Metropolitan Commission on Sewers (1847-9). However, this consultancy work did pose some difficulties, as Smith informed Edwin Chadwick in 1848,

> I wrote at the beginning of the enquiry saying that I could not undertake the matter without payment. I was told that I could not expect a great deal, and claim a regular professional sum.[18]

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[15] *Dictionary of Scientific Biography*, xviii (Oxford: Oxford University Press, 1968), pp.520-522.
[16] Ashby and Anderson, *The Politics of Clean Air*, p.25; Kargon, R.H., *Science in Victorian Manchester: Enterprise and Expertise* (Manchester: Manchester University Press, 1977), p.99.
[17] Gibson, A. and Farrar, W.V, 'Robert Angus Smith, F.R.S, and 'Sanitary Science', *Notes and Records of the Royal Society of London*, 28 (1974), 241-261(p.242). This article has recently been reprinted in Brock, W.H (ed.), *Wilfred Vernon Farrar: Chemistry and the Chemical Industry in the Ninteeenth Century* (Aldershot: Variorum, 1997).
[18] London University College (hereafter U.C.L), *Chadwick Papers*, Angus Smith to Edwin Chadwick, 17th July 1848 (41-3). Chadwick sent Smith £30, see U.C.L, *Chadwick Papers*, Edwin Chadwick to Angus Smith, 13th July 1848 (44-47). Smith was painfully aware of the financial insecurity of his profession. He has been quoted as saying that 'no man in Manchester has ever made a decent living, or indeed any living at all, by analytical chemistry, though four or five had made their way by consulting in addition.' See Kargon, R.H, *Science in Victorian Manchester: Enterprise and Expertise* (Manchester: Manchester University Press, 1977), p.144.

Smith broadened the focus of his research on water quality to include sewage and disinfectants. He assisted Frederick Crace-Calvert and Alexander McDougall in experimenting with sewage deodorants at the River Medlock, and in 1854 he took out a patent with McDougall on a disinfectant powder, leading the *Chemical News* to praise Smith as the 'first authority in Europe on the subject of disinfection.'[19]

In 1851 Smith's attention turned to the study of air quality, and he exhibited a particular interest in the production of sulphur during coal combustion. He shared the sanitarians' belief that the air of towns was less healthy than the air of the countryside and believed that this was due to the high amount of organic and carbonic matter in suspension in town air.[20] His research continued in the same vein with his contribution to the government's Condition of Mines Inquiry (1864), in which he compared the air of mines and large towns. Again, Smith attempted to determine the quality of organic and inorganic particles in suspension in the air, as well as the concentration of various gases present in the air of mines.[21] Smith also focused upon the physiological effects of carbonic acid, and concluded that carbonic acid was harmful to human health.[22] Following this investigation, Smith proposed a 'minimetric' method of estimating the amount of carbonic or hydrochloric acid in the air, which was to be essential in the enforcement of the Alkali Acts.[23] Throughout his service as Chief Alkali Inspector, Smith continued his involvement in other spheres of scientific research for government departments. For example, he wrote a report for the Royal Commission on the Cattle Plague in 1865, and gave evidence to the Royal

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[19]*Chemical News*, 9 (1869), p.105.
[20]Eyler, J.M, 'The Conversion of Angus Smith: The Changing Role of Chemistry and Biology in Sanitary Science, 1850-1880', *Bulletin of the History of Medicine*, 54 (1980), 216-234 (pp.219-220).
[21]Eyler, 'The Conversion of Angus Smith', p.221.
[22]Hartog, *The Dictionary of National* Biography, p.521. See also Eyler, 'The Conversion of Angus Smith', p.222.
[23]Schunck, 'Memoir of Robert Angus Smith', p.95.

Commission on Metropolitan Water Supply of 1867-1869.[24] In 1876, he was appointed an inspector under the Rivers Pollution Prevention Act, under the terms of which he wrote two official reports, in 1882 and 1884.[25]

During the 1870s, Angus Smith concerned himself with gathering together his research on air quality to establish a new discipline, which he named 'chemical climatology.' This was the investigation of artificial climates, such as those modified by industry or cities and the effects of those environments on human health.[26] Smith's study of what we now know as 'acid rain' was innovative. His research on the air of Manchester (1872) preceded other similar investigations by forty years, and his observation that hydrochloric acid may be a component of acid rain pre-dated others by eighty years.[27] This recognition of how chemistry could be usefully applied to the practical problems associated with industrialisation and urban growth was Smith's major talent.[28] For this reason, he is a prime example of Kargon's 'civic' and Macleod's 'civil' scientist.[29] However, Angus Smith was not a great scientist; in fact he has been described elsewhere as 'a half-trained amateur.'[30] He did not make any outstanding discoveries, and his published work often exhibits confused attempts to

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[24]See the *Royal Commission on Cattle Plague*, Third Report and Minutes of Evidence, PP.1865.xxii (c.3656) and the *Royal Commission on Metropolitan Water Supply,* PP.1869.xxxiii (c.4169) and (c.4169-I, II).
[25]Hartog, 'Dr. Robert Angus Smith', p.522. During his investigations into rivers pollution, Smith focused upon the gases given off by micro-organisms living in water, and investigated the effluents given off by sewage works. See Eyler, 'The Conversion of Angus Smith', p.230 and Schunck, 'Memoir of Robert Angus Smith', p.97.
[26]Eyler, 'The Conversion of Angus Smith', p.216.
[27]Gorham, E., 'Robert Angus Smith, F.R.S, and 'Chemical Climatology'', *Notes and Records of the Royal Society of London*, 36 (1982), 267-272 (pp.267-270).
[28]Eyler, 'The Conversion of Angus Smith', p.216; Ashby and Anderson, *The Politics of Clean Air*, p.25.
[29]Kargon, *Science in Victorian Manchester*; MacLeod, 'The Alkali Acts Administration.'
[30]Gibson and Farrar, 'Robert Angus Smith', pp.245-257.

reconcile Pasteur's germ theory and Liebig's fermentation theory, although it should be noted that he did accept Pasteur's work at the end of his life.[31]

During his period as a struggling consultant Smith twice unsuccessfully applied for the chair of Chemistry at Owens College, Manchester; in 1850 and in 1857. In 1862, his application for the Chair of Chemistry at the University of Aberdeen was rejected.[32] The same year he assisted on the jury of the London Exhibition, a role which he also later performed at the Paris Exposition of 1878.[33] From 1864, Smith finally gained a permenent position and financial security when he was appointed Chief Inspector, at a salary of £700 per annum (see 3.2). His research on pollution and national reputation as a sanitary chemist made Smith the logical choice for the position. He continued this position part-time, alongside his private research until his death in Colwyn Bay, on the 12th May 1884.[34] Many memoirs mention his particularly good natured temperament. His colleague at Giessen, Henry Edward Schunck, commented that 'the most marked trait in his character...was a wide benevolence', and furthermore,

> His extreme conscientiousness and high sense of honour appear even in his works, leading him scrupulously to weigh all that can be said on either side of an argument, and to give every man his proper share of merit, refusing sometimes even to credit himself with what was manifestly his due.[35]

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[31]Eyler, 'The Conversion of Angus Smith', p.228.
[32]Gibson and Farrar, 'Robert Angus Smith', pp.243-244.
[33]Anon, 'Robert Angus Smith', p.152.
[34]*The Times*, 13th May 1884, 10d. Smith left £1953 to his niece, see Probate Records, University of Oxford, 15/4 (1884).
[35]Schunck, 'Memoir of Robert Angus Smith', pp.100-101.

Chapters four and five indicate that such characteristics were to influence the enforcement tradition of 'negotiated compliance', adopted by Smith and his sucessors.

Alfred Evans Fletcher

Alfred Evans Fletcher (1827-1920) was born on the 6th May 1827, into a well-known congregationalist family of Denmark Hill, London. His father was David Fletcher, founder and first headmaster of the distinguished, nonconformist Denmark Hill School, and his brother, Lavington Fletcher, was an engineer and inventor of a steam road car. Alfred was sent to Berlin to complete his schooling, and on his return to England was employed in railway work from 1845-1847.[36] Fletcher then undertook the study of chemistry and mathematics at University College, London, as he was debarred from Cambridge on religious grounds.[37] He was awarded the University gold medal for chemistry in 1851.[38] In the same year, Alfred Fletcher married Sarah Elizabeth Morley, the daughter of the owner of a large Leeds cloth factory, and cousin of the famous philanthropist Samuel Morley.[39]

Philanthropic ventures were a constant feature of Alfred Fletcher's life. Whilst sub-inspector for the western district, Fletcher helped to finance a small shop for an impoverished person.[40] Whilst Chief Inspector, he started a charitable mission in East

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[36]Ashby and Anderson, *The Politics of Clean Air*, p.65.
[37]Fletcher, M., *The Bright Countenance: A Personal Biography of Walter Morley Fletcher* (London: Hodder and Stoughton, 1957), p.18. This is a biography of one of Alfred Fletcher's sons. Walter Morley Fletcher (1873-1933) was a renowned physiologist, who followed his father into scientific government service. He served as the first secretary of the Medical Research Committee which was created in 1913, under the National Insurance Act, 1911. Walter Morley Fletcher was awarded the K.B.E in 1918. See the *Dictionary of Scientific Biography*, Volume 5, p.36.
[38]Fletcher, *The Bright Countenance,* p.18.
[39]ibid., p.17; see also Roscoe, H.E, *The Life and Experiences of Sir Henry Enfield Roscoe* (London: Macmillan and Co., 1906), p.34.
[40]P.R.O, MH16/1, Alfred Fletcher to Angus Smith, 10th December 1887. Hereafter P.R.O, MH.

London. However, Fletcher's daughter-in-law commented that these charitable pursuits were a cause of financial hardship for the family:

> With a little more worldly sense of how to manage his own money and his wife's, Alfred Fletcher might have been quite well off, but in his generous faith he was inclined to be directed by pious sentiment rather than by practical wisdom.[41]

Finances were a perpetual problem for the Fletcher family. According to Maisie Fletcher, the family 'existed upon a limited income, which allowed for no lavish expenditure or amusements' and Alfred Fletcher attempted to discourage his son Walter from going to Cambridge University, due to financial hardship.[42]

After he left University College, Fletcher worked for twelve years in the chemical industry.[43] Little is known of this time, except that he was employed for a period at the East London Colour, Chymical and Printing Ink Works of Mile End. In 1858, he wrote to *The Times*, maintaining that workers in colour factories using arsenic 'were in regular enjoyment of perfect health.'[44] Fletcher also managed the chemical firm Wilson and Fletcher.[45]

Alfred Fletcher was appointed sub-inspector of the western district in January 1864 (see figure one). He remained in this district until June 1884, when he was appointed Chief Inspector.[46] Fletcher's major contribution during his service as alkali

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[41]Fletcher, *The Bright Countenance,* p.21. Maisie Fletcher further maintained that 'though there had been money available, most of it had gone into unfortunate, if would-be charitable, investments. Ibid, p.33.

[42]Apparently, Alfred Fletcher wanted the future famous physiologist to become a dentist's apprentice, rather than pursue an academic career.

[43]MacLeod, *Specialist Policy in Government Growth*, p.73.

[44]*The Times*, 9th January 1858.

[45]MacLeod, 'The Alkali Acts Administration, 1863-1884', p.90.

[46]See *The Times*, 9th June 1884, 5c and P.R.O, MH16/2, Hugh Owen to Alfred Fletcher, 3rd June 1884. According to Ashby and Anderson, Fletcher's 'policy was to continue the policy of his predecessor, but he brought to the work a more forceful personality, a more lucid mind, and a greater

inspector was the invention of the 'anemometer', which measured the speed of air currents in the chimneys of chemical works. Fletcher asserted in 1893 that without the anemometer, the Alkali Act would have been inoperative. Due to the 95% emissions limit set by the Alkali Act 1863,

> It became necessary...after first testing qualitatively the effluent gases, and ascertaining how much acid or other matter was contained in one cubic foot, secondly to measure the rate of flow of the gases, and thus calculate the number of cubic feet passing away in a given time. Thus the total quantity became apparent and, knowing independently the quantity of acid generated, the necessary factors were obtained for calculating the percentage of escape.[47]

Fletcher also invented a collapsing aspirator and several forms of constant, self-registering aspirators.[48]

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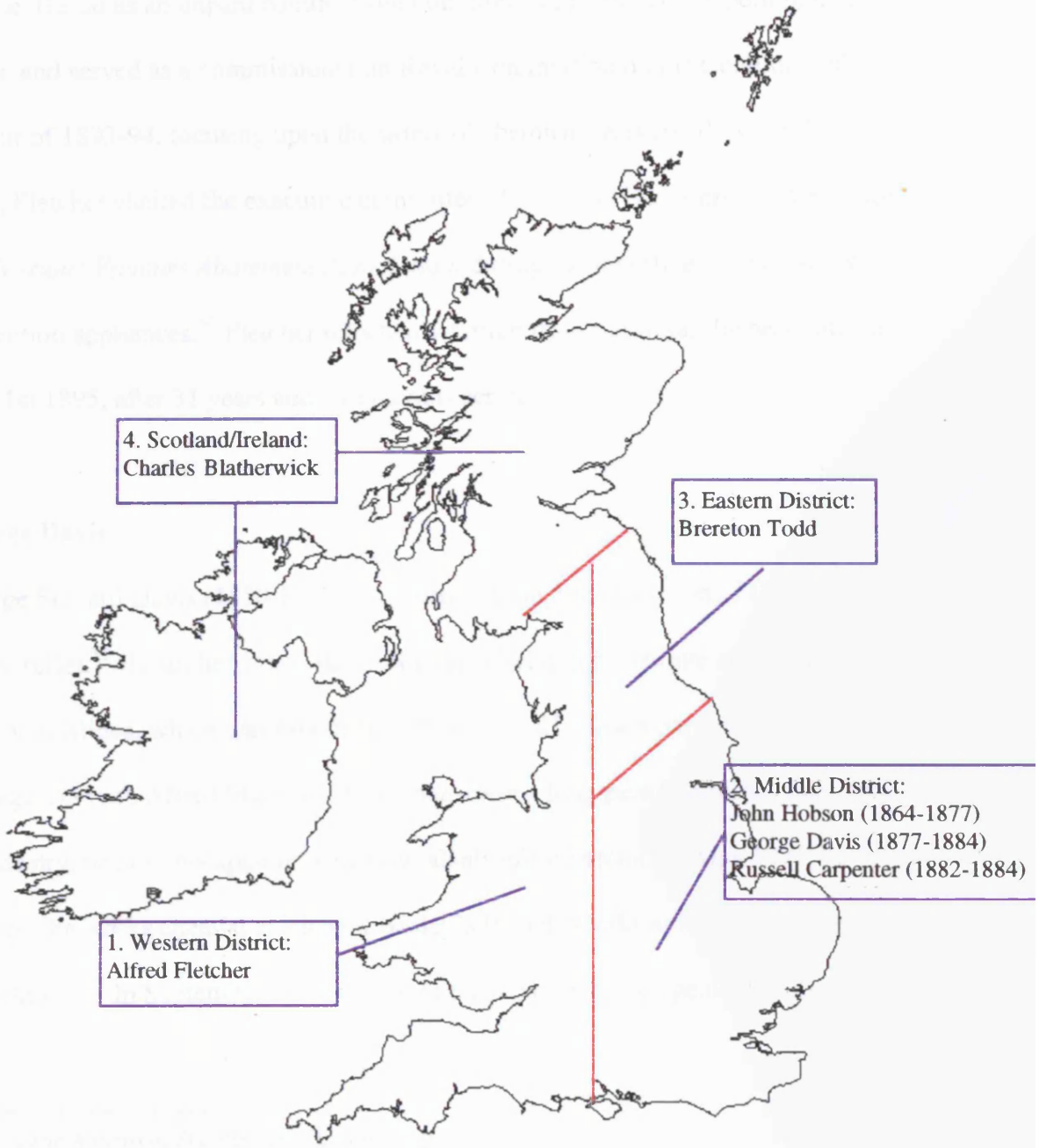
determination to enlarge the Inspectorate's responsibilities.' See Ashby and Anderson, *The Politics of Clean Air*, p.65.

[47]P.R.O, MH16/4, Alfred Fletcher to the L.G.B, 5th January 1893.

[48]A device for drawing a stream of air or oxygen or liquid through an apparatus by suction.

Figure One: Inspection Districts in Great Britain 1864-1884[49]



[49] Taken from information supplied in the Annual Reports of the Chief Alkali Inspector 1864-1907. The western district included Liverpool, St. Helens, Widnes, Runcorn, Flint, Bristol and Swansea. The middle district was comprised of East Lancashire, Staffordshire and the South. The eastern district encompassed 'the Tyne and its' neighbourhood.'

Like his predecessor, Angus Smith, Fletcher exhibited a committment to research into the problems associated with public health, throughout his government service. He sat as an unpaid commissioner on three inquiries into the pollution of rivers, and served as a commissioner on Royal Commission on the Condition of Labour of 1893-94, focusing upon the safety of chemical workers. Between 1891-1896, Fletcher chaired the executive committee of the *Manchester and Salford Smoke and Noxious Vapours Abatement Association*, during its' investigation into smoke prevention appliances.[50] Fletcher reluctantly retired from the Alkali Inspectorate on May 1st 1895, after 31 years and five months service. [51]

George Davis

George Edward Davis (1850-1907) was born in Eton, the eldest son of George Davis, a bookseller.[52] He studied chemistry at Slough Mechanics' Institute and the Royal School of Mines, which was established in 1851, and is now a part of Imperial College. As with Alfred Fletcher, Davis then spent a long period gaining experience in industry, prior to his appointment as an alkali sub-inspector. In May 1871, he became the works chemist at Richard Bealey's Bleach Works at Radcliffe, near Manchester.[53] In September 1872, Davis embarked on the management of the

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[50]Ashby and Anderson, *The Politics of Clean Air*, p.73.

[51]He wrote on that occasion, 'although my official connection with the Local Government Board is now brought to an end, the many pleasant memories of those I have met there, and of the kind help I have ever received, will not lightly pass away.' P.R.O, MH16/4, Alfred Fletcher to Alfred Adrian, L.G.B Legal Advisor, 12th August 1895. For Ashby and Anderson, Fletcher's 'significant contributions to the history of clean air policy in Britain were first, that he consolidated the concept of best practical means as a tool to control pollution, rather than as an escape route for offenders; and second, that he boldly went outside his sphere of authority to tackle the intractable and neglected problem of how to abate smoke.' Ashby and Anderson, *The Politics of Clean Air*, p.71.

[52]Freshwater, D.C., 'George Edward Davis', in Nicholls, C.S. (ed.), *Dictionary of National Biography: Missing Persons* (Oxford: Oxford University Press, 1993), p.175.

[53]It should be noted that George Davis's former colleague at Bealey's was D.B. Hewitt, who was later a manager with Brunner Mond, whilst Davis was an alkali inspector. This illustrates how close

Cannock Chase Chemical Works, near Lichfield. This was an attractive position for a consultant chemist, as analytical work in industry was often routine and low status. [54] Davis remained at Cannock Chase until the end of 1873, during which time he directed the erection of a complete plant for the manufacture of soda and bleaching powder.[55] He moved on to find employment at J.C. Gamble & Son, Gerard Bridge, St. Helens (1874) and the Runcorn Soap and Alkali Company (March-September 1876). In March 1877, he became consulting chemist to Spence Brothers, Manchester. Therefore, George Davis followed a common trajectory for nineteenth-century chemists, progressing from analysis to process control and development.[56]

In 1878 at the age of thirty, Davis replaced John Hobson as sub-inspector for the middle district (see figure one). He was originally based in Manchester, but in 1882 he was directed to move to Birmingham by Angus Smith (see 3.3). Whilst inspector his most notable contribution was the introduction of a method for dealing with the gases from organic fertilizer works, which involved scrubbing vapours with water and burning them in a destructor furnace.[57] George Davis was also a pioneer in the recovery of benzene, sulphate of ammonia and cyanogen from coal and coke oven gases.[58] In fact, by 1890, Davis had applied for a total of thirty four patents, fifteen of

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relationships could be between inspectors and manufacturers. See Donnelly, J.F, 'Chemical Engineering in England, 1880-1922', *Annals of Science*, 45 (1988), 555-590 (p.557).

[54]Davis received the following testimonial when applying for the management position at Cannock Chase in 1872, .'..as an analyst we have formed a high opinion of him. Whilst in our employ he has had ample opportunity to make himself master of the practical details of the various manufactures...further than this we cannot speak, as the practical management of the works has not been entrusted to him.' See Donnelly, J.F, 'Consultants, Managers, Testing Slaves: Changing Roles for Chemists in the British Alkali Industry', *Technology and Culture*, 35 (1994), 100-128 (pp.111-112).

[55]Science Museum Library (hereafter S.M.L), *Papers of George Edward Davis*, DAV 6/4.3.

[56]Donnelly, 'Chemical Engineering in England', p.561.

[57]Colehan, J.E, 'The Centenary of the Alkali Act', *The Chemical Engineer* (1964), 15-21 (p.18).

[58]Swindin, N., 'The George E. Davis Memorial Lecture', *Transactions of the Institution of Chemical Engineers*, 31 (1953), 187-200 (p.187).

which were granted. In 1885 he was awarded a bronze medal for the manufacture of products from coal at the International Inventions Exhibition. [59]

Apparently, Davis only accepted the post as inspector after considerable hesitancy and 'his was not a disposition to endure for long the peaceful calm of government service.'[60] Indeed Norman Swindin, his only student and assistant draughtsman, commented that

> ...the job was on the whole distasteful to Davis for he complained of travelling...and unnecessary report writing. Persuasion, the spirit of the Alkali Acts, was irksome, for Davis was not a diplomatist.

On the day of Angus Smith's death, in May 1884, Davis resigned and returned to private practice as a consultant and analytical chemist in Manchester.[61] He then went to Messrs Newton, Chambers and Company, near Sheffield, to assist in the extraction of benzene from coal gas.[62] For a period, Davis also served as manager of the Rockingham Gas Works, near Barnsley. In 1886, he returned to Manchester to re-establish his private consultancy practice. The following year, Davis, along with his brother, founded the *Chemical Trade Journal*, a publication which focused specifically upon the new discipline of chemical engineering.[63]

Despite his seemingly unhappy experience as an alkali inspector, it is likely that the overview of chemical operations that he gained whilst in government service altered his view of chemistry, and led to one of his greatest achievements, *The Handbook of Chemical Engineering* (1901). This publication, which laid the

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[59]ibid., p.194.
[60]Swindin,'Memorial Lecture'.
[61]P.R.O, MH16/2, George Davis to the President of the L.G.B, 12th May 1884.
[62]*Journal of the Society of the Chemical Industry*, Jubilee Number, July 1931, p.14.
[63]In 1881, whilst an alkali sub-inspector, Davis founded and edited another journal entitled *The Northern Microscopist*. See Swindin, 'Memorial Lecture', p.195.

foundations for the profession of chemical engineering originated from a series of lectures given by Davis at the Manchester School of Technology in 1887.[64] The *Handbook* was based upon commercial/technical specialist knowledge and not upon any specially constructed 'pure' science.[65] According to D.C. Freshwater, George Davis' experience as an inspector:

> ...was to alter his life. The inspectors...had right of access to virtually any chemical company. Thus Davis very quickly gained a vast amount of information about the many chemical operations of his day. This experience acquired in an age when the chemist was regarded as an expert only in a special field, turned Davis into a generalist and made him realise that the enormous variety of industrial chemical processes could be reduced to a relatively small number of operations, and that the study of these in the abstract would enable general principles to be discovered which could be applied to any process operation - the keystone of chemical engineering.[66]

Chemical engineering was first taught at the central institution of the City and Guilds Institute in London during the 1880s.[67] However, Davis, an empiricist rather than a theorist, was the first to convert the various chemical manufacturing processes into a set of phenomena which could be studied independently of specific chemical

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[64]S.M.L, *Papers of George Edward Davis*, DAV 6/4.3.
[65]Donnelly, 'Chemical Engineering in England', p.564.
[66]Freshwater, 'George Edward Davis', p.175. Although helpful in giving Davis an overview of manufacturing processes, his experience as an inspector did cause problems for Davis when he became a consultant. In 1884, the midlands manufacturer, Alexander Chance, publically objected to his former inspector's consultancy advertisement in the *Journal of the Society of the Chemical Industry*. This objection was based upon Davis's previous right of access to works under the Alkali Acts, and the possible betrayal of trade secrets. Davis later commented that such allegations 'show the absolute ignorance of the speaker on the subject of chemical engineering. The science of chemical engineering does not consist in hawking about trade secrets...Chemical engineering has higher aims, it endeavours to work out the application of machinery and plant to the utilization of chemical action on the large scale.' Donnelly, 'Chemical Engineering in England', p.561.
[67]Donnelly, 'Chemical Engineering in England', p.558.

processes.[68] This was a revolutionary idea which was not accepted in Britain until the 1950s.[69] The *Handbook of Chemical Engineering* represented an important shift from former academic work which had treated the notion of 'applied science' and descriptions of particular manufactures as separate entities.[70] Norman Swindin commented that Davis:

> ...alone seemed to have sensed from his early days the need for a new kind of engineer - one who combined the necessary scientific principles with sound practical engineering.[71]

John Hobson, Charles Blatherwick and Brereton Todd

Little is known of the three remaining sub-inspectors who served in the first generation of the Alkali Inspectorate. Dr. Charles Blatherwick was based in Glasgow for the district of Scotland and Ireland until 1892 (see figures one and two). He was originally from Highgate, and was recruited from the parachemical profession.[72] Brereton Todd was residing in the Belgrave Road on his appointment to the inspectorate in 1864. He served as sub-inspector, based in Newcastle for the eastern district (both banks of the Tyne, Middlesborough and Seaham) until 1882, and then oversaw the South-Eastern district until his retirement in 1892 (see figures one and two). He died in 1893.[73] John T. Hobson of Ardwick, Manchester, was based in

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[68]ibid., p.562; see also Freshwater, D.C., 'George E. Davis, Norman Swindin and the Empirical Tradition in Chemical Engineering', in Furter, W.F. (ed.), *History of Chemical Engineering* (Washington: A.C.S, 1980), pp.97-112 (pp.103-4).
[69]Freshwater, 'George Edward Davis', p.175.
[70]Donnelly, 'Chemical Engineering in England', p.563.
[71]Swindin, 'Memorial Lecture', p.187.
[72]MacLeod, 'The Alkali Acts Administration', p.16.
[73]According to Angus Smith 'Mr. Todd has a certain pride which keeps him aloof from individuals and may keep him from knowing sufficiently all that goes on, on the other hand there seems to be no one with whom he is in any degree intimate or has any care to shelter. P.R.O, MH16/1, Smith to the L.G.B, 28th September 1880. Smith implied that Todd's personality may have caused problems in the running

Manchester and appointed as sub-inspector for the middle district (East Lancashire, Birmingham, Yorkshire and London) in 1864 (see figure one). He studied chemistry under Friedrich Wöhler at the University of Göttingen, submitting his dissertation in 1857. This was entitled *Über eine neue Reihe organischer schwefelhaltiger Säuren.*[74] He seems to have suffered several health problems as a direct result of his service in the Alkali Inspectorate, and died in 1877 (see 6.2).[75]

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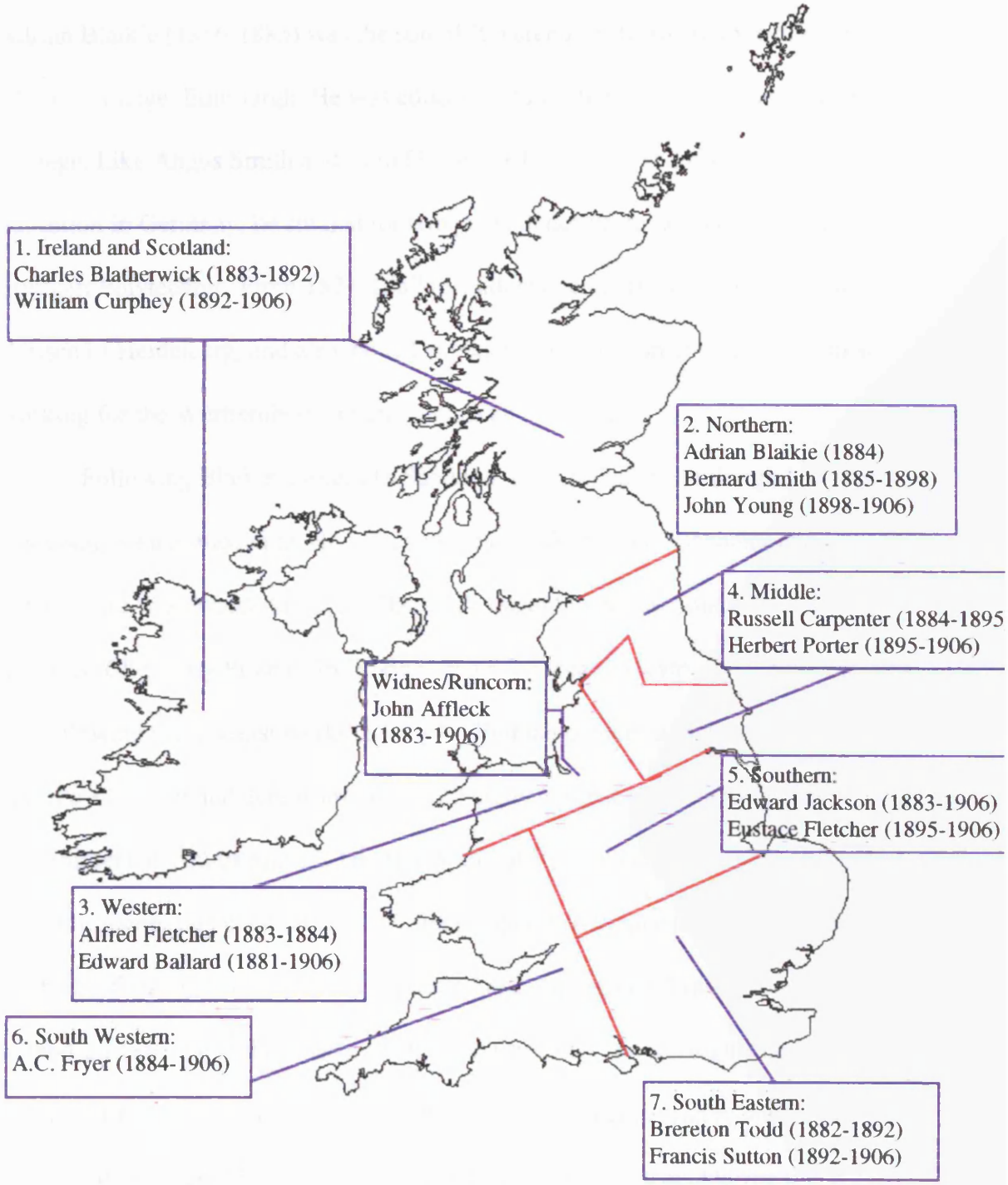
of his district. Todd needed assistance, but initially would not accept any help, despite numerous complaints from certain quarters. He eventually employed an assistant himself, see 3.3.

[74]A new series of organic sulphurous acids.

[75]Tenth Annual Report of the Alkali Inspector (hereafter R.A.I) for Proceedings during 1873 (c.1071), p.405 (1874), xxv.405, see 6.2.

Figure Two: Inspection Districts in Great Britain 1884-1906[76]



[76] Taken from information supplied in the Annual Reports of the Chief Alkali Inspector 1864-1907. The eastern district included Newcastle, Whitehaven, Northumberland, Cumberland, Westmoreland, Durham and North Yorkshire. The western district was comprised of Liverpool, St. Helens and Warrington, the middle district was based around Manchester, and the southern district included Birmingham and the Midland region. A.C. Fryer's was based in Bristol for South Wales and the south west, and the inspector for the south eastern region resided in London.

1881-1906

Adrian Blaikie

Adrian Blaikie (1856-1885) was the son of Reverend Professor Blaikie of the Free Church College, Edinburgh. He was educated at Edinburgh Academy and Fettes College. Like Angus Smith and John Hobson, Blaikie received his chemical education in Germany; he studied for two years under Professor Von Marx at Stuttgart Polytechnic. From 1874, Blaikie studied chemistry under Professor Robert Bunsen of Heidelberg, and also gained experience in government research whilst working for the Württemberg government as an assistant.

Following Blaikie's return to Scotland, he enrolled at Edinburgh University to study science and medicine. He achieved the qualifications of Bachelor and Doctor of Science and was awarded both the Baxter Physical Science Scholarship in 1878 and the Hope Chemistry Prize in 1879. Blaikie gained some industrial experience during the following year, whilst working for a Midlothian papermaker. In 1881, Blaikie became a lecturer and demonstrator at University College, Bristol before his appointment as Angus Smith's laboratory and office assistant in January 1882. By his own admission, this position enabled him to 'gain experience in regard to the ordinary methods of testing and inspection.' In June 1882, he inspected salt works in southern Ireland. In 1883, he assisted George Davis in Cheshire, and in August he took Russell Forbes Carpenter's place in the northern midland district (see figure one). Blaikie then temporarily replaced Brereton Todd in the south eastern district. During this period, he experimented on salt works in Kent, alongside his duties in assisting the Chief Inspector with his annual report to the L.G.B. Blaikie also gained experience of the investigation of complaints from local residents, landowners and local authorities. In

August 1883, Blaikie investigated complaints against a Beverly chemical manure works, and in November 1883 he performed the same duties in Ipswich.[77] Doubtless, this wide experience enabled Blaikie's promotion to the position of inspector for the North Eastern district in July 1884.[78]

Adrian Blaikie died in 1885 of 'blood poisoning' after an illness of ten weeks duration. He was 29 years of age, and had apparently never been in good health.[79] His obituary in the *Journal of the Society of the Chemical Industry* stated that,

> It is seldom that such unflinching perseverance under difficulties, such unswerving integrity, and such practical knowledge are combined with such tact, firmness and sweetness of disposition...There can be no doubt that his orderly and precise character, his power of being firm without giving offence, and his great acquaintance with and the ability to handle the problems of industrial chemistry, would have won him a high place in the sphere to which he had devoted his life.[80]

Russell Forbes Carpenter

Russell Forbes Carpenter (1846-1915) was educated at University College School, and University College, London. In 1864, he was appointed to the operative department of the Royal Mint and after five years of government service, Carpenter, like Alfred Fletcher and George Davis before him, gained industrial experience as manager of a chemical works. During eight years service at Netham Chemical Company, Bristol, he oversaw the manufacture of sulphuric acid, alkali, chemical

[77]P.R.O, MH16/2, Adrian Blaikie to the L.G.B, 17th May 1884.
[78]P.R.O, MH16/2, Hugh Owen to Adrian Blaikie, 17th July 1884.
[79]P.R.O, MH16/2, Reverend Blaikie to the President of the L.G.B, 7th February 1885. He bequethed £158 to his father, see Probate Records, University of Oxford, 17/10 (1885).
[80]Anon, 'Obituary of Adrian Blaikie', *Journal of the Chemical Society*, 47 (1885), 330-331(p.331).

manure, and salts of ammonia from gas liquor. Carpenter was elected a fellow of the Institute of Chemistry on its foundation in the late 1870s. He was thirty five when he joined the Alkali Inspectorate in 1881, and he initially stated that he would prefer a secretarial position over an inspectorship.[81]

The Alkali Act, 1881 allowed for an additional four sub-inspectors, and Carpenter was assigned one half of the middle district, to be based in Manchester (see figures one and two). However, the demise of Angus Smith and the resignation of George Davis in May 1884 spurred Carpenter to apply for the position of inspector in the southern half of the middle district. George Davis gave him the following testimonial,

> Dr. Smith was very strongly of the opinion that of all the sub-inspectors, your previous practical knowledge gave you decided claim to the superior appointment...There is one very great point in your favour which it may be well to mention. To get real improvements effected requires much tact on the part of the Inspector. I have watched your methods of dealing with difficulties with very great interest, and I have been very much pleased with the manner in which the improvements in your half of the district have been effected.

In July, Carpenter was assigned the Inspectorship at an increased salary.[82] Carpenter remained in this position until Alfred Fletcher's retirement in 1895, when, on the 1st June, he became the third Chief Inspector. He took early retirement in 1910, on the grounds of ill health, and was succeeded by William S. Curphey.[83]

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[81]P.R.O, MH16/1, Russell Forbes Carpenter to John George Dodson, President of the L.G.B, July 25th 1881.

[82]P.R.O, MH16/2, Hugh Owen to Russell Forbes Carpenter, 28th July 1884. Carpenter was granted a salary of £420 per annum, with an annual increment of £20 to reach a maximum of £550 per annum.

[83]Carpenter had a history of ill health, see P.R.O, MH16/4, Russell Forbes Carpenter to Hugh Owen, 25th November 1897, and 6.2. Eric Ashby and Mary Anderson have concluded that Carpenter's service as Chief Inspector was undistinguished. He exihibited devotion to Angus Smith's conciliatory

John Affleck

Section nineteen of the Alkali Act, 1881 enabled local authorities to employ a resident alkali inspector, on the condition that they contributed two thirds of his salary. In October 1882, eight townships and the Health Committee of Liverpool applied to the L.G.B for a resident inspector, to oversee pollution abatement in Widnes.[84] John Affleck, from Newcastle, was the successful candidate and served as an alkali inspector from 1883-1907 (see figure two).[85] Although employed locally, Affleck possessed similar qualifications to the central inspectors. He gained an M.A from the University of Edinburgh, before studying chemistry for three years in France and Germany, where he obtained a doctorate. Affleck then accepted a position as chief chemist in the laboratory of the Jarrow Chemical Works. After three years, he was promoted to manager of this works, where he remained for ten years before his appointment as resident alkali inspector.[86]

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enforcement approach, but remained content to toe the departmental line, rather than press for legislatory amendments. See Ashby and Anderson, *The Politics of Clean Air*, pp.77-81.

[84]P.R.O, MH16/1, Eight Townships and Health Committee of Liverpool Corporation to the L.G.B, 28th October 1882.

[85]On Alfred's Fletcher's appointment to Chief Inspector, John Affleck unsuccessfully applied for Fletcher's Western district. See P.R.O, MH16/2, John Affleck to Hugh Owen, 21st May 1884. In June 1885, Affleck's area was enlarged to include Runcorn and Weston. P.R.O, MH16/2, Alfred Fletcher to the L.G.B, 25th June 1885.

[86]P.R.O, MH16/2, Chairman of Associated Sanitary Committees to Charles Dilke, President of the L.G.B, 13th June 1883. There is liitle information about the remaining sub-inspectors, with the exception of Edward Ballard (western district), 1881-1892 (see figures one and two). Prior to his entry into the Alkali Inspectorate, Ballard was Medical Officer of Health for Islington from 1871. See Lambert, R., *Sir John Simon and Social Administration* (London: MacGibbon and Kee, 1963), p.567. In 1878, Ballard completed his *Report in Respect of the Inquiry as to Effluvium Nuisances Arising in Connection with Various Manufacturing and other Branches of Industry* (London: H.M.S.O, 1882).

2.3: Other Inspectorates

In order to contextualise the background of the alkali inspectors, it is necessary to outline the educational qualifications and social background of nineteenth-century central government inspectors in other fields. This section will focus upon a selection of officials, who were entrusted with the regulation of industrial behaviour and required to possess technical expertise in order to perform their role.

The first major central government inspectorate to be established was the Factory Inspectorate in 1833, and the first unofficial Chief Inspector was Leonard Horner (1785-1864). He was born into a Whig, upper-middle class family from Edinburgh,[87] and attended university in the city, to study moral philosophy, mathematics and chemistry.[88] In 1803, Horner became a partner in the family linen business, and from 1813-1827 he was an underwriter at Lloyds Insurance Company. During this period he developed an interest in geology. In 1808, Horner joined the Geological Society of London, of which he was President in 1845-6, and 1860-1. In 1813, he was elected a fellow of the Royal Society.[89] During the 1820s, the future Chief Inspector was involved in the foundation of two schools, the School of Arts and Edinburgh Academy.[90] In 1827, he was invited to become the first warden of the University of London, through his Whig connections. He resigned from this position in 1831, owing to conflicts with academic staff. Horner was appointed to the Factory Inspectorate in 1834, again through his Whig connections, and served as unofficial Chief Inspector until his retirement in 1859.[91] The second Chief Inspector was

[87]It should be noted that Horner always had a private income. See Martin, 'Leonard Horner', p.414.
[88]ibid., p.413.
[89]'Leonard Horner', in Stephen, L. and Lee, S., *Dictionary of National Biography*, ix (Oxford: Oxford University Press, 1917), pp.1265-1266.
[90]Martin, 'Leonard Horner', p.421.
[91]Of the other early factory inspectors, Thomas Jones Howell had served as Judge Advocate of Gibraltar and Commissioner for West Indian Islands Relief. James Stuart was a Scottish Whig

Alexander Redgrave, a man who spent his entire career as a civil servant, and was involved in factory inspection for a total of forty three years. In 1834, at the age of 16, Redgrave entered the Home Office as a clerk in the Criminal Register department. In 1848, he was appointed sub-inspector, and four years later was promoted to inspector.[92] His colleague, Robert Baker, was born in York, and qualified as a doctor at age of 19.[93] In October 1834, he became a superintendent and his early reports contained information which exceeded his job description (see 2.5). For example, Baker detailed the cholera epidemic, the condition of the town of Leeds, and published the moralistic text *The Present Condition of the Working Classes Generally Considered* (1851).[94] Robert Baker rose through the ranks to serve with Redgrave as joint Chief Inspector until 1878.

It is apparent from this brief overview of the biographies of senior factory officials that they did not possess a comparable level of technical training or practical experience as the inspectors of alkali works.[95] With the exception of Robert Baker, many of the factory inspectors came from distinguished families and received a high

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journalist. It has been suggested that Stuart's friendship with Scottish factory owners influenced his policy of non-prosecution. See Henriques, U.R.Q., *The Early Factory Acts and their Enforcement* (London: The Historical Association, 1971), p.13.

[92]Bartrip, P.W.J. and Fenn, P.T., 'The Evolution of Regulatory Style in the Nineteenth-Century Factory Inspectorate', *Journal of Law and Society*, 10 (1983), 201-222 (p.215).

[93]Lee, W.R., 'Robert Baker: The First Doctor in the Factory Department', *British Journal of Industrial Medicine*, 21 (1964), 85-93 (p.85).

[94]ibid., p.92.

[95]Bartrip has noted that none of early factory inspectors possessed a specialist knowledge of industrial health and safety. For example, during the 1880s none of inspectors possessed the sufficient medical knowledge to understand the issue of lead poisoned workers. Alexander Redgrave merely accepted the assumptions of factory owners, who believed that lead poisoned workers were victims of poor personal cleanliness. Bartrip concluded that in this case the expert did not 'possess the capacity to carry through proposals based on rigorous scientific and technological analysis, for scientific and medical goals tended to be subordinate to, and even the servant of, political and economic considerations.' Bartrip, P.W.J., 'Expertise and the Dangerous Trades, 1875-1900', in MacLeod, R.M. (ed.), *Government and Expertise: Specialists, Administrators and Professionals, 1860-1919* (Cambridge: Cambridge University Press, 1988), pp. 89-109 (p.107).

standard of general education. Arguably, this suited them to administrative, rather than complex scientific or technical duties.

The second central government body appointed as a consequence of industrialisation was the Mines Inspectorate. The first inspector of mines, Hugh Seymour Tremenheere (1804-1893), came from a distinguished background. He was the eldest son of a colonel, who was later Lieutenant-Governor of Curaçoa, and he was educated at Winchester and New College, Oxford. In 1834, after achieving a Bachelor and Master of Arts, Tremenheere was called to the bar.[96] Following three years at the Inner Temple, he became a revising Barrister on the Western circuit. In November 1839, Tremenheere was dispatched to Newport to investigate the Chartist rebellion. One month later, he was appointed an inspector of schools at a salary of £700 a year with expenses,[97] having special responsibility for schools maintained in connection with the *British and Foreign Schools Society*.[98] In 1843, Hugh Tremenheere was appointed as both sole mines inspector under the Mines Act, 1842, and an assistant Poor Law Commissioner. He held these posts in unison until 1859.[99] During this period of government service, Tremenheere was involved in several inquiries, through which he displayed a humanitarian concern with the welfare of the working classes.[100] In 1855 and 1861, Tremenheere investigated the management of bleaching and lace works, after which he was appointed commissioner into the employment of children and young persons in trade. He made six reports on this subject between 1863-7. Tremenheere continued his involvement in government

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[96]Webb, R.K., 'A Whig Inspector', *Journal of Modern History*, 27 (1955), 352-64 (p.353).
[97]ibid., p.354. See also Blackie, J., *Inspecting the Inspectorate* (London: Routledge, 1970), p.4.
[98]Harris, J.S., *British Government Inspection: The Local Services and the Central Departments* (London: Stevens and Son, 1955), p.81.
[99]MacDonagh, O.O.G.M., 'Coal Mines Regulation: The First Decade', in Robson, R. (ed.), *Ideas and Institutions of Victorian Britain* (London: Bell, 1967), pp.58-86 (p.63).
[100]Webb, 'A Whig Inspector', p.364.

investigations from 1867 until his retirement in 1871, when he documented the conditions of young persons and women working in agriculture.[101] Tremenheere has been described as 'disinterested and humane',[102] and it has been contended that he 'opposed any arrangement which might have the effect of shifting responsibility from the mine owner to the State.'[103]

Under the Mines Act, 1850, a further four inspectors with previous experience as mines managers were appointed. It has been argued that this was an attempt to appease industry, which feared the recruitment of theoretical scientists.[104] Therefore, in contrast to Tremenheere, Charles Morton, Matthias Dunn, Herbert Mackworth and Joseph Dickinson were mining experts.[105] Charles Morton was thirty nine years old when he joined the Mines Inspectorate. Prior to his entry into government service, he had studied chemistry, geology and mathematics at the University of Edinburgh, lectured at the Mechanics Institute in Slough, and had managed two collieries.[106] Matthias Dunn was nearly fifty when appointed inspector of mines. He had worked in the mining industry for his whole life, and had previously been employed as a check viewer in the North Eastern coalfields. Dunn had also published two books and numerous articles on the mining industry, and had visited collieries on the continent.[107] Joseph Dickinson had worked for eleven years in South Wales and Scotland for mining companies. Herbert Mackworth was the nephew of a baronet. He

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[101]'Hugh Seymour Tremenheere', in Stephen, L. and Lee, S., *Dictionary of National Biography*, xix (Oxford: Oxford University Press, 1917), pp.1114-1115.
[102]MacDonagh, 'Coal Mines Regulation: The First Decade', pp.63-64.
[103]Bartrip, 'British Government Inspection', p.617.
[104]ibid., p.620.
[105]Job, B., *The British Mines Inspectorate from 1851-1913: Its Development and Effectiveness with Particular Reference to Colliery Explosions* (University of Keele: Unpublished Ph.D. Thesis, 1993), p.36.
[106]ibid., p.44.
[107]Bartrip, 'British Government Inspection', p.620.

was Professor in Geology at Kings College, had worked for a colliery company in South Wales for two years, and had also gained experience as a railway engineer.[108]

There are clear parallels with the background of the early alkali inspectors here. Both types of official had gained scientific or technical training at similar institutions and had attained practical experience in the industry they were later employed to regulate.

The Alkali Inspectorate was not the only central government body established in the nineteenth-century to ensure the protection of natural resources. The Salmon Act, 1861, also provided for the appointment of two inspectors, who, like those of alkali works and mines, displayed a notable level of technical knowledge on and dedication to their area prior to their appointment.[109] The first two salmon inspectors were William Joshua Ffennell (1799-1867) and Frederick Eden. Ffennell was a self educated natural historian and fisheries expert. He was the architect of the 1848 Salmon Act, which provided for the preservation of salmon in Ireland. Ffennell also served on the Royal Commission on Salmon of 1861. Similarly, his colleague Frederick Eden was a fishery commissioner for Ireland and expert on the local administration of the Irish fishery districts, prior to his appointment.[110] In 1865, Eden retired and was replaced by another expert on salmon, Francis Trevelyan Buckland (1826-1880). He was the son of William Buckland, Dean of Christchurch, Oxford. Francis Buckland was educated at Winchester and Christchurch, Oxford, where he gained a B.A. Buckland then worked as a surgeon at St. Georges Hospital. From 1856, he wrote for *The Field*, a natural history/field sports journal, where he built up

[108]Job, *The British Mines Inspectorate*, p.45.
[109]24 & 25 Vict., c.109.
[110]MacLeod, R.M., 'Government and Resource Conservation: The Salmon Acts Administration, 1860-1886', *Journal of British Studies*, 7 (1967-8), 114-150 (p.121).

his reputation as a popular writer and amateur natural historian with 'an insatiable love of nature.' This characteristic was also illustrated by Buckland when, in 1865, he organised a piscatorial exhibition at the Natural History Museum.[111] Following his appointment to the Salmon Inspectorate, Buckland continued his work as a popular writer on fisheries; he became the editor of the journal *Land and Water*, which he founded in 1866, with his colleague William Ffennell.[112] It has been commented that Buckland's death in 1880 heralded the end of the age of the 'amateur naturalist.'[113] In 1867, Spencer Walpole (1839-1907), the youngest son of the Home Secretary was appointed as a salmon inspector. The influence of patronage upon Walpole's appointment is clear, as he had no previous knowledge of the salmon issue. Like Alexander Redgrave, Walpole had spent his entire career in the civil service; he had been his father's secretary at the Home Office from 1858-1860, and at the time of his appointment was a third class clerk in the War Office (see 2.5).[114] Walpole went on to become the Lieutenant Governor of the Isle of Man.

The Rivers Pollution Prevention Act, 1876 also provided for the appointment of two inspectors to oversee pollution abatement. The first joint inspector was Robert Angus Smith, who performed these duties part-time alongside his Alkali Inspectorship (see 2.2). The second appointee was Sir Robert Rawlinson (1810-1898), chairman of the 1865 Royal Commission on River Pollution. Throughout his career, he had attempted to utilise his engineering skills to tackle the problems caused by urbanisation and industrialisation. Rawlinson was a civil engineer, and assistant

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[111]'Francis Buckland' in Stephen, L. and Lee, S., *Dictionary of National Biography*, iii (Oxford: Oxford University Press, 1917), pp.204-205.
[112]MacLeod, 'Government and Resource Conservation', p.126.
[113]ibid., p.137. Buckland was replaced by Thomas Henry Huxley, Professor at the Royal School of Mines and eminent scientific publicist, educator and natural historian. Ibid., p.138.
[114]ibid., p.127.

surveyor to the Corporation of Liverpool during the 1840s, and served as an inspector on General Board of Health from 1848. During the late 1850s, Rawlinson became Chief Engineering Inspector for the L.G.B, a position that he retained along with his duties under the Rivers Pollution Prevention Act.[115]

This brief overview has indicated that there were two types of appointee to inspectorates concerned with the regulation of industry or environmental resources. The biographies of Hugh Tremenheere, Leonard Horner, Alexander Redgrave and Spencer Walpole indicate the influence of patronage and social status on appointments. With the possible exception of Horner, who had been a linen merchant for a period, none of these men had first hand experience of mines, factories or piscatorial issues prior to their recruitment. The second type of appointment were the 'experts', those men who had acquired thorough technical training, either in an amateur or a professional capacity. The majority of inspectors of mines, rivers, salmon and alkali works fall into this category. These findings have important implications for the remainder of this chapter, the salary issue (see 3.2), and the enforcement approaches adopted by each body (see chapters four and five).

[115]Breeze, L., *The British Experience with River Pollution, 1865-1876* (New York: Peter Lang, 1993), p.22.

2.4: Recruitment/Patronage

As implied in the preceding section, the influence of patronage upon civil service recruitment is a central issue, and has been the subject of some discussion.[116] Finer has described patronage as 'the recruitment of public servants by private recommendation.'[117] In a 'classic form' of patronage,

> Civil servants will tend to be the social peers, or possibly the social dependants, of the men they serve. Their private and public worlds will coincide; there is unlikely to be tension between the status they enjoy by virtue of their office and their private standing.[118]

Johnson has further contended that the men recruited on account of their expertise may have been in a more ambiguous position than that outlined above. As the 'expert' owed his position to his knowledge, rather than to his social links, working relationships would depend more upon rapport than social convention.[119] Peter Bartrip has agreed that the employment of 'experts' to regulate industrial behaviour was particularly problematic as:

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[116]Richard Johnson has argued that recruitment into the education service was greatly influenced by patronage. See Johnson, R., 'Administrators in Education', p.113. In fact, Sutherland has observed that the education department continued to recruit its inspectors and examiners through patronage until 1914. See Sutherland, G., 'Administrators in Education after 1870' in Sutherland, G. (ed.), *Studies in the Growth of Nineteenth-century Government* (London: Routledge, 1972), p.263. Furthermore, Ursula Henriques has contended that all posts in the early factory service were filled by 'personal patronage', see Henriques, *The Early Factory Acts and their Enforcement*, p.11. Bernice Martin's biographical study of Leonard Horner backs up Henriques' statement. In April 1833, Horner was appointed to the Royal Commission through his Whig connections. After the Factory Act was passed in 1833, Horner was offered a position as inspector by Francis Jeffrey, Lord Advocate of Scotland, who was an old friend of Horner's from Edinburgh. Martin, 'Leonard Horner', p.427. Roy MacLeod has also seen patronage at work in the recruitment of one of the early salmon inspectors. Spencer Walpole, a third class War Office clerk and son of the Home Secretary, was appointed to the salmon inspectorate in March 1867. MacLeod comments that 'there is little doubt that he was advanced to Ffennell's vacant post £700 post on his father's recommendation.' MacLeod, 'Government and Resource Conservation', p.127.

[117]Johnson, R., 'Administrators in Education', p.115.

[118]ibid., p.122.

[119]ibid.

> ...it was politically difficult to appoint persons who had a financial interest in the business under inspection owing to possible accusations of bias in the conduct of their duties. At the same time it was preferable to appoint individuals with some knowledge of the inspection field, and in many cases the best qualified were likely to be managers or directors.[120]

The appointment of Alfred Fletcher, George Davis, Russell Forbes Carpenter and John Affleck illustrate that the management of chemical works was indeed considered to be suitable experience for an alkali inspector (see 2.2).

The issue of recruitment to the Alkali Inspectorate remains hazy.[121] The available records make it clear that all appointments to the Alkali Inspectorate were made by the President of the L.G.B,[122]influenced by the Chief Inspector's recommendation.[123] The education and experience of the alkali inspectors appointed in this period, indicates that recruitment was based upon scientific education and technical/industrial experience prior to their application.[124]

In some cases personal friendships or nepotism may have affected the Chief Inspectors' recommendation. Angus Smith and George Davis were friends, to the extent that the latter resigned upon the day of the former's demise (see 2.2).

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[120]Bartrip, 'British Government Inspection', p.608. Bartrip has observed that railway inspectors were taken from the royal engineers, and explosives inspectors were recruited from the royal artillery and 'in many ways officers from these corps were ideal inspectors for these industries since they possessed technical knowledge about the construction and application of railways and munitions, but had acquired such expertise in a non-commercial capacity.' (p.608).

[121]The original appointment records for Smith and the first four sub-inspectors have been destroyed. However MacLeod has contended that 'in view of the procedures adopted in other instances (e.g. the Medical Department of the Privy Council) it was not improbable that the sub-inspectors were nominated by Smith.' See MacLeod, 'The Alkali Acts Administration', fn.16.

[122]P.R.O., MH16/4, Secretary of the L.G.B to Robert Steele, 15th February 1893 and P.R.O., MH16/4, Sir John Shaw Lefevre to Hugh Owen, 29th March 1896.

[123]P.R.O., MH16/4, John Shaw Lefevre to Hugh Owen, 3rd September 1895. The Permanent Secretary was informed that the file with applications for the position of sub-inspector had been sent to the Chief Inspector, Russell Forbes Carpenter, for his suggestions.

[124]Alkali Inspectors were exempt from the civil service examination, see P.R.O., MH16/1, Edward Sutton to J.A. Fisher Hall, 23rd September 1881.

Furthermore, in January 1892, Eustace Fletcher was recruited as junior laboratory and office assistant by his father, Alfred Fletcher.[125] Eustace Fletcher spent his entire career in the Alkali Inspectorate,[126] rising through the ranks to become a sub-inspector in Edward Jackson's district in July 1895.[127] This pattern of promotion was repeated throughout the period 1864-1906. In 1875, Angus Smith had suggested promotion by seniority,

> ...I would suggest the present men to have quite young men under them, who would remain only a few years, picking out the best to fill occasional vacancies and keeping up a proper mixture of youth and experience.[128]

Indeed, following the Alkali Act, 1881, the employment of an additional four sub-inspectors allowed for such a two tier system. Examples of this type of career progression are provided by William S. Curphey (laboratory assistant 1877, sub-inspector 1882, inspector 1892, Chief Inspector 1910), Dr. Adrian Blaikie (laboratory assistant 1882, sub-inspector 1884) and Dr. Alfred Cooper Fryer (laboratory assistant 1882, inspector 1884).

2.5: Social Relationships

The background of the alkali inspectors outlined in previous sections suggests that they did not share a common social background with land owners, in terms of either social or economic status. The following discussion will assess the nature of the social relationship that inspectors had with manufacturers, as a precursor to the analysis of enforcement issues in chapters four, five and six.

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[125]P.R.O., MH16/3, Alfred Fletcher to the L.G.B, 23rd January 1892.
[126]Ashby and Anderson, *The Politics of Clean Air*, p.76.
[127]P.R.O., MH16/4, Russell Forbes Carpenter memorandum, 5th July 1895.
[128]P.R.O., MH16/1, Angus Smith to the L.G.B, 20th September 1875.

The importance of an unbiased inspectorate was recognised by the *Select Committee on Injury from Noxious Vapours* (1862). The report recommended that an inspectorate 'wholly independent of all local control, and removed as far as possible from all local influence' should be entrusted with the delicate task of refereeing between landowners and manufacturers.[129] Section eight of the Alkali Act, 1863 enshrined this recommendation in law when it stated that,

> No Person either directly or indirectly acting or practising as a Land Agent, or directly or indirectly engaged in any Manufacture, or interested in any Patent in or according to which the Decomposition of Salt or the Condensation of Muriatic Acid Gas may be effected, shall act as an Inspector or Sub-Inspector under this Act.[130]

Furthermore, the letters of appointment to the original four sub-inspectors stated that they were appointed on the understanding that they had no vested interests that may affect their actions.[131]

However, the records of nineteenth-century chemical societies indicate the involvement of alkali inspectors throughout their government service. For example, the records of the Chemical Society (1841) reveal that the first Chief Inspector, Angus Smith, was a member of the council between 1870-1872,[132] and Vice President in 1878-1880.[133] It is also notable that Alfred Fletcher became a member of the council in 1885-1886, one year after his rise to the position of Chief Inspector.[134] Many

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[129]*Report from the Select Committee of the House of Lords on Injury from Noxious Vapours* (1862) PP.1862.p.ix.xiv.1.
[130]26 & 27 Vict., section eight, p.69.
[131]P.R.O., MH16/1, Board of Trade to Alfred Fletcher, Charles Blatherwick and Brereton Todd, 26th January 1864.
[132]Moore, T.S. and Philip, J.C., *The Chemical Society 1841-1941: A Historical Review* (London: The Chemical Society, 1947), p.226.
[133]ibid., p.221.
[134]Moore and Philip, *The Chemical Society 1841-1941*, p.224.

successful chemical manufacturers were members at the same time, including Ludwig Mond (1884-1885), Peter Spence (1873-1874), and Smith's friend from Giessen, Edmund Schunk.

The records of the Society of Chemical Industry (S.C.I) also reveal the involvement of various alkali inspectors. The *Widnes Weekly News* reported in November 1879 that George Edward Davis, sub-inspector for the middle district, was the Secretary of the Chemical Society for South Lancashire.[135] In 1880, George Davis canvassed the Society of Chemical Engineers for the formation of the S.C.I, and along with the manufacturers John Hargreaves and Ludwig Mond, Davis is acknowledged as a founder member. [136]On the 19th April 1881, Davis was voted Honorary General Secretary. He did not retire from this position until July 1883, at which time he was still serving as an alkali sub-inspector.[137]

However, George Davis was not the only alkali inspector with deep involvement with the S.C.I. In fact, Ludwig Mond, suggested that Angus Smith should be voted the first President of the organisation. Although this did not occur, the inaugural meeting of the S.C.I appointed Angus Smith and Alfred Fletcher as committee members.[138]Other committee members included the alkali manufacturer E.K Muspratt, the eminent chemist, Walter Weldon and the iron magnate, Isaac Lowthian Bell.[139] Angus Smith later served as Vice President in 1882,[140] as well as

[135]See the jubilee issue of the journal *Chemistry and Industry*, July (1931), p.9.
[136]Donnelly, 'Chemical Engineering in England', p.557.
[137]Swindin, 'Memorial Lecture', p.187. Afterwards Davis became the chairman of the Manchester section of the Society of Chemical Industry, and he also served as Vice President. See S.M.L, *Papers of George E. Davis*, DAV 6/4.3. In January 1889, Davis became the Secretary of the Chemical Section of the Manchester Chamber of Commerce. See Swindin, 'Memorial Lecture', p.187.
[138]*Chemistry and Industry*, 1931, p.10.
[139]ibid., p.14.
[140]ibid., p.13.

being Vice President of the Institute of Professional Chemists of Great Britain and Ireland in 1877,[141] and a fellow of the Chemical Society of London.[142]

It should be noted that Russell Forbes Carpenter was also involved in the S.C.I, to the extent that he served as chairman of the Manchester section in the years 1894-1896, during which period he was promoted to Chief Inspector.[143] Interestingly, whilst in this position, Carpenter successfully requested that the annual meetings of the Alkali Inspectorate could be rearranged to coincide with that of the Society of Chemical Industry.[144]

A close relationship between inspectors and manufacturers is further implied by the provision of job recommendations by the former for the latter.[145] For example, Frank Tate, a Liverpool chemical consultant, was twice provided with testimonials from serving inspectors. Russell Forbes Carpenter wrote to him in May 1884 praising:

> ...the admirable manner in which you have performed the duties entrusted to you at the works of Messrs. W. Blythe and Co.[Liverpool]...I have had many opportunities of noting and appreciating the success with which you have solved some of the intricate problems that are constantly occurring in the management of an alkali work. The ability you have shown, and the tact with which difficulties have been met, qualify you in no ordinary manner for the

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[141]Russell, *Edward Frankland: Chemistry, Controversy and Conspiracy in Victorian England*, p.454. The Institute of Chemistry had a primary interest in acting as a qualifying association for men in private practice. See Donnelly, J.F., 'Representations of Applied Science: Academics and Chemical Industry in late Nineteenth-Century England', *Social Studies of Science*, 16 (1986) 195-234 (p.211).
[142]Schunk, 'Memoir of Robert Angus Smith', p.99.
[143]*Chemistry and Industry*, 1931, p.41.
[144]P.R.O., MH16/4, Russell Forbes Carpenter to the Secretary of the L.G.B, 26th June 1897.
[145]The fact that inspectors often had close personal friendships with manufacturers should not be overlooked. Hartog notes in the *Dictionary of National Biography* that Angus Smith was a lifelong friend of James Young (1811-1883), the Scottish manufacturer. In 1872, Smith travelled to Iceland on Young's yacht. This trip became the subject of an essay and a book by Smith, as did the friends' later voyage to St. Kilda. See Hartog, 'Robert Angus Smith', p.521 and also Smith's glowing testimony to James Young in Smith, R.A.,'An Address to Section III', *Transactions of the Sanitary Institute of Great Britain*, 5 (1883-4), pp.282-3.

inspectorial appointment for which you tell me you are applying. I wish you heartily every success in your application.[146]

A further application from Frank Tate in February 1885 contained a testimonial from Edward Jackson, which recommended him as 'a thoroughly efficient chemist, whose experience in alkali works would 'render him eminently qualified to fill the office of sub-inspector.'[147]

Therefore, it appears that the alkali inspectors had closer educational, professional and personal links with the manufacturers that they regulated, than they did with the landowners whose property they were charged with protecting. Chapters four and five will reveal to what extent these shared interests affected the enforcement of the Alkali Acts, whilst the next section will reveal whether these interests affected the inspectors dedication to their duty.

2.6: Dedication to Duty

As mentioned in the introduction to this chapter, the role of the individual in historical change lies at the heart of the debate over the 'nineteenth-century revolution in government.' In particular, the question of whether nineteenth-century inspectors were 'zealots',[148] has generated much discussion.[149] Both Jennifer Hart and Henry

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[146]P.R.O., MH16/2, Frank Tate to the L.G.B, 26th May 1884, including testimonial from Russell Forbes Carpenter.

[147]P.R.O., MH16/2, Frank Tate to Sir Charles Dilke, 16th February 1885. All applications from Tate were unsuccessful.

[148]The Oxford English Dictionary defines a zealot as a 'zealous person; uncompromising or extreme partisan, fanatic.' See Sykes, J.B. (ed.), *The Concise Oxford English Dictionary,* 7th edn. (Oxford: Clarendon Press, 1883), p.1253.

[149]Bartrip, P.W.J., 'Success or Failure? The Prosecution of the Early Factory Acts', *Economic History Review*, 38 (1985), 423-427 (p.426). For examples see Jill Pellew on the beliefs of Colonel Vivian Majendie, Chief Inspector of Explosives in Pellew, 'The Home Office and the Explosives Act of 1875'; Bernice Martin on Leonard Horner, one of the first factory inspectors, in 'Leonard Horner: A Portrait of an Inspector of Factories.' Also of relevance are Roy MacLeod's comments on the early salmon inspectors, in 'Government and Resource Conservation.'

Parris have criticised Oliver MacDonagh for under-estimating the role of individuals in encouraging historical change and administrative reform.[150] For, although MacDonagh has presented the office of central government inspector as an essential factor in the growth of nineteenth-century government, he has argued that administrative reform was perpetuated and accelerated by what he calls an 'internal momentum of reform.'[151] In contrast, Hart and Parris have argued that zealots, with an ideological commitment (Benthamism) to State intervention should be credited with providing the impetus towards reform, during this period.[152] Names such as Edwin Chadwick (public health), James Kay Shuttleworth (education) and John Simon (medical department of the Privy Council) are advanced as examples of zealous, committed reformers who pushed forward the pace of change.

Other commentators have since identified various central government inspectors as possessing a commitment to Benthamite ideals. Bernice Martin has argued that the Benthamite principle of utility was a central concept in Leonard Horner's writings on the factory question.[153] Jill Pellew has contended that there can be no doubt that Colonel Vivian Majendie, Chief Inspector of Explosives, was a zealot, who was at least indirectly effected by utilitarianism.[154] He was influenced by laissez-faire hostility to government intervention, but practical experience taught him that central inspection was necessary to ensure the efficient protection of the general public from danger from explosives. For Pellew, Majendie provides an example of

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[150]See Hart, J., 'Nineteenth-Century Social Reform', and Parris, H., 'The Nineteenth-Century Revolution in Government.'
[151]MacDonagh, 'The Nineteenth-Century Revolution in Government: A Reappraisal.'
[152]Hart, 'Nineteenth-Century Social Reform', and Parris, 'The Nineteenth-Century Revolution in Government.'
[153]Martin, 'Leonard Horner', p.415.
[154]Pellew, 'The Home Office and the Explosives Act of 1875', p.177.

'striking energy...in finding a satisfactory solution to the explosives problem.'[155] In addition, Roy MacLeod has argued that the first salmon inspectors were affected by, and acted in keeping with Benthamite ideals. This occurred almost by osmosis, as none of the early inspectors were advocates of the intervention of the State, for its own sake. MacLeod has commented,

> Because the inspectors were influenced by the attitudes and opinions of their time, they provide a classic description of the way in which Victorian 'experts' could use Benthamite imperatives and legislative controls without being tutelary Benthamites, and without advocating State intervention as an end in itself. The inspectors were knowing agents of change, but they did not necessarily applaud its implications or consequences. Ffennell and Eden were more strongly in favour of the tighter government controls familiar in Ireland, but even they gave no evidence of approving State control as a long term policy. Buckland shunned political discussion wherever possible, preferring to keep natural science out of politics, and Huxley, though aware of the need for government scientific policy, was by no means a doctrinaire supporter of government-sponsored science.[156]

For MacLeod, the general philosophy underlying the actions of the early salmon inspectors was an ethical utilitarianism strongly identified with an idea of progress, rather than legalistic Benthamism.[157]

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[155]ibid., pp.188-189.
[156]MacLeod, 'Government and Resource Conservation', p.148.
[157]ibid., p.149.

Richard Johnson has commented that these 'experts' in government, especially in newly established departments, were most likely to be zealous proponents of their cause. He has argued,

> The expert in government will tend to conceive his role as the pursuit of a cause, defined less as political partisanship, more by the imperatives of his expertise. His administration will tend to be dynamic, expansive and creative. He will seek to create new functions, to make policy, to be, in Sir James Stephen's phrase, a 'statesman in disguise.' He will work on 'law-making opinion' - Members of Parliament and the particular public appropriate in his field. These commitments will be all the more intense where public service itself lacks social justification and may be easier to exercise where there are few precedents to guide and limit his modes of action.[158]

However, with reference to the nineteenth-century factory inspectors, Peter Bartrip has maintained that the dedication of these professionals to their employment has been over-emphasised by historians:

> ...the reforming and policy-making roles of inspectors has been somewhat exaggerated. Certainly, the familiar refrain of their reports that the law was fairly well observed was not the cry of the reformer. The inspectorate is more realistically seen as an example of disinterested professionalism.[159]

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[158]Johnson, 'Administrators in Education', p.130. Sutherland has argued that 'medical, technical and scientific experts seem to be rather more similar to zealots in their patterns of behaviour than to regular civil servants. As the zealot has his cause, so the doctor or engineer has his expertise; he has criteria for judging problems and situations which do not derive entirely or primarily from within the government service. Sutherland, 'Introduction', in *Studies in the Growth of Nineteenth-Century Government*, p.8.
[159]Bartrip, 'Success or Failure?', p.426 and *idem*, 'British Government Inspection', p.619. This viewpoint has been expounded by other commentators. David Roberts has argued that nineteenth-century inspectors held the same beliefs as other members of the early Victorian middle class. Roberts, D., *Victorian Origins of the British Welfare State* (New Haven: Yale University Press, 1960), p.168. In addition, Roy MacLeod has also recognised that nineteenth-century inspectors had very different motives for entering government service, 'some were undoubtedly attracted by the security and general good prospects. Other were committed to professional or social ideals which statutory powers could

For this commentator, the early inspectors of factories and mines, with the possible exception of Robert Baker, did not display the characteristics of zealous or committed reformers.[160] Before Baker's entry into the Factory Inspectorate he did exhibit a dedication to the protection of the health and welfare of factory workers (see 2.3). As a Leeds doctor, Baker oversaw the treatment of young factory workers. In 1832, he contracted cholera, which so unnerved him that he gave up his profession to follow factory work.[161]

Questions remain about the dedication of the early alkali inspectors to the abatement of industrial pollution, as existing research has not focused upon the political and philosophical tendencies of the alkali inspectors.[162] However, there is evidence that the first Chief Inspector, Angus Smith, was dedicated to environmental protection. In 1844, almost twenty years prior to his appointment to the Alkali Inspectorate, Angus Smith wrote to the *Manchester Guardian* in despair about the atmosphere of the city.[163] This attitude is also evident in his writings as Chief Inspector. For example, on the 1st March 1880, Smith wrote to the L.G.B about a chemical works at Broich Terrace, Crieff,

> ...I am very sorry to find works in such a place and I wish that a satisfactory clause could be found for preventing chemical works altogether in certain places. Crieff is a sanitorium.[164]

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help achieve. Still others no doubt found that government employment provided agreeable opportunities for travel and independent research.' MacLeod, *Government and Expertise*, p.10.

[160]Bartrip, 'British Government Inspection', pp.619-621.

[161]ibid., p.620.

[162]Roy MacLeod has briefly commented on Angus Smith's beliefs, 'although Smith knew and admired Chadwick, his regard was based on an appreciation of the latter's practical accomplishments in stimulating sanitary science. There is no evidence, in Smith's writings or elsewhere, that he approved of the ramifications of Benthamism, or even consciously applied them in his work.' MacLeod, 'The Alkali Acts Administration', p.111, fn.71.

[163]Kargon, R.H., *Science in Victorian Manchester: Enterprise and Expertise* (Manchester: Manchester University Press, 1977), pp.115-116.

[164]P.R.O., Angus Smith to the L.G.B, 1st March 1880.

Smith expanded upon these views in February 1881, when he commented that:

> ...there are places where to put down a manufactory would be to my mind a crime but there is no punishment. A very dear friend of my own has been intending to put down works in such a situation. I hope I have prevented it. It would have saddened me much if it had been done. The sadness would have come both from the fact that the place had been spoiled although unfortunately I have no rights there, and because a man to be admired has so little respect for it. This is merely a sample of that which many must feel as individuals and which many communities feel.[165]

Although there is no evidence that Angus Smith was a collectivist, an analysis of his career before his entrance into the Alkali Inspectorate leaves no doubt that he was dedicated to the improvement of public health.[166] He held Edwin Chadwick in high esteem, commenting in a paper presented in 1883 to the Sanitary Institute of Great Britain that,

> ...one can scarcely speak upon the subject of Sanitary Reform without mentioning the name of Edwin Chadwick...having had the pleasure and advantage of being at an early period of life more or less associated with him in his work, I am one of those who have had the opportunity of witnessing his earnestness, his unselfishness, and his power.[167]

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[165]P.R.O., MH16/1, Angus Smith to the L.G.B, 18th February 1881.

[166] Smith corresponded with Chadwick from 1845 until the former's death in 1884. However, although the correspondence illustrates Smith's interest in sanitary matters (much of this correspondence focused upon life expectancy in towns, water analysis, road building and fertilizers), it holds no clues to Smith's political or philosophical views. See, *The Papers of Edwin Chadwick*, L.U.C.

[167]Smith, R.A., 'An Address', *Transactions of the Sanitary Institute of Great Britain*, 5 (1883-1884), p.267.

In fact, like his Giessen tutor, Justus Liebig, Smith sought to apply chemistry to the problems attendant upon accelerated industrialisation and population growth. T.E Thorpe, head of the government laboratory, commented that Angus Smith recognised,

> ...the utilitarian side of science: for upwards of forty years he laboured unceasingly to show how chemistry might minister to the material comfort of the physical well-being of men - not in the establishment of new industries - but in raising the general standard of the health of communities by checking or counteracting the evils which have followed in the train of that enormous development of the manufacturing arts which is the boast of this century...There have been greater chemists, no doubt: his name is not associated with any fundamental discovery in chemistry, and his attempts at theorising were not always very happy; but in his true vocation, as the chemist of sanitary science, Smith worked alone, and we have yet to find the man on whom his mantle has fallen.[168]

A vocation must have underpinned much of Smith's work, which was often badly paid or even unpaid, and often took place alongside the demanding role of Chief Inspector of alkali works. Smith contributed research work to the Health of Towns investigation (1843-8), the Metropolitan Commission on Sewers (1847-9), the Reports on Royal Mines (1864), Royal Commission on the Cattle Plague (1865), the Royal Commission on the Metropolitan Water Supply (1867-9) and the Rivers Pollution Prevention Act (1882 and 1884). Smith was also an active member of the Manchester and Salford Sanitary Association, set up in 1852 to educate the public about dangers of dirt and squalid housing.[169]

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[168]Thorpe, T.E., 'Robert Angus Smith', *Nature*, 30 (1884), p.104.
[169]Gibson and Farrar, 'Robert Angus Smith', p.244.

Matched with this, there can be no doubt that Smith was a dedicated government servant. Six weeks before his death, he informed the L.G.B that he was continuing with his reports on salt and cement works, despite an illness which was so severe that he was being carried from room to room. Yet, he commented,

> Still my head is clear and my investigations have come to a point where I am excited to do more. I am very unwilling also to lose hold of the reins either in the Alkali or in the Rivers Pollution Prevention Department...during twenty years I have never been absent from my work above a month at a time, and only three times absent so long.[170]

In August 1882, a Reverend Sylvester of Castleford wrote to the Chief Inspector, threatening to complain to the L.G.B about the inspectorate's failure to abate pollution in his neighbourhood. Smith replied,

> You say you will write to the Board. I should be sorry, I think that you neglected or delayed doing this from any tenderness to me. First, I am not to be considered in the matter if I do not act for the public good. Second, I do not wish to have secrets from the Board. I suppose the Board must feel as I feel that it is very unpleasant to have a complaint and the sooner that people can be satisfied the better.[171]

However, on occasion Smith often found his position as a supposedly neutral government official problematic. For example, he informed the Assistant Secretary of the Board of Trade in November 1872, that Newton and Parkgate Local Board had complained of the chemical works at Flint, belonging to Dr. Muspratt. Smith detected

[170]P.R.O., MH16/2, Angus Smith to the L.G.B., 13th January 1884.
[171]P.R.O., MH16/1, Angus Smith to the Reverend W. Sylvester of Castleford, 19th August 1882.

details included in their letters of appointment.[9] This may be partly explicable by the Local Government Board administrators' lack of understanding about the scientific and technical nature of the alkali inspectors' duties. Therefore, it must be concluded that Angus Smith was able to employ considerable discretion in deciding upon a strategy for the enforcement of the Alkali Acts.

A sixth factor was the newness of the inspectorate and its acceptance by the regulated parties. There was criticism of the Alkali Inspectorate, but this was in no way as widespread or as fierce as opposition to the inspection of factories or schools. Once manufacturers became aware of the enforcement procedures undertaken by the alkali inspectors, the majority were willing to submit to state regulation. However, it is questionable whether this situation would have existed if the inspectorate had adopted a 'penal' rather than a 'partnership' approach to enforcement.

Reference to these criteria illustrates that the effectiveness of the Alkali Inspectorate was mixed, and that the scope of its action was limited by broad structural constraints, rather than by the actions of the individuals involved. There can be little doubt that the extent of industrial atmospheric pollution was reduced during the period under consideration. Hydrochloric acid emissions were the first to be regulated under the Alkali Act, 1863. The *Chemical News* noted that within one year of this legislation, the average escape of hydrochloric acid had been reduced to 1.28%, well within the statutory limit of 5%. The emission of hydrochloric acid was reduced from 13,000 to 43 tons, and all of the registered works were condensing their acid according to the legal

[9]In contrast, both the Poor Law Inspectors and the Education Inspectors were provided with detailed written instructions from their superiors about how to perform their task. See Harris, *British Government Inspection: The Local Services and the Central Departments*, p.187.

requirement.[10] However, it should be noted that measurements were taken from openings in the towers, and excess amounts could have been released deliberately, or escaped from badly designed flues or through cracks in the furnace lining.[11] Moreover, other sources of chemical pollution proved more problematic for the Alkali Inspectorate, particularly hydrogen sulphide. Throughout the 1880s, manufacturers resisted the implementation of methods to recover sulphur from their alkali waste heaps, they disregarded their promises of self regulation and the Alkali Inspectorate lacked the sanctions to impose specific abatement methods upon manufacturers.[12]

It should be noted that the Alkali Inspectorate was only one factor, albeit an important one, in any reduction in atmospheric pollution levels in late Victorian Britain. Various technological and economic factors contributed towards the decrease in atmospheric pollution emanating from chemical sources. Firstly, the Leblanc process was notoriously wasteful - it made one chemical and wasted two. However, the increase in technical knowledge, in part aided by the Alkali Inspectorate, enabled chemical manufacturers to develop processes which allowed them to utilise waste products for economic profit. A prime example of this was the utilisation of approximately 25% of the waste hydrochloric acid for the production of bleaching powder by the Weldon and the Deacon processes. In addition, the Chance process for the recovery of sulphur from alkali waste heaps, that was introduced by the 1880s, created sulphuric acid which was another

[10]MacLeod, 'The Alkali Acts Administration, 1864-1884', p.92.
[11]Hawes, R.A., *A History of Public Health in St. Helens* (University of Liverpool: Unpublished Doctoral Thesis, 1991), p.36.
[12]ibid., chapter two.

source of profit for the Leblanc industry.[13] Hence, in economic terms some types of pollution became a luxury, rather than a necessity, for manufacturers.

The gradual replacement of the Leblanc process of alkali manufacture, during this period, also contributed to increased pollution control. The late nineteenth-century saw the introduction of the more economical Solvay (ammonia-soda) process.[14] The waste product was ammonium chloride, which was neither as unpleasant nor as dangerous as the calcium sulphide heaps created by the Leblanc process. Furthermore, the price of bleaching powder, upon which Leblanc manufacturers relied for profit, collapsed after 1889. These domestic developments were matched by the rise of foreign competition, predominately from Solvay plants in Germany, France, the United States and Russia. In addition, Leblanc manufacturers were hit by the closure in export markets; in particular the tariffs that were piled on British chemical products by the United States during the 1890s, heralded the closure of what had been their largest foreign market. This economic climate prompted the rationalisation of the alkali industry, and the closure of the least efficient works, when the United Alkali Company was established in 1890. However, by 1920 the wasteful Leblanc process was obsolete.[15]

A final possible factor which aided the decrease in atmospheric pollution during this period was the displacement of chemical pollution from air to water. Studies of industrial water pollution during the late nineteenth century have asserted that traditional

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[13]The method was only slowly taken up by manufacturers, and as late as 1890, only two firms were working the Chance process in St. Helens, and they were doing this inefficiently. See Hawes, *A History of Public Health in St. Helens*, p.59.

[14]At 1873 levels, one ton of 56% soda ash could be delivered a cost of £7 1s 4d by the Solvay process. The equivalent cost from Leblanc manufacturers was £9 1s 10d. See Cohen, J.B., *The Life of Ludwig Mond* (London: Methuen & Co., 1956), p.134.

[15]Haber, L.F., *The Chemical Industry during the Nineteenth Century* (Oxford: Oxford University Press, 1958).

legislative-judicial methods to control water pollution failed until the early 1890s.[16] Therefore, weak legislative sanctions meant that river pollution remained a 'safer' alternative option for polluters. In particular, the noxious liquid from alkali waste heaps was frequently allowed to drain into the nearest watercourse by manufacturers.[17] Further research on the problems of air and water pollution in tandem, set in the local context of a specific city at a specific time, would fully reveal the extent of the displacement of chemical pollution from air to water.[18]

The nineteenth-century Alkali Inspectorate set the pattern and emphasis for the unique approach to pollution control that exists in modern Britain, and its legacy is evident in the regulation of industry by many types of central government inspectorates today. However, in the final analysis, it must be asserted that adherence to *laissez-faire* principles and concern for economic profit limited intervention to protect the natural environment during the period 1864-1906.

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[16]Richards, *River Pollution Control in Industrial Lancashire 1848-1939*, section 11.1.
[17]Hawes has noted that in St. Helens, 24 heaps drained directly into Sankey Brook, and four more into the canal. See Hawes, *A History of Public Health in St. Helens*, p.44. See also Willmot, S.,'Pollution and Public Concern: The Response of the Chemical Industry in Britain to Emerging Environmental Issues, 1860-1901', in Homburg, E., Schröter, H.G., & Travis, A.S. (eds.), *The Chemical Industry in Europe, 1850-1914: Industrial Growth, Pollution and Professionalization* (Boston: Kluwer Academic Publishing, 1998).
[18]One study of this type is the thesis by Richard Hawes, *ibid.*

Appendix One

Prosecutions under the Alkali Acts 1864-1906

Date	Company	Location	Offence	Penalty
1866	Bridgewater Smelting Works	St. Helens	Section 9	Not Known
1867	Not Known	Liverpool	Section 9	£25 & costs
1869	Not Known	St. Helens	Section 9	Not Known
1871	Not Known	St. Helens	Section 9	£50
1877	St. Helens Chemical Co.	St. Helens	Section 9	£25 and costs
1879	Phoenix Alkali Works	Widnes	Section 9	£50 paid in lieu of prosecution
	Golding and Davis	Widnes	Section 9	£50 paid in lieu of prosecution
1880	St.Helens Chemical Co.	St. Helens	Section 9	£5 & costs
	Joseph Fison & Co.	Bramford	Section 9	£50 paid in lieu of prosecution
1883	Hunt Bros.	Castleford	Section 9	£50
	Copper works	Newcastle	Section 9	£10
1884	Sutton Lodge Chemical Company	St. Helens	Section 9	£5 & costs
1885	Not Known	Not Known	Section 11	£50 and costs
1886	Geo. Rayson & Son	Not Known	Section 11	£20 & costs
	Joseph Turner & Co.	Queensferry, Flintshire	Section 11	£1 & costs
	Shortley Bridge & Consett Gas Co.	Not Known	Section 11	£15 & costs
	Westhoughton Gas Co.	Not Known	Section 11	£12 (4 years fee in lieu of prosecution)
	Walton on Thames Gas Co.	Not Known	Section 11	£12 (4 years fee in lieu of prosecution)
	Ludlow Union Gas Co.	Not Known	Section 11	£12 (4 years fee in lieu of prosecution)

Date	Company	Location	Offence	Penalty
1886	Robert Fletcher & Sons	Not Known	Section 11	£12 (4 years fee in lieu of prosecution)
	M.A Aitken & Son	Not Known	Section 11	£12 (4 years fee in lieu of prosecution)
	Pattinsons Pearl Hardening Co.	Newcastle	Section 11	£10 & costs
	Arnott & Bulton	Not Known	Section 11	£3 (1 years fee in lieu of prosecution)
1887	M.N.D`Andria	Salford	Section 11	£3 & costs
	W.J Barnes	Rainham	Section 11	£10 & costs
	Geo. F. King	Keynsham	Section 11	£18
1888	Johnson & Co. Manure Co.	Berwick	Section 9	£20 & costs
	Talk-o`-th`-Hill Co.	Audley, Staffs.	Section 11	£10 & costs
	Bridgnorth Corporation	Bridgnorth	Section 11	£10 in lieu of prosecution
	Thomas Farmer & Co.	London	Section 9	£20 & costs
	W.H. Hale	West Ham, London	Section 11	£5 5s & costs
	William Parks	Marston, Cheshire	Section 11	Fee paid in lieu of prosecution
	J. Fison & Co.	Ipswich	Section 9	£50 & costs
	J. & R. Marriott	Narborough, Norfolk	Section 11	£30 & costs
	Seaham Chemical Works	Seaham Harbour	Section 11	£10 & costs
	John Crossley & Sons	Halifax	Section 11	£18 back fees in lieu of prosecution
	C.A. Barrett	Chelmsford, Essex	Section 11	£17 back fees and £5 penalty
1889	Messrs Thomas Crow & Sons	West Ham, London	Section 9	£10 & costs
1891	Northwich Gas Co.	Northwich	Section 9	£10 & costs

Date	Company	Location	Offence	Penalty
1891	Not Known	Not Known	Section 11	£5 & costs
	Not Known	Not Known	Section 11	£5 & costs
1892	Messrs Bowman, Thompson & Co.	Not Known	Section 11	£5
	Messrs Bowman, Thompson & Co	Not Known	Section 9	£20
1892	Cotton Powder Co.	Faversham, Kent	Section 11	£18
	Godalming Gas Co.	Godalming	Section 11	£9
	Skelskey`s Adament Cement Co.	Not Known	Section 11	£6
1893	Tipperary Gas Co.	Tipperary, Ireland	Section 11	£9 paid in lieu of prosecution
	Godfrey Woodhead	Not Known	Section 11	£6 paid in lieu of prosecution
	Bradburn & Co. Ltd	Wednesfield	Section 9	£25 & costs
	Phospho-Guano Co. Ltd.	Not Known	Section 9	£20 & costs
1894	W.H. Goulding	Cork, Ireland	Section 9	£5 & costs
	J. Hutchinson & Co.	Bolton, Lancashire	Section 11	£10 & costs
	Little Island Chemical Co.Tar	Cork, Ireland	Section 11	£15 & costs
	Southport Corporation	Southport	Section 9	Not Known
	Excelsior Carbonising Co.	Dewsbury	Section 11	£10
	Micham Gas Light Co.	Micham, Surrey	Section 17	£10 paid in lieu of prosecution
	Richmond Gas Co.	Mortlake, Surrey	Section 17	£10 paid in lieu of prosecution
1895	W. Smith & Co.	Bruntcliffe	Section 11	£3 in lieu of prosecution
	J. Shaw & Sons Ltd.	Tawton	Section 11	£6 in lieu of prosecution

Date	Company	Location	Offence	Penalty
1895	J. Shaw & Sons Ltd.	Stainland	Section 11	£6 in lieu of prosecution
	Jabez Johnson	Leeds	Section 11	£6 in lieu of prosecution
	Whitwam & Co.	Linthwaite	Section 11	£6 in lieu of prosecution
	Singleton & Co.	Kirkburton	Section 11	£6 in lieu of prosecution
	Langley Bros.	Ossett	Section 11	£6 in lieu of prosecution
1895	J.W. Hewson	Thoresby	Section 11	£3 in lieu of prosecution
	W.L. Bassitt	Marshchapel	Section 11	£6 in lieu of prosecution
	W. & H.M. Goulding	Blackpool, Cork	Not Known	£5 and costs
1896	G. Millard	Manchester	Section 17	Case withdrawn
	Not Known	Not Known	Section 11	Fees paid in lieu of prosecution
	Not Known	Not Known	Section 11	Fees paid in lieu of prosecution
	Not Known	Not Known	Section 11	Fees paid in lieu of prosecution
	Not Known	Not Known	Section 11	Fees paid in lieu of prosecution
	Not Known	Not Known	Section 11	Fees paid in lieu of prosecution
1897	H.J. Fenner	Cork, Ireland	Section 11	2s paid in lieu of prosecution
	Commercial Gas Co.	Poplar, London	Section 9	Court proceedings adjourned
	Thomas Kenyon	Manchester	Section 9	£20 paid in lieu of prosecution
1898	Hamor Lockwood & Co.	Manchester	Section 9	£20 & costs
	Burndon Tar Co.	Bolton	Section 11	£5 fee paid in lieu of prosecution

Date	Company	Location	Offence	Penalty
1898	Perry, Spear & Co.	Crelake, Tavistock	Section 9	£20 & costs
	Sheffield Chemical Co.	Attercliffe, Sheffield	Section 9	£20 & costs
	Sheppy Glue and Chemical Works	Queenborough, Kent	Section 9	£20 & costs
	Not Known	Not Known	Section 11	Fees paid in lieu of prosecution
1899	Not Known	Not Known	Section 11	Fees paid in lieu of prosecution
	Not Known	Not Known	Section 11	Fees paid in lieu of prosecution
1900	Charles Butler	Gomersal	Section 11	£5 & costs
	Electro-Chemical Co. Ltd.	St. Helens	Section 9	£20
	H.W. Fenner	Cork, Ireland	Section 11	£3 & special costs proceedings stopped
	H.W. Fenner	Cork, Ireland	Section 11	£2 & special costs proceedings stopped
	Newton in Makerfield Council	Earlestown	Section 9	£20
1902	Not Known	Not Known	Section 11	Fees paid in lieu of prosecution
1903	John Grindell	Hull	Section 9	Fee paid in lieu of prosecution
	Not Known	Not Known	Section 11	Fees paid in lieu of prosecution
	Not Known	Not Known	Section 11	Fees paid in lieu of prosecution
	Not Known	Not Known	Section 11	Fees paid in lieu of prosecution
1905	Not Known	Not Known	Section 9	£50 and costs
	Not Known	Not Known	Section 11	Fees paid in lieu of prosecution
	Not Known	Not Known	Section 11	Fees paid in lieu of prosecution
	Not Known	Not Known	Section 11	Fees paid in lieu of prosecution

Date	Company	Location	Offence	Penalty
1905	Not Known	Not Known	Section 8	£50 and costs
1906	Not Known	Not Known	Section 9	£20 paid in lieu of prosecution
	Not Known	Not Known	Section 9	£20 paid in lieu of prosecution
	Not Known	Not Known	Section 11	Fees paid in lieu of prosecution

Source: Annual Reports of the Chief Alkali Inspector 1865 - 1907

Section 9: Adoption of Best Practical Means
`The owner of any work specified in the schedule to this act...shall use the best practical means for preventing the discharge into the atmosphere of all noxious gases and of all offensive gases evolved in such work, or for rendering such gases harmless and inoffensive when discharged`.

Section 11: Certificate of Registration
`An alkali work or a scheduled work, erected after the commencement of this Act, or which has been closed for a period of twelve months, shall not be registered under this Act unless the work is furnished with such appliances as at the time of registration appear to an inspector...to be necessary in order to enable the work to be carried on in accordance with such requirements of this Act as for the time being apply to such work`.

Section 15/17: Obstruction of an Inspector
`The owner of every such work and his agents shall render to every inspector all necessary facilities for an entry inspection examination and testing in pursuance of this Act`.

Alkali, & c. Works Regulation Bill, 1881

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1866: 1867 xvi.1

1867: 1868 xviii.1
1868: 1869 xiv.1
1869: 1870 xv.1
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1879-80: 1878-9 (23) xlviii.1
1880-1: 1880 (161) xlvi.1
1881-2: 1881 (92) lxii.1
1882-3: 1882 (26) xlii.1
1883-4: 1883 (8) xliii.1
1884-5: 1884 (57) lii.1
1885-6: 1884-5 (48) l.1
1886-7: 1886 (2.Sess.II) xliii.543
1887-8: 1887 (53) liv.1
1888-9: 1888 (72) lxx.1
1889-90: 1889 (49) lii.1
1890-1: 1890 (63) xlvi.1
1891-2: 1890-1 (50) liii.1
1892-3: 1892 (48.Sess.1) liii.1
1893-4: 1893-4 (59) lvi.1
1894-5: 1894 (3) lv.1
1895-6: 1895 (98) lxv.1
1896-7: 1896 (7) lv.1
1897-8: 1897 (33) lvii.1
1898-9: 1898 (57) lvii.1
1899-1900: 1899 (69) lvi.1
1900-01: 1900 (39) lii.1
1901-02: 1901 (46) xliii.1
1902-03: 1902 (53) lxii.1
1903-04: 1903 (48) xli.1
1904-05: 1904 (75) liv.1
1905-06: 1905 (64) xliv.1
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C. Periodicals and Newspapers

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Chemical Trade Journal

Journal of the Society of the Arts
Journal of the Society of Chemical Industry
Nature
Nineteenth Century
Penny Magazine
Reports of the British Association for the Advancement of Science
The Times
Transactions of the National Association for the Promotion of Social Science
Transactions of the Sanitary Institute of Great Britain

Local Publications

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C. UNPUBLISHED DOCTORAL DISSERTATIONS

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the emission of a harmful gas, but it was powerless to act as it was not covered by the Alkali Act. He complained,

> I am again in a difficulty. If I tell the people at Parkgate, I am party to a prosecution at once; if I do not I conceal information that may be useful to the public. I see, in this case the knowledge was not obtained by a confidential communication, and I do not break faith if I give it to others, but instead of being a Government Officer doing a certain fixed work, closely defined by an act of Parliament, I should become an unauthorised spy and seek a position by no means agreeable either to the manufacturers or to myself. In this case the escape of gas was that of a gas the most difficult to deal with and not yet satisfactorily dealt with by any person.[172]

It was decided by the Board of Trade that a copy of this correspondence should be forwarded to Newton and Parkgate Local Board. The Board of Trade had effectively decided that manufacturers should not be protected from private litigation by the Alkali Inspectorate.[173]

The second Chief Inspector, Alfred Fletcher, took a pragmatic view of State intervention to regulate chemical pollution. He adhered to *laissez-faire* principles, yet justified the Alkali Acts as a necessary constraint upon the freedom of the individual.[174] Fletcher argued that the British State did have a duty to regulate the fair use of the common property, such as the natural resources of air and water,

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[172]P.R.O., BT22/8/6, File R 7140/72, Angus Smith to the Assistant Secretary of the Board of Trade, 11th November 1872. It was decided in a minute dated July 30th 1872, that a copy of this letter should be sent to Newton and Parkgate Local Board.
[173]P.R.O., BT22/8/6, Railway Department File R7140/72, anonymous minute, 30th July 1872.
[174]This is a similar attitude to that attributed to Colonel Vivian Majendie by Pellew. See, Pellew, 'The Home Office and the Explosives Act of 1875.'

> We all resent the interference of law; it comes as a restraint on our freedom. We prefer to think that our actions are so well regulated as to need no guidance from others...unfortunately, the pressure of a present necessity, and a disproportionate view of self-interest, often distort the judgement, so that the constraint of law becomes necessary to prevent one man from trenching on the freedom of others while claiming to exercise his own. As men crowd more and more together, regulations as to possible pollution of air and of water become of the greater importance. The early settler in a new country, whose nearest neighbour is twenty miles away from him, may do much in the way of polluting both air and water without injuring anyone...As population, however, increases...or when twenty large chemical works are crowded into the space of a square mile...then indeed the balance is reversed.[175]

However, Fletcher justified the manufacturer's right to produce goods which provide for the comforts demanded in the modern world,

> ...almost all the good things we enjoy, the clothes we wear, the houses we live in, and much of the food we eat, are the outcome of some manufacturing process, during the progress of which smoke or vapour is discharged, to the detriment of the air we breathe. Shall we, then, stop all this work, and clothed in skins and such rough garments as may have sufficed for our savage ancestors, at once gain repose and a clear atmosphere? Few, indeed, would counsel such a course; rather would we strive to elaborate as much as is possible from the materials nature has given us, striving the while to carry on

[175]Fletcher, A.E., 'The Present State of the Law Concerning the Pollution of Air and Water', *Journal of the Society of the Arts*, 36 (1882-3), pp.567-568.

> our industry with such added skill as shall, as far as possible, diminish the evils liable to accompany it. [176]

Central government interference with individual rights and private property, was also justified by Alfred Fletcher on the grounds that the common law offered no legal remedy or protection for the general public against industrial pollution, due to the difficulty of identifying the culprit.[177] Furthermore, Fletcher contended that:

> ...there is often a margin, an unbridged space, between the distance a man will go prompted by self-interest and the distance prompted by duty.[178]

Although there is no evidence that Alfred Fletcher was a collectivist, his justifications for the State regulation of the chemical trade certainly had a Benthamite tone. Fletcher advocated that the State accept a positive, tutelary role, to ensure that the obstacle of industrial pollution did not stand in the way of the pursuit of individual freedom.[179]

The one way in which Alfred Fletcher appeared to be a zealot was in his attitude to the pollution caused by coal smoke.[180] Smoke caused by domestic fires or non-chemical manufacturing processes were not a legislative concern of the Alkali Inspectorate, and yet in every one of Fletcher's annual reports he digresses to tackle this issue. For example, in his twenty fifth annual report to the L.G.B, Fletcher contended:

> ...it is by no means necessary that the public should suffer in health, in comfort, and in pocket by the continuance of the smoke nuisance. It has been abundantly shown by example that the prevention of black smoke is possible in the case of both mechanically and hand stoked fires. The emission of black

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[176]ibid., p.569.
[177]ibid., p.570.
[178]ibid., p.571.
[179]Midwinter, E.C., *Victorian Social Reform* (London: Longman, 1968), p.20.
[180]See also Ashby and Anderson, *The Politics of Clean Air*, p.74.

> smoke is an offence against the Public Health Act of 1875, in which it is declared to be a nuisance rendering the offender liable to be dealt with summarily...The administration of the law against smoke is in the hands of the local authorities; the public should insist on their fulfilling their duty in this respect.[181]

Of the sub-inspectors, the only one of whom we know anything is George Edward Davis. His former colleague, Norman Swindin, has branded him a 'technically-minded Gladstonian.'[182] Like Alfred Fletcher, Davis wholeheartedly agreed with central government inspection. However, he based his argument upon the incapability of local authorities to implement the Alkali Acts efficiently and fairly.[183] In his chairman's address to the Society of the Chemical Industry in 1896, he maintained,

> I believe I am not alone in the opinion that all inspection of whatever kind should be centralised in some Government Department, and that no more duties of this kind should be entrusted to Local Authorities...I may be accused of having some bias towards this method of administering Acts of Parliament; but on my local tours of inspection I had ample opportunity of seeing the immense amount of damage done to local industries by petty and ineffective interference from the local authorities. In fact I can go as far to say that of the many complaints it was my duty to investigate, there did not exist one single

[181]25th R.A.I for proceedings during 1888 (c.5758), p.33 (1889), xviii.1.
[182]Swindin, 'Memorial Lecture', p.198.
[183]For more of Davis's views on the local implementation of pollution control see Willmot, S.,'Pollution and Public Concern: The Response of the Chemical Industry in Britain to Emerging Environmental Issues, 1860-1901', in Homburg, E., Schröter, H.G., & Travis, A.S. (eds.), *The Chemical Industry in Europe, 1850-1914: Industrial Growth, Pollution and Professionalization* (Boston: Kluwer Academic Publishing, 1998).

> one that was not traced to personal jealousy, to municipal bickerings, or to political differences.[184]

George Davis may also be described as a zealot, but not in terms of government service or pollution control.[185] His pet cause was the introduction of the discipline of chemical engineering. In 1896, he pushed his ideas to the *Society of Chemical Industry*,

> What we require in this country is a special chair of chemical engineering to prepare students for positions and works managers and superintendents of processes. It is strange how few chemists possess any knowledge of even elementary engineering, and fewer still any conception of practical mechanics; and yet an engineer will learn chemistry and apply his combined knowledge to the requirements of his profession. There is a field open here.[186]

In conclusion, George Davis, Angus Smith and Alfred Fletcher all exihibited a belief in, and a dedication to, pollution abatement. However, none of these men could be described as 'zealots' who possessed a committment to State intervention for its own sake.

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[184]Davis, G.E., 'Chairman's Address', *Journal of the Society of Chemical Industry*, 15 (1896), 782-787 (p.784).

[185]Davis did exhibit an interest in pollution control after his resignation from the Alkali Inspectorate in 1884. In 1890, he published a book with his brother Alfred R. Davis entitled *The River Irwell and its Tributaries: A Monograph on River Pollution* (Manchester: John Heywood, 1890).

[186]Davis, 'Chairman's Address', p.786. On the formation of the S.C.I Davis had suggested that this organisation be named the *Society of Chemical Engineers*, but this had been considered too *avant-garde*.

2.7: Summary

The educational backgrounds and work histories of the Alkali Inspectorate reveal several important facts. Most obvious is that a high level of academic training was possessed by the nineteenth-century alkali inspectors. Even those who entered the service at the lowest level, as laboratory assistant to the Chief Inspector, could be expected to have attained a doctorate, or have carried out chemical research on the continent (see, for example, the career of Adrian Blaikie). Furthermore, many of the inspectors received their chemical education at German or Scottish Universities, where this type of study was better established.[187] Secondly, it is notable that the majority of inspectors of whom we have reasonably detailed knowledge, worked at some time in the chemical industry - usually as the manager of a chemical works (see, for example, George Davis, Russell Forbes Carpenter, Alfred Evans Fletcher and John Affleck). The only exceptions to this rule were Edward Ballard, who was a Medical Officer of Health, and had displayed especial interest in the effects of noxious vapours on health, and Angus Smith, who had spent much of his life applying his research to the problems of public health identified by government. The background of other nineteenth-century inspectors offers an interesting parallels to these findings. For example, all of the mines inspectors appointed under the Mines Act, 1850, had worked as mines managers.

This chapter has also found that patronage did not have great influence in the selection of alkali inspectors, with the exception of Eustace Fletcher, who was employed by his father, Alfred Evans Fletcher. It is possible, as in the case of George Davis, that applicants were known personally to Chief Inspectors, through the close

[187]See Roderick, G.W. and Stephens, M.D., 'Private Enterprise and Chemical Training in Nineteenth-Century Liverpool', *Annals of Science*, 27 (1971), 85-93.

knit social network which surrounded chemical societies during the nineteenth-century.

The fourth section of this chapter highlighted the social networks that the Alkali Inspectors were involved in, paying particular attention to their membership of learned societies and manufacturers associations. Importantly, the small amount of existing work on the Inspectorate has analysed the Alkali Acts in terms of the clash of divergent interest groups, finding differing degrees of conflict. Dingle has focused upon the clash of landowners and manufacturers through the common law process, which encouraged the introduction of State regulation of the chemical industry, Richard Hawes has mentioned the difficulties that alkali inspectors faced in their dealings with local authorities, and Sarah Willmot has focused upon the occasionally hostile attitude of manufacturers towards regulation by the Victorian State.[188] However, this chapter has suggested that the relationship between manufacturers and inspectors was reasonably close. In fact, many of the inspectors shared an educational background, work history and social network with the group that it was charged with regulating. The typical alkali inspector shared closer interests with chemical manufacturers, than he did with either the civil servants with whom he worked at the L.G.B, or the landowners whose property he was intended to protect. Chapters four and five will reveal to what extent these shared interests affected the implementation of the Alkali Acts.[189]

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[188]See Dingle, '"The Monster Nuisance of All", Hawes, 'The Control of Alkali Pollution in St. Helens, 1862-1890' and Willmot, 'Pollution and Public Concern.'

[189]Bartrip and Fenn have already noted with reference to the Factory Inspectorate, inspectors often shared a common background with the factory owners that they were regulating. However, they argue that this did not effect the actions of inspectors in enforcement. They contend that 'although inspectors and some employers shared common social backgrounds - two inspectors who held office in the thirties had been partners in textile firms - their interests were far from identical. The inspectors had no special interest in treating employers leniently or avoided prosecution, except in so far as alternative procedures promised achievement of their objective...compliance with the law.' For these

The final section of this chapter focused upon the dedication of the inspectors to the cause of environmental protection. Although many of the inspectors were involved in the external dissemination of their private pollution related research, the evidence indicates that they were not fanatical devotees to pollution control. George Edward Davis was certainly committed to a cause; however, this was the establishment of the discipline of chemical engineering, rather than the abatement of pollution from industrial sources. Angus Smith did, on occasion, exhibit an altruistic 'green' concern for the preservation of natural beauty, but these comments form asides in his letters to the L.G.B. He was certainly dedicated to the application of chemistry to the problems associated with public health, and showed a willingness to contribute to central government investigations in many areas. However, one must conclude that Smith cannot be viewed as a 'crusader' for environmental protection - there are no lengthy critiques of industrialisation in his writings on the Alkali Acts.

In many ways, Alfred Fletcher's attitudes towards the role of the State in the regulation of the nineteenth-century chemical industry are the most illuminating. Fletcher utilises Benthamite arguments in favour of government interference in the chemical trade - on the grounds that it is a necessary exception to the rule. In the same

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commentators this endorses Perkin's argument that Victorian Britain saw the emergence of a professional class which played an objective role in the 'class struggle' and had 'a professional interest in disinterestedness.' Bartrip and Fenn maintain that the Factory Inspectorate fall into this category, and were not 'captured' by the interests that they were regulating. See Bartrip, P.W.J., and Fenn, P.T., 'The Conventionalisation of Factory Crime - A Reassessment', *International Journal of the Sociology of Law*, 8 (1980), 175-186 (p.184). Furthermore, Henry Parris has observed that the first inspector of railways, Major-General Pasley was on close social terms with railway officials. However, Parris maintains that this did not effect Pasley's judgement, and in fact was a useful attribute. He argues 'There is no evidence that Pasley's judgement was biased by good fellowships, and there is something to be said on the other side. The powers of the Board of Trade over railways were few and weak. Much of its achievement was the result of persuasion rather than legal power. For example, in Pasley's day...there was no statutory basis for accident enquiries; yet the companies co-operated. Perhaps Pasley's social gifts contributed to the establishment of those good relations with the companies which were a valuable asset to his department. Parris, H., *Government and the Railways* (London: Routledge, 1965), p.34.

way as the Chief Inspector of Explosives, Colonel Vivian Majendie, he viewed State regulation as undesirable as a general rule. This echoes Roberts' argument that nineteenth-century government inspectors held the same views as the majority of the Victorian middle classes. For Fletcher, the problem of noxious emissions from chemical works, and the failure of the common law to address this, justified State intervention.

The next chapter will continue the examination of the education, experience and status of the inspectors, with an analysis of the funding granted to the Alkali Inspectorate. Issues of personality and shared interests will be brought to the forefront in chapters four and five, which explore discretionary enforcement.

Chapter Three: The Fiscal Context

3.1: Introduction

The following chapter will set the implementation of the Alkali Acts in its fiscal context. The issue of Treasury control and financial backing is a vital component in this study, for as one commentator has asserted, the influence of Treasury control is 'one critical factor which must enter into any interpretation or explanation of the internal workings of a Victorian department.'[1]The following discussion will explore the relationship between the Treasury and the Local Government Board in particular, as it was this office which controlled the administration of the Alkali Acts for most of the period in question.

It has been maintained that, during the second half of the nineteenth-century, the Treasury developed a desire to reduce the national debt, a liberal belief in individual action and a commitment to free trade.[2] Overall, according to Roy MacLeod, this led to 'a spirit of rigorous national accounting and the deification of 'thrift' as a moral virtue.'[3] These beliefs are illustrated by the fact that the gross National Debt was actually reduced during this period, from £840 million in 1819 to £620 million in 1914.[4] For many, this dedication to economy was translated into punitive action against other government departments, made possible by the powerful position held by the Treasury.

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[1]MacLeod, R.M., *Treasury Control and Social Administration: A Study of Establishment Growth at the L.G.B 1871-1905* (London: G. Bell and Sons Ltd., 1968), p.9.
[2]Roseveare, H., *The Treasury: The Evolution of a British Institution* (New York: University of Columbia Press, 1969), p.187.
[3]MacLeod, R.M., 'Science and the Treasury: Principles, Personalities and Policies, 1870-1885', in Turner, G. L'E. (ed.), *The Patronage of Science in the Nineteenth-Century* (London: Leyden-Noordhoff, 1976), pp.115-172 (p.124).
[4]Roseveare, *The Treasury*, p.187.

This powerful position was consolidated by several developments in the mid-nineteenth-century. From 1863, it was empowered when all departments were required to surrender their balances to the Exchequer and the Treasury gained the right to present items of civil expenditure to parliament for approval. In this way, the Treasury became the department through which parliament attacked public expenditure.[5] This government department was further strengthened by the creation of the Controller and Auditor-General's Office in 1868, which reformed the system of public accounting and auditing. Furthermore, the introduction of open competition for recruitment to the civil service in June 1870, enabled the Treasury, as a high status department, to secure the appointment of the most able candidates.[6] Henry Roseveare has noted that from a total of 58 recruits to the Treasury in the period 1870-1913, 57 were university graduates and 54 of these were Oxbridge graduates. A total of 40 had received first class degrees, whilst 23 has achieved double firsts. Sixteen had come top in the higher Civil Service examination.[7] This gave the department an additional intellectual dominance over other government offices.[8]

The powerful position held by the Treasury has led to some debate about the extent of its influence over social and economic policy during the late nineteenth-century. The popular view of this department has been summarised by one commentator, who has asserted that:

> ...the Treasury has been assigned the role of villain of the mid-nineteenth-century piece. It is alleged that in the pursuit of stringent economy, it

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[5]See Pellew, J., *The Home Office, 1848-1914* (London: Heinemann, 1982), p.11 and MacLeod, 'Science and the Treasury', p.125.
[6]Wright, M., *Treasury Control of the Civil Service 1854-1874* (Oxford: Clarendon Press, 1969), p.17.
[7]Roseveare, *The Treasury*, p.187.
[8]However, Roy MacLeod has asserted that as late as 1881, none of the clerks at the Local Government Board were Oxbridge graduates. See MacLeod, *Treasury Control and Social Administration*, p.41.

exercised an inflexible and, sometimes, capricious control of public expenditure.'[9]

Several commentators have depicted the Treasury as an oppressive force which exerted negative pressure on other Victorian government departments. Of particular relevance to this study are the ideas of Roy MacLeod, who has asserted that the Treasury frustrated the growth and development of the L.G.B during the late Victorian era.[10]

However, both Maurice Wright and Henry Roseveare have argued that, although frequently parsimonious and inflexible, the Treasury was not an *eminence grise* at the heart of Victorian government. They have contended that the Treasury's power of control over other departments and its ability to create and implement policy has been greatly exaggerated.[11] Wright has suggested that the Treasury failed to restrain departmental spending and furthermore that, as a body, it was powerless to investigate the spending levels of other departments.[12]

In the light of a significant body of research into both nineteenth-century government policy and the Treasury, it is surprising that there has been little historical research into the financial background of government inspectorates at this time.[13] It is

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[9]Wright, *Treasury Control of the Civil Service*, p.vii.

[10]MacLeod, *Treasury Control and Social Administration*, pp.52-53. For the frustration of the Board's technical and scientific aims during this period see *idem.*, 'The Frustration of State Medicine 1880-1899', *Medical History*, 11(1967), pp.15-40. In contrast, Henry Parris has contended that it would be hard to argue that the development of the L.G.B was seriously hampered by Treasury control. Parris, H., *Constitutional Bureaucracy* (London: George Allen and Unwin, 1969), p.248.

[11]See Wright, M., 'Treasury Control 1854-1914', in Sutherland, G. (ed.), *Studies in the Growth of Nineteenth-Century Government* (London: Routledge, 1972) pp.195-226 (p.195) and also the conclusions reached in Wright's book, *Treasury Control of the Civil Service, 1854-1874*. In addition, see Roseveare, *The Treasury*, p.197.

[12]Wright, 'Treasury Control 1854-1914', p.197.

[13]The only exception to this is Peter Bartrip's investigation into the budgets of the nineteenth-century factory and mines inspectorates. See Bartrip, P.W.J., 'British Government Inspection, 1832-1875: Some Observations', *Historical Journal*, 25 (1980), 605-626 and Bartrip, P.W.J., 'State Intervention in Mid-Nineteenth-Century Britain: Fact or Fiction?', *Journal of British Studies*, 23 (1980), 63-83. Crucially, this commentator relates the budgets of these inspectorates to their effectiveness in the

also notable that no in-depth analysis of the fiscal context of the Alkali Acts administration has so far been provided by those who have explored the intricacies of Victorian environmental law.[14] This is remarkable as the financial backing of the Alkali Inspectorate is a central issue for a variety of reasons. First, the finance committed by the British State to a cause can help to illuminate the level of State support for that cause. Therefore, the levels of salaries and expenses are an indicator of the extent of British State support for environmental protection. It is contended here that at 'grass roots' level, the State's financial commitment to pollution abatement may be more revealing than parliamentary rhetoric about the value of the central government inspection of chemical works.

Second, this examination of fiscal issues is vital as it facilitates a comparison between the State's financial support of the Alkali Inspectorate, and the funding of other central government inspectorates. This comparative framework will utilise data gathered from the records of the inspectorates of factories and mines. These bodies have been selected for comparison with the alkali inspectorate because all three inspectorates fulfilled similar functions. They were all central government agencies charged with the regulation of business interests and certain aspects of industrial behaviour. Peter Bartrip has noted that these inspectorates fall into the category of central government agencies formed to safeguard the victims of economically beneficial activities.[15] It is also important, especially when considering salary levels, that inspectors from all of these agencies required a level of technical knowledge in

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implementation of factory and mines legislation. The link between budget and the effective enforcement of the Alkali Acts is one that will come under the spotlight in chapter six of this thesis.
[14]The accounts provided by Eric Ashby and Mary Anderson, and Roy MacLeod give only cursory attention to fiscal issues commenting mainly on major changes in salary levels. See Ashby and Anderson, *The Politics of Clean Air*, p.36; also MacLeod, 'The Alkali Acts Administration, 1863-1884: The Emergence of the Civil Scientist', (pp.90, 98, 104).
[15]Bartrip, 'British Government Inspection, 1832-1875', p.609.

order to carry out their duties effectively, if not also an amount of technical education and training prior to appointment (see chapter two). Furthermore, all of these inspectors worked full-time and covered districts which together incorporated the whole nation.[16]

This analysis of the funding of the Alkali Inspectorate is also valuable as the debates which took place between the Treasury, the Board of Trade, the L.G.B and the inspectors themselves, give an insight into perceptions of the role, the status and the effectiveness of alkali inspection. In addition, in a broader context these discussions are indicative of the relationship between certain government departments and the Treasury, and will provide a contribution towards discussions about Treasury control during the Victorian era.

Finally, finances are a central element in the wider consideration of the working and effectiveness of the alkali inspectorate. The funding issue forms an important background to the enforcement process and the constraints under which the inspectors worked, as there can be no doubt that the budget made available to the alkali inspectorate affected the implementation of policy. These are subjects which will come under the spotlight in chapters four, five and six.

The following discussion will be divided into three interlinking subject areas, salary, expenses and external funding, before reaching conclusions regarding the fiscal context of the Alkali Acts administration.

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[16]The only exception was Angus Smith, chief alkali inspector who was employed part time. John Lambert, Permanent Secretary of the L.G.B commented in his evidence to the R.C.N.V on the 6th June 1877, 'Dr. Angus Smith...has always refused to give up his whole time; he prefers to retain a certain amount of freedom - but I have no doubt we get quite as much work out of him as if he did give up his whole time. However, he has always refused to do so...' R.C.N.V, Minutes of Evidence, PP.1878.xliv.43, Q.13,175, p.566.

3.2: Salary

Salary was a contentious issue in the early history of the Alkali Inspectorate. In 1862, it was recommended in the *Report of the Select Committee into Injury from Noxious Vapours* that alkali inspectors should be paid a reasonable salary to ensure that they were 'wholly independent of all local control, and removed as far as possible, from all local influence.'[17] However, heated debates concerning the appropriate level of remuneration for Alkali Inspectors had begun prior to the selection of the first inspectors. On 2nd September 1863, the Privy Council for Trade wrote to George Hamilton, the Secretary of the Treasury regarding the salary level for the new officials. It was asserted by the Board of Trade that Alkali Inspectors should receive the same salary as similar technically trained inspectors,

> Bearing in mind the extensive scientific knowledge, combined with high character and great judgment required...and taking into consideration the fact that the appointment may only last four years...My Lords are of opinion that no less a salary should be allotted to these officers than is given to the highest paid Inspectors who have somewhat similar duties to perform. My Lords therefore propose that the Inspector should receive one thousand pounds a year with travelling expenses and that the sub-inspectors should receive not less than five hundred pounds a year also with travelling expenses.[18]

The Treasury refused to agree to the stated amounts of £1,000 per annum plus expenses for the Inspector and £500 for the sub-inspectors employed under the Act. The Secretary of the Treasury, Hamilton had previously argued in a letter to the Board

[17] *Report from the Select Committee of the House of Lords on Injury from Noxious Vapours*, PP.1862.xiv.ix.
[18] P.R.O., MH16/1, Privy Council for Trade to George Hamilton, 2nd September 1863.

of Trade, that Factory Inspectors were the highest paid inspectors in the public service owing to:

> ...the number and importance of the Factories in the United Kingdom and the responsibility devolving on the Inspectors involving moral as well as physical considerations they would appear to constitute the highest class of inspectors- that their salaries £1000 a year including travel expenses and contingencies being probably not more than £700 a year without such expenses and that the salary of the Inspector of Mines is £700 a year with an allowance of £100 a year for travelling and incidental expenses.[19]

In the face of these arguments, the Privy Council for Trade submitted to the Treasury's wish that the inspector should receive only £700 per annum with travelling expenses. However, the Board of Trade expressed concern that it might be difficult to find a suitably qualified person at that salary. The Treasury was also reminded that the Alkali Works Bill was of an exceptional character and was only carried through parliament with the cooperation of the alkali trade. Moreover, the manufacturing interest would only submit to State regulation implemented by a highly qualified inspector. The Board of Trade complained,

> It is therefore of the utmost importance that the services of some gentleman should be secured for the office of inspector whose qualifications and attainments will be recognised by that body, and my Lords regret that for the sake of such a small reduction in the salary from that proposed by the Board

[19]P.R.O., MH16/1, George Hamilton to James Booth, Committee of the Privy Council for Trade, 11th September 1863.

> any step should be taken which could interfere with the proper working of the Act.[20]

Furthermore, in answer to the Treasury's contention that Factory Inspectors were the highest class of inspector, and deserved a salary of £1,000 per annum, the Board of Trade pointed out that Railway Inspectors were also paid £1,000 per annum.[21]

Officials at the Board of Trade took particular exception to the Treasury's suggestion that the sub-inspectors should receive a salary of £350 per annum. It wrote that,

> The requirements in the cases both of Inspector and of sub-inspector are nearly identical. The Inspector having only in addition to the duties of the sub-inspector to frame regulations and exercise general supervision. The scientific qualifications of the latter ought to be of the highest character, and my Lords do not believe that the salaries proposed by the Treasury will suffice to tempt men of the requisite attainments to undertake these duties.[22]

In the light of these assertions, the Board of Trade argued that a salary of £400 per annum would be the lowest possible salary level payable to alkali sub-inspectors. The Treasury submitted to this demand, stating:

> ...having regard to the circumstance of the appointments under the Alkali Works Regulation Act being only for a limited term as well as to the particular qualifications required, my Lordships will not object to the salaries being made £400 a year. Their Lordships however deem it necessary to state that

[20]P.R.O., MH16/1, Privy Council for Trade to George Hamilton, 26th September 1863.
[21]ibid.
[22]ibid.

were the act made permanent and the appointments placed on a permanent footing they should consider a salary of £350 a year sufficient.[23]

The Treasury's cost cutting efforts were also extended to the number of sub-inspectors that were required to ensure the adequate enforcement of the Alkali Act. In September 1863, Hamilton, Treasury secretary, suggested that two sub-inspectors would be sufficient.[24] In reply it was asserted that frequent, unbiased inspection would only be achieved by the employment of four full-time sub-inspectors. J. Emerson Tennent, then Secretary of the Board of Trade, wrote that,

> There are between 80 and 100 Alkali Works which it will be necessary to inspect...It is essential to the efficient inspection of these works that the visits of the sub-inspectors should be frequent and continuous and...it should be known that such visits may take place at any moment...each of the four districts...mentioned contains a sufficient number of works to occupy the time and attention of one sub-inspector.[25]

The Privy Council for Trade again expressed the view that a salary of £400 per annum would be the smallest amount sufficient for full-time central government inspectors. Local professional chemists resident in the four districts could be employed at a lower rate of remuneration, but this solution would be unsuitable:

> ...having regard to the novel and delicate nature of the duties which they will have to perform, and the class of persons over whom they will be called on to exercise superintendence, My Lords are of the opinion that it is desirable that the sub-inspectors should possess an exclusively official character and be

[23]P.R.O., MH16/1, Treasury to Sir J.E. Tennant, 19th October 1863.
[24]P.R.O., MH16/1, George Hamilton to James Booth, Committee of the Privy Council for Trade, 11th September 1863.
[25]P.R.O., MH16/1, J.E. Tennent to George Hamilton, 16th January 1864.

protected from all suspicion of local or personal influence. Under these circumstances My Lords think that £400 per annum...is the lowest rate of salary which will enable them to secure the services of properly qualified persons for the office of sub-inspectors...[26]

As with the sub-inspectors' salaries, the Treasury gave in to the demands of the department and the Board of Trade was permitted to employ four sub-inspectors at a salary of £400 per annum.[27] Therefore, salaries were set at £700 per annum for the inspector, and £400 per annum for the sub-inspectors.[28]

The new sub-inspectors did not raise the subject of salary until 1866, when their request for a salary of £600 a year was rejected on the grounds that the sub-inspectors must wait for the revision and permanent extension of the Alkali Act.[29] When the Alkali Act was extended for an unlimited period in 1868, this prompted the sub-inspectors to repeat their request for a salary increase. The four sub-inspectors (Charles Blatherwick, John Hobson, Brereton Todd and Alfred Fletcher) applied through Angus Smith for an increase. They based their arguments on several grounds, these being experience, workload, comparability and social status. First, the sub-inspectors argued that they had successfully completed their five years trial and the time was ripe for a salary increase. Furthermore, the sub-inspectors contended that Smith had .'..always considered that it was not right for us to propose any change until we had made a distinct trial of the Office, and shown that we were doing as the

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[26]ibid.
[27]P.R.O., MH16/1, Treasury to Privy Council for Trade, 21st January 1864.
[28]According to Harold Perkin's study of the distribution of the national income of England and Wales between families, in 1867 a middle class income was between £300 - £1,000 per annum. The salaries granted to the inspector (£700 p.a.) and the sub-inspectors (£400 p.a.) would therefore place them firmly in the middle class bracket, in fact earning in the top 2% of family incomes. See Perkin, H., *The Rise of Professional Society: England Since 1880* (London: Routledge, 1989), p.29.
[29]Reported in P.R.O., MH16/1, Four sub-inspectors to George Sclater-Booth, President of the L.G.B, 17th September 1874.

Act directed.'[30] The second argument for a salary increase advanced by the sub-inspector was a comparative one, based upon the salaries, training and responsibilities of other central government technical inspectors. The sub-inspectors asserted that,

> We hear of Inspectors of Collieries and Factories obtaining £600 a year at the commencement of their duties, and this without any previous training. Our work as you are aware, is not so easy as theirs; it requires a special training, to which our previous life must have been in point devoted, besides the five years since our appointment. It requires in reality a certain knowledge of science, and also of the Chemical Acts; as well as a great deal of thought, activity, and watchfulness...At any rate considering the salaries of the Inspectors and their work, compared with our own, we look upon ourselves as being paid less, whilst with a desire to avoid all presumption, we imagine our attainments are required to be neither inferior nor less rare.[31]

Therefore, the pay differential that existed between Alkali and other inspectors was presented as illogical and unfair.[32] The third argument presented by the sub-inspectors was related to the increasing volume and delicate nature of the work that they were expected to perform. They contended that,

> Since the time of our appointment to office, the work has increased at least 40% in some parts, and nearly so as a whole, owing to the development of trade. In many instances from the nature of the position we occupy we have

[30]P.R.O., Board of Trade (hereafter BT) file 13/2/2, four sub-inspectors to Angus Smith, 3rd November 1868.
[31]ibid.
[32]The sub-inspectors were justified in noting a pay differential between themselves and other inspectors. For example, on their appointment in 1852, the four sub-inspectors of mines and collieries were paid £400 per annum. Four years later, in 1856, their salary was raised to £600 per annum. See Job, B., *The British Mines Inspectorate from 1851-1913: Its Development and Effectiveness with particular reference to Colliery Explosions* (University of Keele: Unpublished Ph.D. Thesis, 1993), p.45.

> been able to mediate between the landed proprietors and farmers on the one hand, and the Alkali Manufacturers on the other, and thus have been the means of preventing many vexatious law suits.[33]

The last argument for a salary increase advanced by the sub-inspectors in November 1868 was that the salary level did not befit the social position that they were expected to uphold. The sub-inspectors argued that,

> We find it difficult with our present salaries to keep up that position in society which is expected of us. It may be said that we accepted the appointment with a perfect knowledge of the amount of remuneration we should receive, but although this is true in part, it is not entirely so, as we scarcely knew what our duties would be, the position that might be assigned to us in social life, or the amount required in the District to maintain this position.[34]

Angus Smith forwarded this letter to the Assistant Secretary of the Board of Trade, with the following supportive comments:

> ...I do not feel that I have any right to refuse forwarding the wish that has been so frequently expressed. Apart from this consideration I have thought that we had arrived at a point when the subject might be supposed to deserve revival, since the Houses of Parliament have a second time passed the Alkali Act. I am told also that at the end of the first Act, it is usual to raise the salaries of Inspectors of Collieries & c. As I have likewise been informed that it was the opinion of the Lords of the Privy Council for Trade that the salaries in the first instance ought to have been greater, it seems at least clear that the desire

[33]P.R.O., BT13/2/2, Four sub-inspectors to Angus Smith, 3rd November 1868.
[34]ibid.

> expressed cannot be considered unreasonable even if it were accompanied by the expectation that the original proposal might be exceeded.[35]

However, Smith did state that he did not agree with the arguments relating to the salaries of other inspectors,

> I doubt the propriety of giving any such opinion as that expressed in the letter regarding the duties of the other inspectors which are frequently very heavy and require special knowledge as I am informed.[36]

The reaction of the Board of Trade to the sub-inspectors request is revealing. In an internal memorandum dated 15th December 1868, a J. S. Fanshawe commented that,

> I do not see how we can recommend any increase in the salaries of the Sub-inspectors in the face of the Treasury letter of October 1863 in which they say that they will not object to the allowance of £400 a year as the appointments were temporary, but if they should hereafter become permanent they would consider £350 a year sufficient.

Apart from the likelihood of Treasury rejection, Fanshawe refused to forward the pay increase to the Treasury on the grounds that the comparison with other inspectorates was inadequate. He argued that .'..compared with similar officers under the Home Department the Alkali Inspectors have no reason to complain as will be seen by referral to the list attached.'[37] This viewpoint was endorsed by other administrators at the Board of Trade. In a note, one official commented that the payment of central government inspectors should be more distinctly classified by the Treasury,

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[35]P.R.O., BT13/2/2, Angus Smith to the Assistant Secretary of the Board of Trade, 9th November 1868.
[36]ibid.
[37]P.R.O., BT13/2/2, J.S. Fanshawe memorandum, 15th December 1868.

> I agree with Mr. Fanshawe that under the circumstances there will be no cure in applying to the Treasury for an increase in the salary of the sub-inspectors, even if the House were satisfied of the justice which seems doubtful. There appears to be absolutely no rule in the Treasury on this subject ... There ought to be a careful classification with reference, first, to the nature of the service and second, to the official position of the person employed.[38]

The Board of Trade reacted by asking the sub-inspectors whether they would prefer to work part-time (and supplement their income with private professional work) or receive an increase in salary. They replied that as their duties were continually increasing and demanded their full-time attention, they had no choice but to request a salary increase. Despite this answer, yet again no increase in salary was forthcoming.[39]

The subject rested again until 1871, when the sub-inspector for Scotland and Ireland, Charles Blatherwick, memorialised the Permanent Secretary of the Board of Trade, Thomas H. Farrer, for a pay increase. However, Farrer's attitude was negative, he argued that it would be 'better to postpone the settlement of the question of salaries until the results of the inquiry into the proposed extension of the provisions of the Alkali Act are known.'[40]

The subject of a pay increase rested again until 1874. In September, following the extension and amendment of the Alkali Act, the four sub-inspectors (Charles

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[38]P.R.O., BT13/2/2, anonymous memorandum, undated.
[39]Reported in P.R.O., MH16/1, Four sub-inspectors to George Sclater-Booth, President of the L.G.B, 17th September 1874.
[40]P.R.O., MH16/1, Thomas Farrer to Charles Blatherwick, 17th July 1871. It is interesting then that in his evidence to the Royal Commission on Civil Establishments (Ridley Commission) in 1888, Farrer commented that 'we can, any of us at the offices, cheat the Treasury if we please. We can cheat them in big things; they may bully us in small things.' Quoted in Wright, 'Treasury Control 1854-1914', p.199. Therefore, it is probable that Farrer was just not disposed to 'cheat the Treasury' over the matter of the sub-inspectors' salary increase.

Blatherwick, John Hobson, Brereton Todd and Alfred Fletcher) sent a memorial for a salary increase to George Sclater-Booth, President of the L.G.B. The sub-inspectors contended that they had already been rejected on several occasions (1866, 1868 and 1871). Furthermore, they had utilised tact in order to secure the successful attainment of the aims of the Alkali Act, 1863, and often had to act as arbitrators in disputes between two powerful groups, landowners and manufacturers. They stated,

> Considerable tact was required in introducing a system of inspecting to those who had hitherto been quite unused to it, and to disarm prejudice. In this way we believe we have been very successful, the objects of the Act have been fully obtained and the principal manufacturers instead of regarding us with suspicion welcome us in assisting them in controlling their works, and eagerly ask advice of us on points connected with the suppression of noxious vapours. We are often consulted by occupiers of land where damage has been done by chemical works, and have sometimes been placed in the position of arbitrators between the owners of land and the owners of factories.[41]

As in 1868, the sub-inspectors plea for a salary increase was again based upon a comparison with the salaries of other government inspectors,

> We therefore respectfully submit to your consideration that as no advance whatever has been conceded to us since we commenced our duties now eleven years ago we respectfully suggest that an advance to £800 would only fairly represent the present value of our services. This would only put us in a position not quite equal to that of the Inspectors of Mines, Sanitary Inspectors and some of the Inspectors of Factories whose duties are neither more arduous

[41]P.R.O., MH16/1, Four sub-inspectors to George Sclater-Booth, 17th September 1874.

> nor do they demand more special training than our own. Although during our eleven years of office we have had no increase of salary our duties have largely increased and must now under the next act increase still more.[42]

Angus Smith wrote to Alfred Fletcher in support of this petition, commenting that 'the salaries are even now less than most considered right by the Board of Trade at the commencement of the work' (£500).[43] Despite the support of the Chief Inspector, the sub-inspectors' requests were again ignored, and no reply was made.

However, pressure on the L.G.B was maintained by the sub-inspectors. On February 1st 1875, Alfred Fletcher, sub-inspector for the western district, wrote to John Lambert, Assistant Secretary of the L.G.B, that since 1864:

> ...the work has constantly increased until now it is fully double of what it was then. At present the new act is coming into play and the work is rapidly increasing on every hand - more factories come under inspection, more noxious vapours have to be examined in each factory and the old work itself that we have hitherto done is multiplied by the action which the manufacturers are taking in order to comply with the new act.[44]

Fletcher emphasised that he did not find the volume of work problematic, but he did complain 'that my work does not provide me with means of living. I could not maintain and educate my family if I had no private income.' [45] He also said that he 'wished we were paid in proportion to our work, so much for every factory visited.' The reaction of L.G.B officials to this demand was negative. On the 1st February 1875, George Sclater-Booth minuted Lambert,

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[42]ibid.
[43]P.R.O., MH16/1, Angus Smith to Alfred Fletcher, 22nd August 1874.
[44]P.R.O., MH16/1, Alfred Fletcher to John Lambert, 1st February 1875.
[45]ibid.

> When it appears evident that the labours of these Inspectors are producing an appreciable result, I shall be happy to take the question of increasing their salaries into consideration.[46]

Lambert responded by agreeing,

> I believe you had quite decided not to consider the question of an increase in the salaries of the Alkali Inspectors until you have had some experience of the operation of the new Act.[47]

He wrote informing the sub-inspectors that their claim was refused. Angus Smith reacted by writing in support of the sub-inspectors pay-claim. On the 24th February 1875, Smith wrote to the Permanent Secretary that,

> The inspectors would willingly be judged by their work, which has been to carry out the Alkali Act. No succeeding work can be better carried out. If the act failed to do all that was expected it is not the inspectors who are to blame.[48]

Smith added that,

> When beginning a new act, which I may add is to a great extent carried out by extra-exertion, it is not pleasant to find those who must do the details, activated by a deep feeling of being utterly neglected, or as they would say

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[46]P.R.O., MH16/1, George Sclater-Booth to John Lambert, 1st February 1875. The argument that no extra salary would be granted until HCl emissions were palapbly reduced is reminiscent of the Board of Education's system of 'payment by results' which was applied to education inspectors after 1862.
[47]P.R.O., MH16/1, John Lambert to George Sclater-Booth, 3rd February 1875. According to Herbert Preston-Thomas, Lambert's 'official income never approached that of a popular dentist or a moderately successful stockbroker.' See Preston Thomas, H., *The Work and Play of a Government Inspector* (Edinburgh: William Blackwood and Sons, 1909), p.53. Under a Treasury minute dated 4th December 1871, John Lambert himself received a salary of £1,500 p.a. See Bellamy, C., *Administering Central-Local Relations, 1871-1919: The L.G.B in its Fiscal and Cultural Context* (Manchester: Manchester University Press, 1989), p.159.
[48]P.R.O., MH16/1, Angus Smith to John Lambert, 24th February 1875.

more than neglected. They are...perfectly capable of seeing clearly the importance of the position which their long experience has given them...[49]

The Chief Inspector also emphasised that the sub-inspectors deserved a pay increase on the grounds that they acted as advisors to a large and important body of people, and 'their loss to that body, the public and the Board would be great.'[50] Angus Smith also argued that an unattractive salary would make the recruitment of suitably qualified alkali sub-inspectors problematic. Sclater-Booth was unshaken by this plea. On the 2nd March, he instructed Lambert to reply to Smith stating that:

> ...the complaints made to me by deputations last year were to the effect that the ravages caused by the fumes of muriatic acid from the alkali works were doing the most serious injury. This was particularly the case on the Mersey, which I suppose is Mr. Fletcher's district. If I hear that the vegetation of the coming Spring is perceptibly the better for the exertions of the Inspectors under the provisions of the new Act, it will form good ground for applying to the Treasury in the matter of their salaries.[51]

In July 1875, Angus Smith wrote to the Board, enclosing complaints regarding damage to crops in the Runcorn area. However, the Chief Inspector justified both the work of the inspectors and his conciliatory enforcement approach, and also testified to the improved state of alkali works in Runcorn and Widnes and the achievements of the Alkali Act, 1874.[52] In November 1875, Smith forwarded the reports of the district inspectors to the L.G.B, with a reminder that the sub-inspectors hoped for a salary

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[49]ibid.
[50]ibid.
[51]P.R.O., MH16/1, George Sclater-Booth to John Lambert, 2nd March 1875.
[52]P.R.O., MH16/1, Angus Smith to John Lambert, 24th July 1875. Smith included district reports from John Hobson, Alfred Fletcher and Brereton Todd.

increase in the light of these reports.[53] This time Lambert's response was positive; he minuted Sclater-Booth with the suggestion that:

> ...these reports be acknowledged with an expression of satisfaction, and the hope that the sub-inspectors will not relax in their efforts to give full effect to the late Act? At the same time Dr. Smith may be informed that you have made application to the Treasury to increase the salary of the sub-inspector by £100 per annum from the 25th of March next.[54]

In this way the sub-inspectors achieved the salary increase that they had so long requested. Their salaries were raised from £400 to £500 per annum in March 1876 (see figure three).

The matter rested for five years, until 1880, Alfred Fletcher wrote to George Sclater-Booth, requesting another increase in salary. Fletcher again highlighted the issue of technical training and the higher salaries paid to other inspectorates. He stated,

> The duties of my office are technical and require a special training for their fulfilment, such as are usually rated at a higher scale of remuneration one might chose perhaps for comparison those of the inspectors of mines. Their salaries range from £600 to £1000 while their duties are certainly not more difficult or important than those of the office I fill.[55]

Fletcher also highlighted his personal contribution to the successful implementation of the Alkali Acts, arguing that during his sixteen years of service,

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[53]P.R.O., MH16/1, Angus Smith to John Lambert, 16th November 1875.
[54]P.R.O., MH16/1, John Lambert to George Sclater-Booth, November 1875.
[55]P.R.O., MH16/1, Alfred Fletcher to George Sclater-Booth, 20th January 1880.

> I have invented several instruments which have proved to be of great use in carrying out the Alkali Acts - one of these is essential without it the Act of 1863 could not have been carried out at all and were it withdrawn the Act would now cease to be operative. These instruments and methods of operations are now daily used by my colleagues and by the manufacturers.[56]

This claim for a pay increase was also backed up by the alleged support of the manufacturing interest, and also the general increase in trade. Fletcher wrote that 'the chemical manufacturers amongst whom I labour are enjoying a time of comparative prosperity, and through their increased activity my work is also increased.'[57] However, Fletcher was informed that his claim could not be considered because the departmental estimates for the forthcoming year had already been forwarded to the Treasury for its consideration.[58] In November 1880, Fletcher made a renewed claim for a salary increase to the then President of the L.G.B, John Dodson. Again he was brushed off with a letter informing him that the estimates for the ensuing year had already been sent to the Treasury.[59] A month later, Angus Smith wrote in support of Fletcher's claim, arguing,

> Mr. Fletcher...frequently complains that he is not allowed to make progress in life and no labour will help him. I can only say that Mr. Fletcher has done work which would justify an advance even if not extended to the other sub-inspectors.[60]

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[56]ibid. Fletcher was referring to the invention of the anemometer, a device designed to measure the speed of currents of air in chimneys. Fletcher also invented a collapsing aspirator and several forms of constant, self-regulating aspirators.
[57]ibid.
[58]P.R.O., MH16/1, L.G.B to Alfred Fletcher, 28th January 1880.
[59]P.R.O., MH16/1, Alfred Fletcher to John George Dodson, 10th November 1880.
[60]P.R.P, MH16/1, Angus Smith to the L.G.B, 8th December 1880.

In November 1881, Alfred Fletcher, Charles Blatherwick and Brereton Todd again memorialised the L.G.B for a salary increase from the £500 per annum granted to them in 1876. The sub-inspectors again focused upon their arguments upon their technical expertise and experience, contending:

> ...the time has come for the amount of our salaries to be brought more into accordance with the importance of the offices we fill. We are expected to be familiar with every chemical manufacture and devise methods for bringing the law to bear in each case. Special apparatus and chemical methods have from time to time been devised so as to detect and measure the emission of noxious gases, a work often involving much original research and invention.[61]

As before, the sub-inspectors focused upon the more attractive salaries granted to other technical inspectors. It was argued that:

> ...£1000 is more nearly in proportion to that which is paid to other similar Inspectors. The Inspectors of Mines receive from £800 to £1100, while their duties are certainly not more arduous nor responsible than ours.[62]

The L.G.B informed Fletcher and Blatherwick that they would receive £650 per annum, whilst Todd was granted a small rise to £550 per annum.[63] It was not until February 1885 that the Treasury agreed to a pay rise for Todd to the same level of Blatherwick - £650 per annum. However, the Treasury categorically stated that this was:

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[61]P.R.O., MH16/1, Alfred Fletcher, Charles Blatherwick and Brereton Todd to the L.G.B, 8th November 1881.
[62]ibid.
[63]See P.R.O., MH16/1, John Lambert memorandum, 27th December 1881.

> ...on the distinct understanding that the increased rate of payment is personal to Mr. Brereton Todd and that the personal allowance of £100 now granted will not be continued to his successor.[64]

On the retirement of Todd and Blatherwick in 1892, the maximum salary for an alkali inspector fell to £550 per annum. At 1894 levels this amount was £50 lower than the maximum salary of a first class clerk at the L.G.B (see figure three).[65]

The debate over the salary level of the 'resident inspector' also highlights official reluctance to raise salary levels. John Affleck was appointed as inspector for Runcorn and Widnes in June 1883, at a salary of £600 per annum (see figure two). The Treasury immediately expressed concern over the salary level which had been set for the new inspector, as it was £200 over the usual starting salary for a sub-inspector under the Alkali Act. The Treasury expressed concern that the salary of the new resident inspector would raise the salaries of the other sub-inspectors.[66] However, the arrangement was sanctioned on the understanding that the Associated Sanitary Committees paid two thirds of Affleck's salary (£400), one half of his expenses (£50) and £20 per annum to account for this employee's future possible pension.[67] In September 1895, John Affleck wrote to Henry Chaplin, the President of the L.G.B, requesting a pay rise of £100 per annum (raising his salary to £700 per annum), and an enlarged inspection district (presently Widnes and Runcorn), to include St. Helens and Liverpool (currently inspected by Edward Ballard, see figure two). Affleck contended that the local sanitary authorities supported his application, on the

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[64]P.R.O., MH16/2, Treasury to the Secretary of the L.G.B, 16th February 1885. Todd had applied for this salary increase in July 1884. See P.R.O., MH16/2, Brereton Todd to Hugh Owen, 12th July 1884.
[65]MacLeod, *Treasury Control and Social Administration*, p.55.
[66]P.R.O., MH16/2, Treasury to the L.G.B, 11th July 1883.
[67]ibid.

understanding that they did not have to contribute to the additional increase. Affleck further argued:

> ...in resigning my previous appointment as Chemical Works manager in 1883, in favour of the office I now hold, I was strongly influenced in my decision by the consideration that my new appointment would be for life and would enable me to earn an adequate retiring allowance, when no longer able to fulfill my duties. But having entered the service of the Board at a later period of life than the rest of my colleagues, I find that owing to the subsequent order in Council enforcing the retirement of all civil servants at the age of 65, my expectations in this respect will be materially prejudiced.[68]

However, when he was consulted over this issue, the Chief Inspector, Russell Forbes Carpenter, did not support Affleck's application. He argued that the necessity for daily visits to Runcorn and Widnes had diminished due to improvements in abatement processes. Furthermore, Affleck was not responsible for the inspection of all works in the districts that paid his salary. In fact, Ballard dealt with eight works in Liverpool and St. Helens that should have fallen under Affleck's jurisdiction. Echoing the Treasury's sentiment regarding equality, expressed in July 1883, Carpenter added,

> I will not make comment on the moving force underlying Dr. Affleck's application, except to mention that a difference in maximum salary already exists between that of the extra inspector and of the senior staff inspector, and in favour of the former; an increase would still further accentuate the difference.[69]

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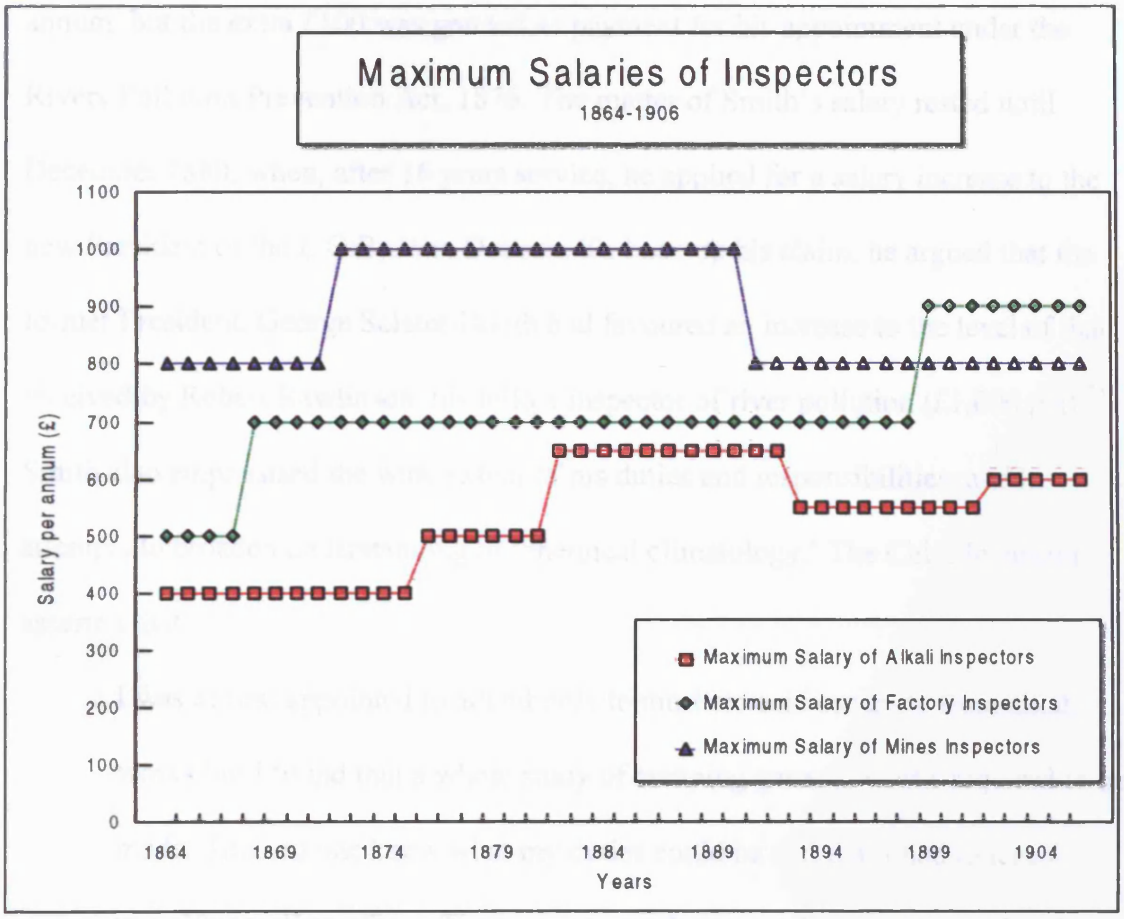
[68]P.R.O., MH16/4, John Affleck to Henry Chaplin, 27th September 1895. Affleck's application included letters of support from the local authorities who selected him.
[69]P.R.O., MH16/4, Russell Forbes Carpenter to Henry Chaplin, undated.

Hugh Owen, Permanent Secretary at the L.G.B, further commented in a memorandum to Henry Chaplin, that as Affleck's work in Widnes and Runcorn had diminished .'..he might fairly be expected to undertake that extra inspection (in Liverpool and St. Helens) without any increase in his salary.' He agreed with Carpenter that it would not be fair on other inspectors (whose maximum salary level was £550 per annum) to only raise Affleck's salary.[70] Therefore, in November 1895, John Affleck's request for a salary increase was rejected. Again as appears to be a common practice at the Board, he was officially informed that the rejection was on the grounds that it was believed that the Treasury would not agree to it.[71]

[70]P.R.O., MH16/4, Memorandum from Hugh Owen to Henry Chaplin, 22nd November 1895.
[71]P.R.O., MH16/4, L.G.B to John Affleck, 27th November 1895.

Figure Three



Taken from Civil Service Estimates 1864-1906.[72]

[72]The figures for the salaries of inspectors/sub-inspectors of factories, mines and chemical works were based on the maximum amount payable to any employee below the rank of chief inspector, including all possible annual increments, excluding travel expenses or contingencies. The highest salary level for factory inspectors was at first noted as 'dependent upon 30 years service.' This amount was £500 p.a. in 1864. When the position of deputy chief inspector was introduced in 1899, the maximum salary was increased to £900 p.a. The maximum salary level for mines inspectors was initially linked to 15 years service under the acts. In 1864, this amount was £800 p.a. In the period 1872-1891, Joseph Dickinson was granted a personal salary of £1,000 p.a. See Pellew, *The Home Office 1848-1914*, p.129. After the retirement of Hugh Tremenheere in 1891, the position of chief inspector became redundant, but 14 inspectors were paid £800 p.a. The maximum salary level for alkali inspectors was never officially linked to any length of service. However, the informal policy of promotion from the 'bottom upwards' meant that any inspector promoted to the senior pay scale would have had wide experience of the enforcement of the alkali acts (see chapter two). For example, by the early 1890s, Brereton Todd and Charles Blatherwick had served for nearly thirty years and earned £550 each per annum. It should be noted that the salary of John Affleck (£600 p.a), who served as a local resident inspector from June 1883 is not included in the graph, as two thirds of this amount was paid by various sanitary authorities annually.

Attention will now turn to the salary of the Chief Alkali Inspector. In 1868, Angus Smith's request that the Board of Trade appoint him full-time and increase his salary from £700 per annum was rejected. In 1878, his salary did increase to £800 per annum, but the extra £100 was granted as payment for his appointment under the Rivers Pollution Prevention Act, 1876. The matter of Smith's salary rested until December 1880, when, after 16 years service, he applied for a salary increase to the new President of the L.G.B, John Dodson. To back up his claim, he argued that the former President, George Sclater-Booth had favoured an increase to the level of that received by Robert Rawlinson, his fellow inspector of river pollution (£1,000 p.a).[73] Smith also emphasised the wide extent of his duties and responsibilities, and his attempts to broaden understanding of 'chemical climatology.' The Chief Inspector asserted that,

> I was at first appointed to attend only to muriatic acid escaping from alkali works but I found that a whole study of escaping gases at works required to be made. Thus no one knew what my duties could be and that I had to teach myself as well as others. The appointment I saw would be useless unless I imposed on myself higher duties. It was necessary to examine kindred questions, and that I have opened up the whole subject is well known. Our knowledge of air as affected by works and by habitations is very different from that which existed when I gave myself up to the work.[74]

Smith maintained that although he was employed on a part-time basis, at a pro rata salary, the demands of alkali inspection were such that he did not have time to sufficiently supplement his income with other employment. Smith argued,

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[73]See 2.3 for Rawlinson's qualifications and employment history.
[74]P.R.O., MH16/1, Angus Smith to the L.G.B, 8th December 1880.

> My appointment was peculiar. I was not called upon to give my whole time. Although free to follow my profession I saw at the time that I intended to follow it only so far as to enable me to pay expenses of my scientific enquiries. I have not done so much as that and my enquiries have been almost entirely confined to my appointment.[75]

Smith also complained that his current salary of £700 per annum would not be sufficient to provide for him upon his retirement. He requested a salary of between £1000 and £1,200 per annum, which would provide for his allowance for retiring, with a continuation of his present salary if obliged to retire. The Board reacted by raising Smith's salary to £1,000 per annum. However, reference to figure four illustrates that this salary increase still placed the salary of the Chief Alkali Inspector, significantly below the salary of Alexander Redgrave, chief inspector of factories.[76]

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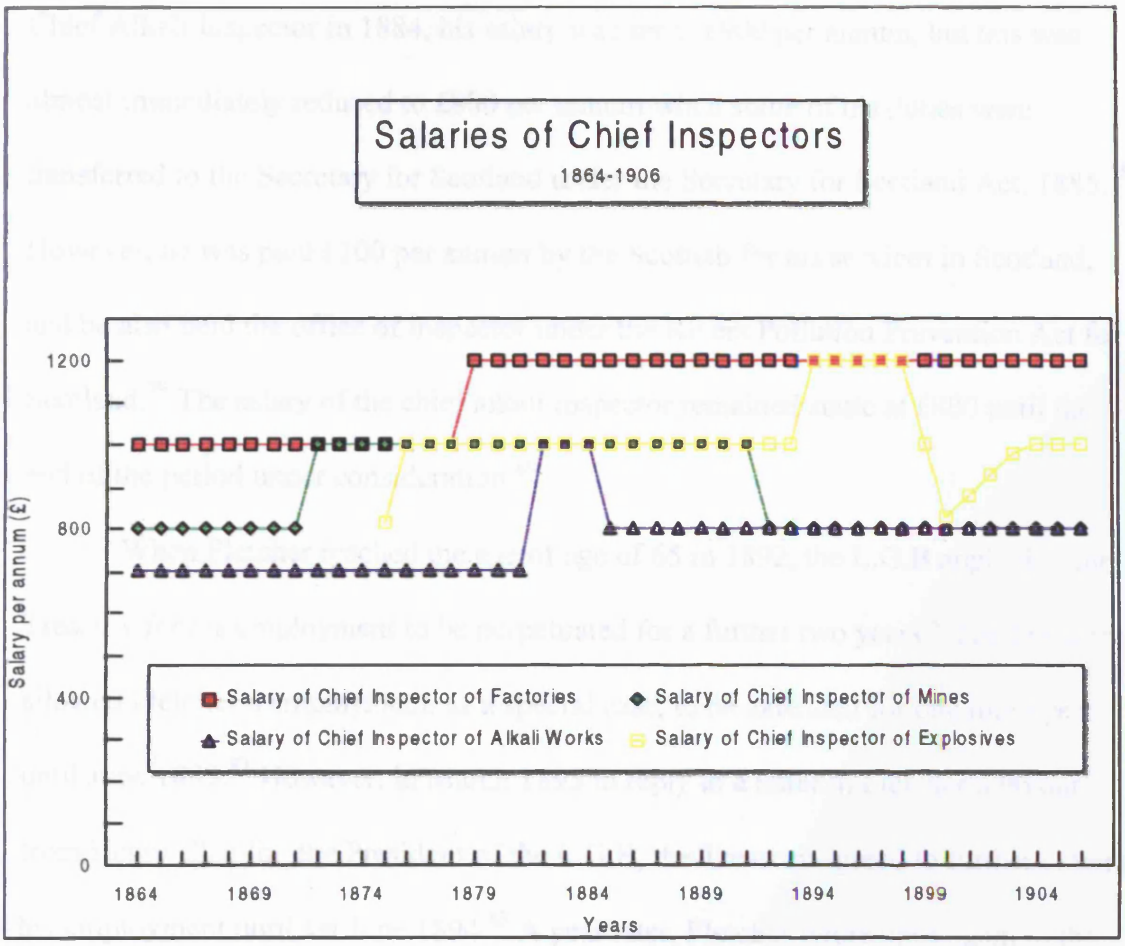
[75]ibid.

[76]Smith's situation as regards salary forms an interesting comparison with the position of the eminent scientist Thomas Huxley. When he became Chief Salmon Inspector in 1880 he was permitted to continue his other appointments. Therefore, he received £600 per annum for his post at Royal School of Mines and £200 per annum for his lectureship in biology at the Normal School of Science, in addition to £700 per annum for his inspectorship. See MacLeod, R.M., 'Government and Resource Conservation: The Salmon Acts Administration', *Journal of British Studies*, 7 (1967-8), 114-150 (p.139).

Figure Four



Taken from the Civil Service Estimates 1864-1906.[77]

[77]This graph indicates the maximum amount of salary payable to a chief inspector in each department, including all possible annual increments. Only the salary of the Chief Inspector of Factories officially included an undisclosed amount to cover travel expenses and contingencies. It should also be noted that until 1878, there were two chief inspectors at a salary of £1,000 p.a each. On Robert Baker's retirement in 1878, Alexander Redgrave's salary was raised to £1,200. In the case of the mines inspectorate, the salary of £1,000 p.a., which was paid to H.S. Tremenheere until his retirement in 1891 was noted as 'personal to the present holder.' On Tremenheere's death the position of chief inspector of mines was not filled and the maximum salary of £800 p.a. was payable to 14 inspectors. The salary of the chief alkali inspector has been calculated with refence to the civil service estimates for England and Wales. After 1885, the chief alkali inspector received an additional £100 p.a for his services in Scotland, which was not paid by the English Exchequer. It should also be noted that from 1878-1884, Angus Smith received £100 p.a under the Rivers Pollution Prevention Act, 1876, and this amount has been subtracted from his salary as chief inspector of alkali works as shown.

Figure four indicates that the payment of £1,000 to the Chief Alkali Inspector did not remain in place after Smith's death in 1884. When Alfred Fletcher became Chief Alkali Inspector in 1884, his salary was set at £900 per annum, but this was almost immediately reduced to £800 per annum when some of his duties were transferred to the Secretary for Scotland under the Secretary for Scotland Act, 1885.[78] However, he was paid £100 per annum by the Scottish for his services in Scotland, and he also held the office of inspector under the Rivers Pollution Prevention Act for Scotland.[79] The salary of the chief alkali inspector remained static at £800 until the end of the period under consideration.[80]

When Fletcher reached the age of age of 65 in 1892, the L.G.B applied to the Treasury for his employment to be perpetuated for a further two years.[81]The Treasury allowed Fletcher's employment, as a special case, to be extended for one more year, until June 1893.[82] However, in March 1893 in reply to a letter in Fletcher's favour from Henry Chaplin, the President of the L.G.B, the Treasury agreed to further extend his employment until 1st June 1894.[83] A year later, Fletcher wrote once again to the L.G.B, requesting that his retirement be postponed until December 31st 1896.[84] The Treasury replied that it could see no reason to extend Fletcher's employment for a

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[78]In November 1885, the Under Secretary for Scotland wrote to the L.G.B expressing the hope that the English department would continue inspection in Scotland. See P.R.O., MH16/9, 25th November 1885.
[79]P.R.O., MH16/1, Hugh Owen to the Treasury, 11th June 1895. Unlike Smith, Fletcher received no additional salary for his services under the Rivers Pollution Prevention Act. P.R.O., MH16/1, Hugh Owen to the Treasury, 11th June 1895.
[80]On his appointment to Chief Inspector in May 1895, Russell Forbes Carpenter was informed that he ..'. would receive a salary at the rate of £800 per annum with the following allowances, £1.1.0 for each night when absent from home on duty and 7s for each day's absence from home on duty of not less than ten consecutive hours, together with the repayment of your actual travelling or locomotion expenses. You would also receive the allowance of £100 per annum towards the expense of a laboratory.' P.R.O., MH16/4, L.G.B to Russell Forbes Carpenter, 31st May 1895. It should be noted that even a first clerk at the Treasury earned more than this. In 1894, the salary scale for these officials was set at a maximum of £900 per annum. See MacLeod, *Treasury Control and Social Administration*, p.56.
[81]See P.R.O., MH16/3, Hugh Owen to the Under Secretary for Scotland, 23rd April 1892.
[82]P.R.O., MH16/3, Treasury to the L.G.B, 9th July 1892.
[83]P.R.O., MH16/4, Treasury to the L.G.B, 20th March 1893.
[84]P.R.O., MH16/4, Alfred Fletcher to the L.G.B, 19th March 1894.

further period.[85] Following a plea from the Board, the Treasury relented that 'in the light of a personal assurance from the President that Fletcher's expertise is needed for the new act', it would not object to Fletcher's continuation until the 31st December 1896.[86] Fletcher eventually retired on the 31st May 1895, on a pension of £570 per annum.[87]

In summary, this consideration of the salary issue illustrates the alkali inspectors' prolonged struggle against official stonewalling, with the result that all ranks were paid significantly less than factory and mines inspectors, who had similar duties, qualifications and experience. Furthermore, it appears that L.G.B officials feared the Treasury, were often unwilling to pass on requests to the Treasury, and often used the attitude of the Treasury as an official excuse for decisions made by its own personnel. It should also be noted that on occasion, the Treasury would back down and grant increases, especially if the Board of Trade or the Local Government Board persisted.

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[85]P.R.O., MH16/4, Treasury to the L.G.B, 10th April 1894.

[86]P.R.O., MH16/4, Treasury to the L.G.B, 15th May 1894. According to Maurice Wright, the Treasury found it particularly difficult to resist determined demands when made in unison by departmental Permanent Secretaries and ministers (in this case Hugh Owen and Henry Chaplin). See Wright, 'Treasury Control 1854-1914', p.211.

[87]P.R.O., MH16/4, Treasury to the L.G.B, 8th August 1895. The inspectors were entitled to a pension ..'.at the rate on one-sixtieth of your salary for each year of your service with an addition of seven years added under the Professional Clause of the Superannuation Act, 1859; but you would not be entitled to a pension if you retired before attaining the age of sixty unless previously disabled from performing your duties through accident or ill health, and in no case could a retiring allowance exceed forty sixtieths of your salary.' See P.R.O., MH16/1, John Lambert to Charles Blatherwick, 8th February 1882.

3.3: Expenses

This picture of dissatisfaction and official stonewalling continues with the issue of expenses. It is important to note that whilst under the jurisdiction of the Board of Trade (until 1872), there is evidence to suggest that Angus Smith was empowered to set the levels of expenses required for his inspectors in the forthcoming year, and furthermore, that he received all that he asked for. For example, in October 1865, Smith submitted his estimates for the following year to the Board of Trade. He requested £880 for the inspectors travelling and personal expenses, and £140 for laboratory expenses, making a total of £1020. Figure five illustrates that the civil service estimates for 1866/7 awarded the Alkali Inspectorate this exact amount.[88] The following year, Smith achieved the same result. He requested expenses totalling £1150, and reference to figure five indicates that his request was granted.[89]

However, in 1868 the sub-inspectors began to express dissatisfaction with the expenses granted to them. Upon their recruitment in 1864, the sub-inspectors were granted 12/- for each night or six hour period that they were absent from home on official business.[90] In November 1868, following the perpetuation of the Alkali Act, the four sub-inspectors complained about this amount, asking Angus Smith if their 'allowance for daily expenses be increased to 21/-, the present amount is 12/-, being scarcely sufficient to cover the necessary hotel bills.'[91] Surprisingly, Smith was not supportive of this complaint, writing to the Assistant Secretary of the Board of Trade that,

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[88]P.R.O., BT13/1/2, Angus Smith to the Secretary of the Board of Trade, 13th October 1865.
[89]P.R.O., BT13/1/3, Angus Smith to the Secretary of the Board of Trade, November 1866.
[90]P.R.O., MH16/1, Treasury to the Board of Trade, 3rd July 1864. By 1882, the day and night allowance had been raised to 15/-, and was claimable only in cases where the inspector had spent ten hours absent from home. See P.R.O., MH16/1, John Lambert to Charles Blatherwick, 8th February 1882.
[91]P.R.O., BT13/2/2, Four sub-inspectors to Angus Smith, 3rd November 1868.

> Regarding the request for a larger allowance of personal expenses it seems to me not to be important, and as far as I am informed the sum of one guinea a day would be greater than that given to other factory inspectors. Although the present sum may occasionally be found hardly sufficient, I believe I may say that this is not an evil which happens to press hard on any one. [92]

However, it is notable that an official at the Board of Trade disagreed with Smith's assessment. He supported the sub-inspectors' request, arguing that,

> The question of personal allowances appears to be one which does deserve consideration for as compared with other inspectors those in question are insufficient. However I have been prevailing to enquire at the Treasury whether any recommendation for an increase would be likely to receive favourable reply and I am told that no application for an increase is...likely to be granted at this moment and I would like a private note to be sent to Dr. Smith to say so and request that he will inform applicants.[93]

In May 1873, the Chief Inspector again felt it to be his duty to report the sub-inspectors' complaints regarding expenses to the L.G.B. Angus Smith commented that the failure of the L.G.B to pay expenses in advance of expenditure was seen as particularly problematic,

> I have endless small complaints that whilst everything is done to diminish rights and privileges, nothing is done on the other side...The expenses were at first paid quarterly by the Board, afterwards monthly...Now the sub-inspectors, my colleagues, speak in this way "We must in some cases pay out of our own

[92]P.R.O., BT13/2/2, Angus Smith to the Assistant Secretary of the Board of Trade, 9th November 1868.
[93]P.R.O., BT13/2/2, J.S Fanshawe memorandum, 15th December 1868.

pockets sixty pounds, thus giving money to the Board, which we have not been accustomed to receive. It is not fair for men of small incomes to be continually out of pocket such a sum." They would prefer therefore that you would be so good as to not deprive them of any privileges especially at a time when they feel so much disappointed as not having them increased. For myself, as I said I do not come to consider the subject, but speak for others.[94]

Further difficulties arose in May 1882 (even though expenses granted to the inspectorate doubled from £1,000 - £2,000 in this year, see figure five), when Angus Smith attempted to secure the refund of the expenses of George Davis (£80), who he had moved to a different part of his inspection district (from Manchester to Birmingham, see figure one). Smith asserted that this move was for the good of the department as Davis:

> ...had a great deal of professional work among chemists in the north and he would prefer coming less in contact with them. But there is a reason of more force here. I was unwilling to send Mr. Carpenter to so many entirely new works as he would meet with in the south. Mr. Davis has had experience of a great variety.[95]

Furthermore, Davis had:

> ...no desire to go to Birmingham where he has no interests or friends, he wishes rather to live near or in London where he is more at home. I could not however agree to this as it seemed that Birmingham would save much time

[94]P.R.O., MH16/1, Angus Smith to the L.G.B Accountant, 15th May 1873. However, in November 1875 Smith did complain to the Board on his own behalf, 'I feel inclined to say at present that I think I have done more than I was desired to do and to make up my reports I have spent several hundred pounds of my own. I might add more but I say this only to show that the work could not have been done without a great deal of endeavour, self-denial or whatever name be given to it.' P.R.O., MH16/1, Angus Smith to the L.G.B, 16th November 1875.
[95]P.R.O., MH16/1, Angus Smith to the L.G.B, 10th May 1882.

and money in travelling...I sincerely trust that the Board will agree to any proposals as it will otherwise cause us much inconvenience.[96]

However, Smith was informed by the L.G.B that no funds would be made available for this purpose and 'it would be contrary to their practice to defray the expenses incurred by one of their inspectors in removing from one district to another.'[97]

The parsimony of officials at the Local Government Board is further revealed by the inspectors' struggle for the payment of expenses for foreign research. The first foreign trip was suggested by Angus Smith in 1874, when he requested permission to visit Germany with Alfred Fletcher as his research assistant, in order to investigate the condensation of sulphur gases, which were to be regulated under the new act.[98] Henry Fleming, Joint Permanent Secretary at the L.G.B, wrote to the Treasury recommending the payment of expenses for this trip:

> ...the Board...consider it highly desirable that this application should be agreed to. The Board do not propose that Dr. Angus Smith or Mr. Fletcher...should receive any additional remuneration for their own sources, but the Board consider that they should be allowed, while engaged on this special (investigation), the sum of £1.1 a per day each for their total hotel expenses with the actual expenditure for travelling and incidentals connected with

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[96]ibid.

[97]P.R.O., MH16/1, J.F. Rotton, Legal Advisor, to Angus Smith, 26th May 1882. Many other examples of niggardliness on the part of the L.G.B may be found in its files. For example, in October 1891, the Chief Inspector, Alfred Fletcher was warned that no telegraphs for food, lodgings or transport may be sent at the public expense, despite his assurances that these messages were connected with his official business - the inspection of chemical works. P.R.O., MH16/3, L.G.B to Alfred Fletcher, 9th October 1891. Furthermore, in December 1896, the inspector for the south eastern district, Francis Sutton was informed that he could not claim for the expenses he incurred when subpoenaed to appear as an expert witness in two court cases, as ..'.it appears...that you did not attend the court in the discharge of any duty as an officer of the Board, and hence...your expenses should not be charged in your account against the Board.' P.R.O., MH16/4, Samual Provis, Assistant Secretary at the L.G.B to Francis Sutton, 15th December 1896.

[98]P.R.O., MH16/1, Angus Smith to the Assistant Secretary of the L.G.B, 23rd September 1874.

> examining and testing the works proposed to be visited. It will be seen that the enquiry will not extend beyond a fortnight, and the additional expenditure involved in it will be defrayed from the amount included under sub-head B of the estimates of the department for the present year.[99]

The Treasury agreed to these terms, and Smith and Fletcher's trip to Germany was sanctioned.[100]

However, in 1878, the tense relationship between the L.G.B and the Treasury was again to cause problems for Smith, who faced even greater obstacles in obtaining permission to visit Holland and the South of France with Alfred Fletcher.[101] Edward Sutton, an assistant secretary at the L.G.B, was instructed to write to Smith to inquire as to the exact purpose of the visit and its relevance to the administration of the Alkali Acts.[102] Smith replied to the satisfaction of the Board, but John Lambert noted to George Sclater-Booth that Smith should only be granted expenses of £60, because 'as the sum is under £100 the amount may be incurred without going to the Treasury for their approval.'[103] On his return to England in November, Angus Smith complained to the Board that £60 was not sufficient to cover the expenses of his trip,

> I found it quite impossible to do the work properly for the sum and therefore practised an economy to which I am not fond of being subjected. Even as it was I left some places I should have gladly seen.[104]

Smith continued that he did not visit Holland at all, and sometimes travelled constantly in order to reduce accommodation costs. The Chief Inspector requested the

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[99]P.R.O., MH16/1, Henry Fleming to the Treasury, 2nd October 1874.
[100]P.R.O., MH16/1, Treasury to the L.G.B, 7th October 1874.
[101]See P.R.O., MH16/1, Angus Smith to the L.G.B, 16th September 1878.
[102]P.R.O., MH16/1, Edward Sutton to Angus Smith, 2nd October 1878.
[103]P.R.O., MH16/1, John Lambert to George Sclater-Booth, 4th October 1878.
[104]P.R.O., MH16/1, Angus Smith to the L.G.B, 16th November 1878.

repayment of £74, to cover some of the expenses incurred (their actual expenditure should have been £86). However, John Lambert refused this request, despite the fact that the payment of £74 would not require Treasury consent. Lambert stated that only the agreed amount of £60 would be payable by the Board.[105]

The L.G.B's attempts to sidestep the Treasury were again evident in September 1881, when the Board sanctioned a request from Smith to visit Germany. The Chief Inspector requested £84 and stated that he 'was quite willing to take the risk of paying all beyond this sum.'[106] However, the chief inspector was informed that permission was granted, but he would only be granted expenses of £70.[107] Again, the sanction of the Treasury would not have been necessary for the payment of an additional £14.

On his succession to the Chief Inspectorship, Alfred Fletcher was even more unfortunate in his treatment regarding foreign research trips. In April 1887, Fletcher sought permission to investigate new pollution abatement apparatus being utilised in France, Germany and Switzerland, which would assist in the more efficient working of the Alkali Act. Fletcher wrote,

> A similar permission was granted on these occasions to my predecessor in office...The present would be a convenient time for me to go. I have corrected the last sheets of my annual report and have recently visited the Newcastle and Lancashire districts. At the moment there is nothing to cause anxiety on leaving my work.[108]

[105]P.R.O., MH16/1, John Lambert memorandum, 16th November 1878.
[106]P.R.O., MH16/1, Angus Smith to L.G.B, 27th August 1881.
[107]P.R.O., MH16/1, Edward Sutton to Angus Smith, 12th September 1881.
[108]P.R.O., MH16/2, Alfred Fletcher to the Secretary of the L.G.B, 23rd April 1887.

The reply received from the Board was terse; its Permanent Secretary, Hugh Owen, wrote to Fletcher that 'the President does not think it is appropriate to put in a request for a continental visit to the Board.'[109] However, Fletcher persisted in the face of this rejection. Only two months later he requested the sanction of the Board to visit Professor Lunge in Zürich, with whom he planned to visit chemical works. Fletcher added that he would limit the expense of this excursion to £30.[110] Crucially, the President of the L.G.B, Sir Charles Dilke, wrote to the Permanent Secretary, Hugh Owen on the 5th June:

> ...this cannot be done without Treasury consent? If so, I do not see any way of making the application at present. Could not some report on this matter be obtained from Germany?[111]

Again Fletcher's request was denied, it is supposed due to the reluctance of the Board to approach the Treasury. There is no evidence that any further requests for finance for foreign visits were made during his remaining eight years in office.

Correspondence regarding expenditure on laboratories and scientific equipment also reveals difficulties for the alkali inspectors. In April 1867, the Treasury agreed to the payment of £50 p.a. to Smith for a laboratory, and £4 per annum to Fletcher for the hire of a cottage.[112] Two years later, Alfred Fletcher wrote to Angus Smith requesting permission to move from St. Helens to Liverpool, on the

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[109]P.R.O., MH16/2, Hugh Owen to Alfred Fletcher, 30th April 1887.
[110]P.R.O., MH16/2, Alfred Fletcher to Hugh Owen, 11th June 1887.
[111]P.R.O., MH16/2, Charles Dilke to Hugh Owen, 15th June 1888. Maurice Wright has contended that the grudging language used by the Treasury when it conceded increases often discouraged departments from submitting applications to the Treasury, unless they were believed to be absolutely necessary. See Wright, *Treasury Control of the Civil Service 1854-1874*, p.172.
[112]P.R.O., BT15/7, File 1549/71, Treasury to Thomas Farrer, Permanent Secretary of the Board of Trade, 22nd April 1867.

grounds that it was more convenient for travel to all parts of his district. Fletcher argued in a letter dated the 15th March 1869,

> In 1864 when I took up my station here my chief work was in St. Helens. Since that time the work has much increased in Widnes. New works have opened also at Warrington and in North Wales so that I find this place to be no longer central. Also the railway routes are somewhat altered since I came here. A direct line is now constructed from Liverpool to St. Helens, also one to Runcorn, so that from the Edge Hill station Liverpool will be direct communication with St. Helens, Warrington, Widnes and Runcorn...Then I shall be within 40 minutes of St. Helens, Warrington, Widnes and Runcorn, Now it takes 46 minutes to reach St. Helens, my nearest point, 70 minutes to Widnes and longer still for Warrington, so much time being lost with waiting at railway junctions.[113]

Fletcher also added that he needed a better laboratory in his new place of residence. Fletcher's request for permission to move was promptly sanctioned by the Board of Trade. Furthermore, he was granted an increased allowance of £16 per annum, to cover the cost of rental and fittings for a laboratory in the new place of residence.[114] However, in December 1869, the Board of Trade refused Fletcher's request for the refund of additional monies spent on the new laboratory (£60).[115] Privately, it was commented by a Board of Trade official that 'if we conceded this claim we should probably have similar claims from the other inspectors.'[116] However, it is notable that

[113]P.R.O., BT15/7, File 1549/71, Alfred Fletcher to Angus Smith, 15th March 1869. For the constraining effect of travel on the enforcement of the Alkali Acts, see 6.2.
[114]P.R.O., BT15/7, File 1549/71, Mr. Gray to Angus Smith, 25th March 1869.
[115]Smith did not make a request for this expenditure until the 2nd December 1869, See P.R.O., BT15/7 (Finance Department file 1549/71), Angus Smith to Board of Trade. For refusal of payment see BT15/7, Board of Trade to Angus Smith, 24th December 1869.
[116]P.R.O., BT 15/7, File 1549/71, anonymous memorandum, 24th January 1869.

again the rejection was officially justified to Angus Smith on different grounds. First, Alfred Fletcher had not applied for the permission of the Board in advance of his expenditure, and second that this sub-inspector had already been allowed an additional £16 per annum to meet the expenses of a laboratory in his own house. Sir Louis Mallet, President of the Board of Trade further commented that 'my Lords cannot but consider that the room he has fitted up is for his own convenience, and they must therefore decline to grant his request.'[117]

In January, 1870, Angus Smith wrote to Louis Mallet, accepting responsibility for omitting to secure permission for Fletcher's expenditure, and pleading that the President reconsider the matter. Smith argued that he failed to inform the Board of developments in advance of Fletcher's expenditure, because he wanted to wait until he could speak personally about the subject in London. Smith wrote,

> It has been my wish to make everything as convenient as possible to my colleagues so that they might work comfortably, convenience is very important and it is also, so far, expensive. Chemists take a great deal of trouble in order to obtain it. In the reply it has been taken as a mere luxury which was really of no actual use.[118]

Smith was informed in February that after careful consideration, the Treasury had agreed to sanction half of Fletcher's expenditure on laboratory equipment (£30). However, Smith was directed to 'distinctly point out to Mr. Fletcher that no further claim of this kind will be entertained' and that permission was required prior to outlay in the future.[119] However, in July 1877, Fletcher requested permission from the L.G.B

[117]P.R.O., BT 15/7, File 1549/71, Louis Mallet to Angus Smith, 24th December 1869.
[118]P.R.O., BT 15/7 (Finance Department file 1549/71), Angus Smith to Sir Louis Mallet, 14th January 1870.
[119]P.R.O., BT 15/7 (Finance Department file 1549/71), Sir Louis Mallet to Angus Smith, 25th February 1870. See also, BT15/7, Treasury to Assistant Secretary of Commercial Department, February 18th

to move to Edge Hill, Liverpool and to receive £30 towards the cost of fitting up a new laboratory (on top of a rent subsidy that had risen to £20 per annum).[120] Angus Smith supported Fletcher's application, commenting that,

> He used the money (granted in 1869) to fit up well, and it cannot be said to be much when it has lasted eight years. It might be said that the fittings and materials would do again and so make it less expensive this time but one is a little uncertain when making such changes and I cannot calculate exactly. He might try to do it for less but I do not say that it will be much less. I should like to see him well provided. He has more to do than he had eight years ago, and he may have more still.[121]

The Treasury enquired whether Fletcher was entitled to a laboratory in his place of residence for the purposes of his office; the L.G.B replied in the negative. Despite this, and previous assertions regarding Fletcher's laboratory expenses, the Treasury sanctioned this expenditure. This indicates again that on occasion the Treasury could be more supportive of increases than the inspectorates' own department.[122]

A more positive side to the Treasury was further revealed in January 1882, when Angus Smith wrote that the new sub-inspectors would require £30 each for laboratory equipment.[123] The Chief Inspector was informed by the Local Government Board that an expenditure of not more than £25 for apparatus for each of the new sub-

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1871. Fletcher was content with his new laboratory arrangements, commenting to Angus Smith 'the arrangements here I find are very convenient for work, and I have made already full use of them. My need of them seems daily to increase, I could not get through my present work in the old place at Whiston.' See BT15/7, Alfred Fletcher to Angus Smith, 11th January 1870.

[120]P.R.O., MH16/1, Alfred Fletcher to Angus Smith, 10th July 1877.

[121]P.R.O., MH16/1, Angus Smith to the L.G.B, 10th July 1877.

[122]P.R.O., MH16/1, Treasury to the L.G.B, 13th September 1877. By 1890, Fletcher was receiving £100 per annum for laboratory rent and expenses. See P.R.O., MH16/3, Hugh Owen to the President of the L.G.B, 30th September 1890.

[123]P.R.O., MH16/1, Angus Smith to the L.G.B, 16th January 1882.

inspectors would be allowed.[124] However, complaints over laboratory expenses continued. In February 1883, Angus Smith reported to the Board that one of his sub-inspectors had declared that:

> ...Inspection is slavery. I have it...pressed upon me that the requests for grants for laboratories have not been attended to and trouble and expense is put upon the Inspectors. So we all have some troubles but we do not intend to be beaten if possible.[125]

A month later, Smith wrote that due to the demands of economy, his inspectors were being inconvenienced by having to make experiments in their own houses. Smith argued that each inspector should receive adequate annual financial assistance from the L.G.B. The Chief Inspector commented,

> It is not easy for them to spare a room for laboratory. I proposed that each should have twenty pounds per annum for that purpose. I ought to mention that in one case, Mr. Fletcher's, this has been allowed and he spent this in taking a larger house with a room to spare for the purpose. Mr. Davis and Mr. Jackson complain much, also Dr. Blatherwick and Mr. Curphey. I thought that thirty pounds would suit Dr. Blatherwick and Mr. Curphey, they could use it together whilst the rest had twenty. Mr. Fletcher is pressing for more as he wants a room in Widnes and one in St. Helens; I am not disposed to go so far and am only afraid my plan may be considered more than enough.[126]

John Lambert informed Smith that the permission of the Treasury would be required for an expenditure of this amount.[127] However, it appears that when the claim was

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[124]P.R.O., MH16/1, L.G.B to Angus Smith, 28th February 1882.
[125]P.R.O., MH16/2, Angus Smith to the L.G.B, 20th February 1883.
[126]P.R.O., MH16/2, Angus Smith to the L.G.B, 10th March 1883.
[127]P.R.O., MH16/2, John Lambert to Angus Smith, 22nd March 1883.

passed on by the Board, Treasury sanction was granted. Smith requested an additional £70 and the level of expenses granted to the inspectors rose by £75 for the following financial year, 1884-1885 (see figure five).[128]

However, the attitude of the Treasury and the Local Government Board was not so positive about increases in staffing levels, to the extent that inspectors were forced to finance the employment of additional staff themselves. Angus Smith commented in his evidence to the Royal Commission in May 1877, that along with knowing where to limit the employment of additional inspectors in districts, there was also a:

> ...difficulty (in) obtaining the Treasury's consent to a multiplication of the inspectors. Those are difficulties that I have met with, and...I am considering the matter with those things before me.[129]

Smith went on to discuss the problem of financing more assistants for the district inspectors. In September 1875, Angus Smith wrote to the L.G.B requesting that they fund the recruitment of a temporary young chemical assistant for Brereton Todd in the eastern district, which encompassed Newcastle-upon-Tyne. Smith argued that he:

> ...considered that some complaints sent from his district were well founded and I do not say that I have yet got to the bottom of the subject in every case...my last visit showed a good deal of dissatisfaction...I was not pleased to

[128]Civil Service Estimates for 1884-1885, PP.1884, p.132. There is evidence to suggest that the Local Government were usually forthcoming with funds for scientific equipment, as long as this expense was sanctioned in advance. On the purchase of chemicals and equipment see P.R.O., MH16/1, L.G.B to Angus Smith, 11th April 1877 and MH16/1, J.F. Rotton, Assistant Secretary at the Local Government Board to Angus Smith, 5th May 1879.

[129]R.C.N.V (1878), Minutes of Evidence, PP.1878.xliv.43, Q.12,335, p.535. However, Angus Smith may have been led to believe that the Treasury was responsible for rejections, when this was a decision taken by the L.G.B. As previously mentioned, in official letters the L.G.B sometimes blamed the Treasury, rather than admit its reluctance to pass on or grant requests.

hear what was said in Newcastle, and I am inclined to think that as Mr. Todd is now willing to receive aid he should have some for a time.' [130]

This request was promptly rejected by the L.G.B because 'there does not appear to be sufficient grounds for granting the additional assistance for which you apply.'[131]Six weeks later, the Chief Inspector wrote informing the Board that he had offered to pay for an assistant for Todd himself, but the district inspector had rejected his offer.[132] Smith commented in his intermediate report for 1876,

> Thinking it possible that some assistance was necessary, or would at least be useful to Mr. Todd, I offered to send him this for a short time as a trial at my own expense; but he had a desire to finish the work himself, and to reduce all the escapes to the standard of the new Act first, leaving the matter to be reconsidered.[133]

Todd later engaged a temporary assistant himself (a Mr. Foster), although he restated his claim for a permanent, State-funded assistant in his evidence to the Royal Commission in 1877.[134]In November 1875, Smith pressed his request for assistance for himself, maintaining,

> The assistant I could do with at present is one who could be sent anywhere to examine the air of a place by my methods, so that I might continue my

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[130]P.R.O., MH16/1, Angus Smith to John Lambert, 20th September 1875. Smith later argued that his reasons for demanding assistance for Todd were ..'.to have some more statistics to give to the Commission, and to confirm a number of results which I received from Newcastle, and which I obtained for myself also. There were complaints made at Newcastle which made me anxious, and I wished more work done.' R.C.N.V (1878), Minutes of Evidence, PP.1878.xliv.43, Q.12,317, p.534. For further discussion of Todd's difficulties in his district see 6.2.
[131]P.R.O., MH16/1, John Lambert to Angus Smith, 30th September 1875.
[132]P.R.O., MH16/1, Angus Smith to the L.G.B, 10th November 1875.
[133]Intermediate R.A.I, for proceedings during 1876, PP.1876 xvi.1, p.7.
[134]14th and 15th R.A.I, for proceedings during 1877 and 1878, PP.1879 xvi.131-271, p.204. For Todd's complaints to the Royal Commission, See R.C.N.V (1878), Minutes of Evidence, PP.1878.xliv.43, Q.7384, p.329. Alfred Fletcher and John Hobson made the same demands in their evidence.

> investigations, having found them too expensive for me alone. He could also assist by external observation, not entering works. We should thus obtain a record of the condition of the air of a place and not be subjected to fanciful reports.[135]

Importantly, this time Smith had changed his tactics by requesting a temporary, rather than a permanent assistant. Smith later commented:

> ...I found an unwillingness to give me a constant assistant, and as I was very anxious to have some things done in Newcastle at the time, I asked for a temporary one, which was much easier to give than a constant one, and less expensive.[136]

Smith was successful. William S. Curphey was employed as his 'temporary' assistant in 1877. He completed laboratory work in connection with alkali works and river pollution, remained in the Alkali Inspectorate for a total of forty three years and served as Chief Inspector from 1910-1920.

Figure five compares the levels of expenses granted to the Inspectorates of alkali works, factories and mines in the period 1864-1906. As was the case with the salary data (see figures three and four), this graph reveals that the alkali inspectorate was consistently granted a significantly lower budget for expenses than inspectorates with similar duties. The expenses budget remained reasonably static over the period, even after 1881, when the inspectorate began to generate external funding for the State. This is a crucial issue which will be explored in the next section (3:4).

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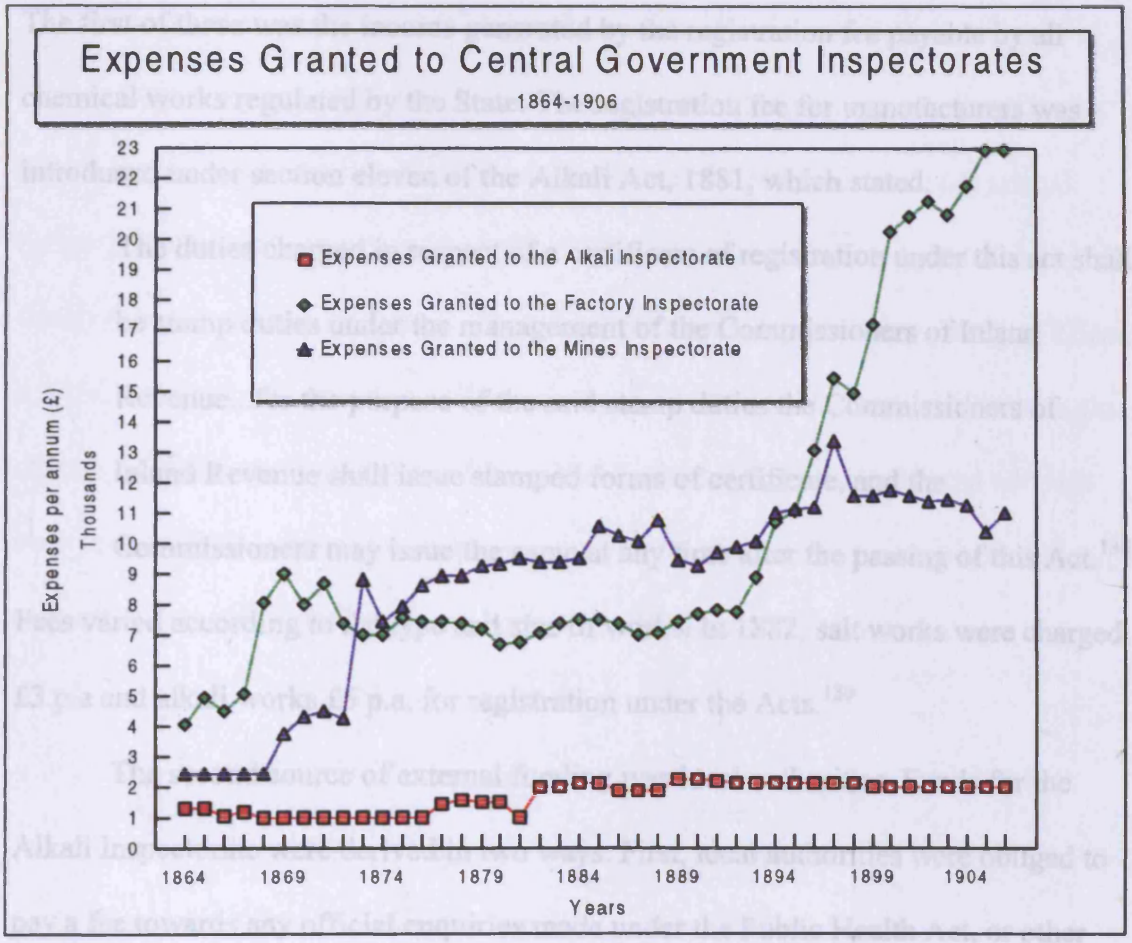
[135]P.R.O., MH16/1, Angus Smith to the L.G.B, 10th November 1875.
[136]R.C.N.V (1878), Minutes of Evidence, PP.1878.xliv.43, Q.12,314, p.534.

Figure Five



Taken from the Civil Service Estimates 1864-1906.[137]

[137]The expenses granted to these government departments were calculated in the following way. The expenses of the factory inspectorate represent the annual amounts given for allowances for the Chief Inspector's travel to Ireland and Scotland, the travel allowances and personal expenses of the sub-inspectors, the payment of the fees of certifying surgeons, the legal expenses of prosecutions and various incidental expenses. However, it should be remembered that the level of expenses illustrated in this graph is artificially low, because the chief inspector(s) was granted an undisclosed amount for 'travel expenses and contingencies' as part of his annual salary. See figure 4. The expenses of the mines inspectorates were calculated by adding the annual amounts granted for travel and personal expenses, and incidental expenses - which included an amount to provide for the prosecution of offenders. The Alkali Inspectorate's expenses represent travelling and personal expenses, and costs of laboratories and instruments (these were later included under the heading incidental expenses). The amounts for 1878-1886 also include the expenses incurred under the Rivers Pollution Prevention Act, 1876. These amounts (approximately £140 p.a.) could not be accurately subtracted from the total annual expenses, because the precise amounts were not separately listed in the estimates.

3.4: External Funding

The subject of funding from external sources is an important adjunct to State funding of the Alkali Acts administration. External funding emanated from several sources. The first of these was the income generated by the registration fee payable by all chemical works regulated by the State. The registration fee for manufacturers was introduced under section eleven of the Alkali Act, 1881, which stated,

> The duties charged in respect of a certificate of registration under this act shall be stamp duties under the management of the Commissioners of Inland Revenue...for the purpose of the said stamp duties the Commissioners of Inland Revenue shall issue stamped forms of certificate, and the Commissioners may issue the same at any time after the passing of this Act.[138]

Fees varied according to the type and size of works. In 1882, salt works were charged £3 p.a and alkali works £5 p.a, for registration under the Acts.[139]

The second source of external funding was local authorities. Funds for the Alkali Inspectorate were derived in two ways. First, local authorities were obliged to pay a fee towards any official enquiries made under the Public Health Act, or other legislation. Local authorities were often sent returns by the L.G.B about chemical works in their area. The second source of local authority funding can be found under section 17 of the Alkali Act, 1881, wherein local authorities were empowered to employ and fund a local alkali inspector.[140] During this period, one 'resident

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[138]44 & 45 Vict. c.37, PP.1881.I.31.

[139]See the correspondence between the L.G.B and Scottish and Irish manufacturers held at the P.R.O. in files MH16/5-MH16/9.

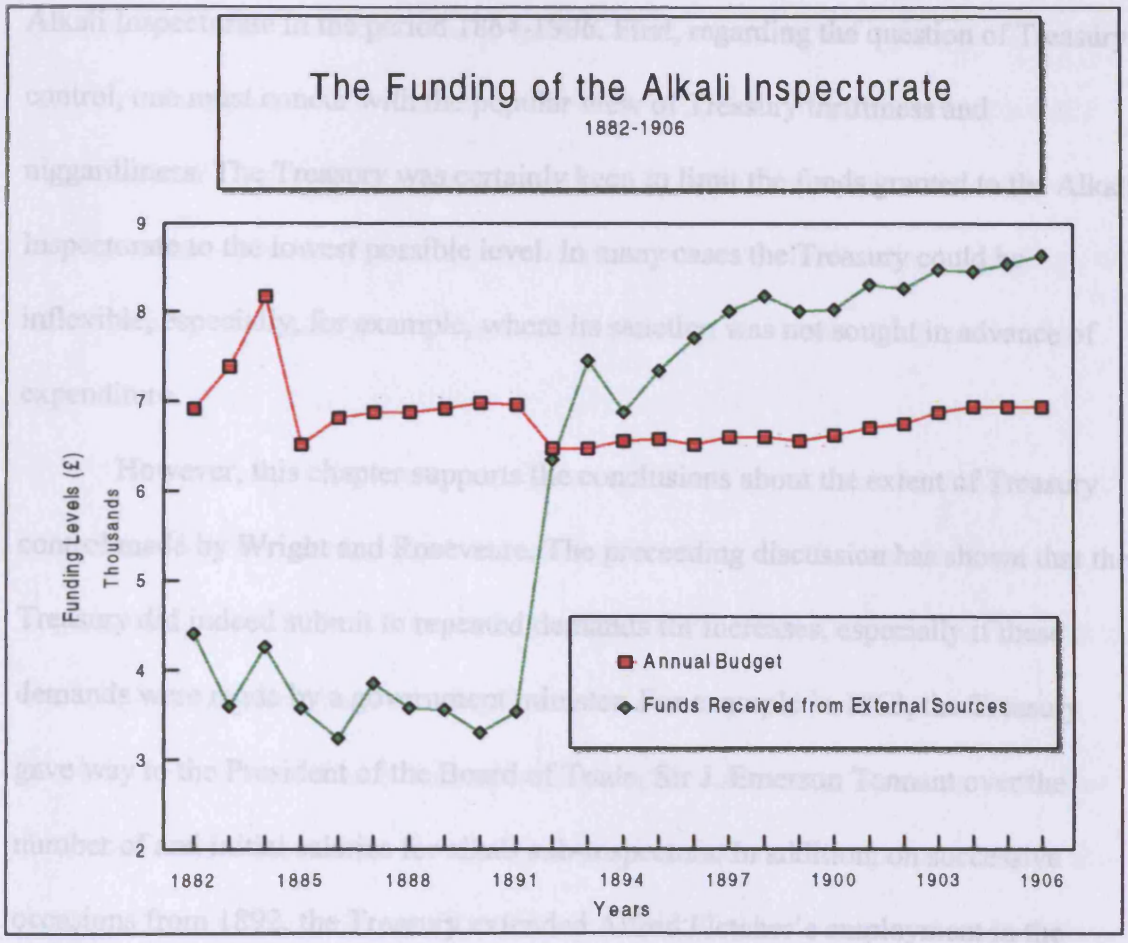
[140]44 & 45 Vict. c.37, PP.1881.I.34. Section 17 stated 'If any sanitary authority or authorities apply to the central authority for an additional inspector under this Act, and undertake to pay a proportion of his salary or remuneration, not being less than one half, out of any rate or rates leviable by such authority or authorities...the L.G.B may...appoint an additional inspector under this Act; and such inspector shall have the same powers and be subject to the same power of removal and the same regulations and liabilities as other inspectors under this Act.'

inspector' was employed by a local authority under this section. John Affleck was appointed in June 1883 by the Committee of Associated Sanitary Authorities (encompassing Widnes, Runcorn and surrounding areas, see figure two) at a cost of £450 per annum to these authorities (see figure six).[141]

Figure six compares the annual amount of external funding generated by the Alkali Inspectorate and the cost of the Inspectorate to the British State (its annual budget). It is interesting to note that after 1892, the inspectorate was granted less funding than it actually generated. Therefore, the alkali inspectorate became, in effect, a self-financing body which actually created a profit for the Exchequer. However, this chapter (and figures three, four and five) has illustrated that this profit was not paid back to the Alkali Inspectorate in increases in salaries and expenses, even though the requested increases would not have been a burden upon public funds.

[141]P.R.O., MH16/2, Chairman of the Associated Sanitary Committees to Charles Dilke, President of the L.G.B, 13th June 1883.

Figure Six



Taken from the Civil Service Estimates 1882-1906.[142]

[142]The annual budget of the Alkali Inspectorate was calculated by adding together the annual sums granted by the Treasury which included salaries to all grades of the inspectorate, and the personal, travel and incidental expenses. The amounts listed as funding from other sources are constituted by three types of funding. First, the annual contribution of various sanitary authorities of two thirds of the salary of a resident inspector (£400 p.a), plus 50% of his expenses (£50 p.a). Second, the income generated by the annual payment of a statutory fee by manufacturers registered under the Alkali Act. Third, an amount from local authorities to repay the 'costs of official inquiries.'

3.5: Summary

The preceding discussion leads to two sets of conclusions about the funding of the Alkali Inspectorate in the period 1864-1906. First, regarding the question of Treasury control, one must concur with the popular view of Treasury thriftiness and niggardliness. The Treasury was certainly keen to limit the funds granted to the Alkali Inspectorate to the lowest possible level. In many cases the Treasury could be inflexible, especially, for example, where its sanction was not sought in advance of expenditure.

However, this chapter supports the conclusions about the extent of Treasury control made by Wright and Roseveare. The preceeding discussion has shown that the Treasury did indeed submit to repeated demands for increases, especially if these demands were made by a government minister. For example in 1863, the Treasury gave way to the President of the Board of Trade, Sir J. Emerson Tennant over the number of and initial salaries for alkali sub-inspectors. In addition, on successive occasions from 1892, the Treasury extended Alfred Fletcher's employment in the light of assurances from Sir Henry Chaplin, President of the Local Government Board. This fits in with Wright's perception that if government departments were 'prepared to swear that an increase was 'absolutely necessary' and...do battle with the Treasury, if need be at ministerial level, approval could be obtained despite the most strongly held objection.'[143] For Wright, the Treasury had great respect for ministerial independence and autonomy, and wished to preserve good relationships with the departments.[144]

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[143]Wright, *Treasury Control of the Civil Service 1854-1874*, p.164.
[144]ibid., p.169. Henry Parris has concurred with this view, contending that gaining Treasury consent was not an impossibility for any popular and determined minister. See Parris, *Constitutional Bureaucracy*, p.254.

This chapter has also highlighted the miserly attitude displayed towards the Alkali Inspectorate by the Local Government Board from 1872. This was despite the the fact that the inspectorate actually generated revenue for the Exchequer after 1881, and created a profit for the State after 1892. The L.G.B's unsupportive attitude is a key issue in the light of Wright's assertions that ministerial persistence would lead to success with the Treasury. In fact, in several instances outlined in the preceeding discussion, the Treasury granted funds despite the Board's lack of support for the request.

The preceding discussion has shown that funding proposals made by inspectors were frequently rejected by successive Permanent Secretaries and Presidents of the L.G.B. This lack of departmental support certainly had a deep-rooted and long-lasting effect upon funding levels, which remained far lower than those granted to inspectors of factories and mines. Furthermore, it is interesting that where the Board took a decision to reject requests for increases, it often utilised a tactic of placing blame on the Treasury. This chapter has highlighted the tense relationship which existed between the Treasury and the Local Government Board, despite Wright's assertion that the Treasury wished to preserve good relationships with departments. Administrators at the L.G.B attempted to side-step the Treasury where possible, by not passing on requests or granting small amounts for which a higher sanction was not necessary. It is clear that officials at the Board assumed that requests were bound to be rejected.

The second set of conclusions which can be drawn from this chapter spring from the Civil Service Estimates. Levels of salaries and expenses have uncovered several important comparisons between the Alkali Inspectorate and certain other

nineteenth-century regulatory agencies. First, throughout the period under consideration the remuneration granted to both the Chief and the sub alkali inspectors remained substantially lower than the salaries granted to the inspectors of factories and mines (see figures three and four). This is interesting in the light of the conclusions reached in chapter two, where it was asserted that alkali inspectors required a high level of both academic and practical technical training and experience, before appointment to even the lowest inspectorial rank (assistant to the chief inspector). Although these qualifications are comparable to those required for appointment to the mines inspectorate, it has already been contended in this thesis that the factory inspectors did not need to possess such a high level of industrial knowledge or training prior to recruitment (see chapter two). Despite this, salary levels remained lower for alkali inspectors, answerable to the Local Government Board, than for the Home Office controlled inspectors of either factories or mines. This fits in with the general picture of salary differentials for civil service staff during this period, where the clerks of the L.G.B were paid less than those in other government departments, including the Home Office.[145]

The Civil Service Estimates also highlight a noticeable disparity between the level of expenses granted to the alkali inspectorate and the expenses sanctioned for the inspectors of factories and mines (see figure five). This was despite the fact that all three inspectorates were charged with the regulation of large numbers of industrial premises that were spread nationwide, and therefore required similar levels of travel

[145]During this period, the higher division salary scale for Assistant Secretaries and first and second class clerks working at the L.G.B was noticeably lower than the salary scales for staff at the Treasury, the Home Office, the Foreign Office and the Colonial Office. For further details, see MacLeod, *Treasury Control and Social Administration*, p.56.

and personal expenses. In fact, the Alkali Inspectorate may have incurred additional expense upon chemicals, instruments and the rental of laboratory space.

Crucially, it has been asserted elsewhere that the factory and the mines inspectorates had their own problems with securing the sanction of the Treasury for increases in salary, staff and expenses.[146] Peter Bartrip has contended, following an analysis of the annual budgets of the inspectorates of factories and mines, that the resources allocated were insufficient to ensure truly effective enforcement. Bartrip believes that *laissez-faire* ideology and a desire for economy stifled the growth of inspectorates, contending that this under-funding was the product of:

> ...a compromise between demands for effective implementation of the statutes and desire to avoid over-bureaucratization and unacceptable levels of State intervention in industry.[147]

This is a view that can be readily applied to the funding of the Alkali Inspectorate. This chapter began with the assertion that the budget assigned to pollution control could be used as an indicator of the political priority placed upon this objective. The relatively low funding levels granted to the alkali inspectorate, give the impression that the State intended the Alkali Inspectorate to have only modest interference with commercial freedom. The regulatory regime was not intended to have a detrimental effect upon manufacturers' profits.[148] This relationship between environmental protection and economic well-being is central to pollution control, and is explored further in following chapters.

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[146]See Pellew, *The Home Office 1848-1914* and Bartrip, 'British Government Inspection, 1832-1875.'
[147]Bartrip, 'British Government Inspection, 1832-1875', p.624.
[148]The description of the duties of the inspectors distinctly emphasised that they were not to interfere with or interrupt manufacturing processes. See 26 & 27 Vict. c.124. s.8.

There are several explanations that may be advanced for the lower level of financial support for the regulation of the chemical industry, than for other industries. First, as illustrated earlier, the factory and mines inspectorates were under the jurisdiction of the Home Office, which was an older, better established and higher status government department than the L.G.B.[149]It is also relevant that in 1863, when the Alkali Inspectors were recruited, the factory inspectorate was already a well established body. However, the salary differential between the two inspectorates was a lasting phenomenon. In 1873, when the position of Chief Inspector of Factories had been established for forty years, the salary attached to this post was £1,000 per annum. Yet, after the post of Chief Alkali Inspector had been in existence for forty years in 1906, the holder was still paid £200 less per annum.[150]

A second explanation for the funding differential is that the inspectors of factories and mines were concerned with the protection of human life - both with the physical well-being of workers (legislation governed hours of work and precautions to prevent the occurrence of industrial accidents) and the moral condition of miners and factory workers (legislation dictated appropriate ages and educational arrangements for child workers). However, the Alkali Acts were framed predominately in terms of the protection of the private property which belonged to a restricted interest group (landowners). It was rare that the chemical workers received any mention in the annual reports of inspectors. Therefore, it is possible that the motivation behind the

[149]Jill Pellew has contended that the Home Office ranked high in terms of pay and prestige. For this reason in the period 1880-1896, the Home Office was always chosen by new recruits over the L.G.B. See Pellew, *The Home Office 1848-1914*, p.35. The low status of the L.G.B may be explicable in part by its organisation. Herbert Preston-Thomas, a former civil servant, commented that it had the old Poor Law Board at its nucleus, 'which had been among the worst paid of government departments, and had a very low standard of entrance examination, and had contained a very small proportion of men of liberal education.' See Preston-Thomas, *The Work and Play of a Government Inspector*, p.195.
[150]See the Civil Service Estimates for 1906-07: PP.1906.lxxi.1.

Alkali Acts justified a lower status and differential scale of pay and expenses for alkali inspectors. One should recall here the sentiment expressed by the Treasury Secretary, George Hamilton in 1863 (see p.92). He asserted that factory inspectors constituted the highest class of inspectors and deserved a higher salary than alkali inspectors because the former had responsibilities 'involving moral as well as physical considerations.'[151] This is suggestive, as it implies that the lives, limbs and morality of workers was accorded a higher status by the Treasury, than the interests of the landowning classes that wished their property to be protected from pollution.

A third explanation for the lower salaries of alkali inspectors during the period 1864-1906, is the low status of science and scientists at this time.[152] It has been asserted elsewhere that until 1914, much scientific research was the result of private and individual initiative.[153]

Overall, it is concluded that for various reasons, the alkali inspectorate was granted a low level of funding, in relation to inspectorates with similar duties. Chapter six will focus more specifically on the consequences of such low levels of funding for the administration of the Alkali Acts. The two preceding chapters have focused upon organisational themes central to the administration of the Alkali Acts. Issues of biography, recruitment, funding and status have all been fully investigated. This thesis will now turn its attention towards the enforcement of the Alkali Acts.

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[151]P.R.O., MH16/1, George Hamilton to James Booth, 11th September 1863.
[152]Thomas Huxley, the renowned Victorian scientist and salmon inspector stated that 'a man who chooses a life of science chooses not a life of poverty, but, so far as I can see, a life of nothing.' Quoted in Reader, W.V, *Professional Men: The Rise of the Professional Classes in Nineteenth-Century England* (London: Weidenfeld and Nicolson, 1966), p.140.
[153]MacLeod, 'Science and the Treasury: Principles, Personalities and Policies, 1870-1885.'

Chapter Four

The Enforcement Approach Adopted by the Alkali Inspectorate

4.1: Inspectorates and Enforcement

The purpose of this chapter is predominately descriptive, highlighting how the Alkali Acts were enforced in late Victorian Britain. However, it is necessary before commencing such an analysis to set the enforcement strategy of the Alkali Inspectorate in a wider social and academic context. Therefore, the discussion which follows seeks to provide an overview of the characteristics and historical background of inspectorates, thus providing a framework for later commentary.

A central government inspectorate is a body which oversees the implementation of legal regulations amongst certain sectors of the community.[1] Gerald Rhodes has formulated a binary categorisation of inspectorates. These are classified as either 'efficiency' or 'enforcement' inspectorates. 'Efficiency' inspectorates are concerned with overseeing the provision of public services such as education, policing and the prison system; hence are an integral part of the State's administrative system. The term 'enforcement inspectorate' is used to describe any inspectorate whose:

> ...function appears to be principally one of securing compliance with legislative goals encapsulated in statutory rules or standards.[2]

An enforcement inspectorate may be a part of central or of local government, or could be a quasi-autonomous public body, such as the Health and Safety Executive.[3]

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[1]In contrast, the police are concerned with the enforcement of the general criminal law amongst the general public. See Cotterrall, R., *The Sociology of Law: An Introduction*, 2nd edn. (London: Butterworths, 1992), p.257.

[2]Rhodes, G., *Inspectorates in British Government: Law Enforcement and Standards of Efficiency* (London: George Allen and Unwin, 1981), p.10.

The regulation of economic and business activity through government intervention in the form of 'enforcement inspectorates', has become widespread in Western democratic and industrial societies.[4] Keith Hawkins has offered an explanation for this development,

> Regulation is a means of coping with technological change: specialized enforcement bureaucracies have been invented to get to grips with the problem of order in complex societies. Prohibitions, enforceable by the criminal sanction, have been grafted onto an existing structure of criminal law in an effort to manage economic relationships and further the protection of the public by the control of certain forms of behaviour regarded - in excess - as harmful or undesirable. Existing forms of legitimate conduct have been transformed into deviant ones in an attempt not to repress activity, but to regulate it.[5]

In this way, the unwanted side effects of the capitalist system, such as pollution and industrial accidents are brought under the scrutiny of central government.[6]

Clearly, the Alkali Inspectorate were conceived as a central government 'enforcement' inspectorate, and it is this type of regulatory agency with which this chapter is concerned. These bodies became increasingly widespread in nineteenth-century Britain. The formation of an Inspectorate under the Alkali Act of 1863 followed a pattern of central government intervention which saw the provision of inspectorates to oversee

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[3]Cotterrall, *The Sociology of Law,* p. 257.
[4]Richardson G.M., Ogus, A.I. and Burrows, P., *Policing Pollution: A Study of Regulation and Enforcement* (Oxford: Clarendon Press, 1983), p.vii.
[5]Hawkins, K., *Environment and Enforcement: Regulation and the Social Definition of Pollution* (Oxford: Oxford University Press, 1984), p.xii.
[6]Richardson *et al*, *Policing Pollution*, p. vii.

many areas of economic life, including factories (1833) and mines (1842).[7] Indeed, as Peter Bartrip has noted, this era has been branded the 'age of the inspector', and a total of twenty two central government inspecting departments were established in the period 1832-1875.[8]

The use of central government inspectorates to implement an escalating amount of legislation during this period, has been presented as a vital component of the growth of government intervention during the nineteenth-century. In his seminal article 'The Nineteenth-Century Revolution in Government: A Reappraisal', Oliver MacDonagh has outlined a five stage process of Victorian government intervention. The introduction of an inspectorate to enforce legislation is central to this incremental process. MacDonagh has contended that:

> ...the appointment of executive officers was a step of immense, if unforeseen, consequence. Indeed we might almost say that it was this which brought the process into life. There was now for the first time a body of persons, however few, professionally charged with carrying the statute into effect.[9]

Furthermore, the appointment of these enforcement officers is often depicted as almost inevitably leading to progress and legislative success. According to MacDonagh, the appointment of inspectors to enforce legislation:

> ...meant a much fuller and more concrete revelation, through hard experience and manifold failures, of the very grave deficiencies in both the restrictive and executive clauses of the statute; and this quickly led to demands for legislative

[7]26 & 27 Vict. c.124, s.6
[8]Bartrip, 'British Government Inspection 1832-1875', pp.605-607.
[9]MacDonagh, 'The Nineteenth-century Revolution in Government', p.59.

> amendments in a large number of particulars. These demands were made moreover with a new and ultimately irresistible authority.[10]

In this way, the 'enforcement' inspectorate has been depicted as both characteristic of, and central to, the growth of government during the Victorian era.

The basic function of this type of central government 'enforcement' inspectorate has remained the same since the first body of this type was established under the Factory Act, 1833.[11] Between the State's decision to intervene with prohibitory legislation and the impact of this intervention, lies the process of implementation or enforcement.[12] It is this enforcement process that is the concern of inspectorates. As will become evident, enforcement is not merely connected with the prosecution of offenders, but encompasses a whole range of reactions and responses utilised to secure compliance with statute law.[13] Roger Cotterrall has illustrated this point,

> The methods of law enforcement available to regulatory agencies are typically varied and carefully graduated, ranging from the use of administrative sanctions such as notices issued by the agency requiring compliance with the law, through court enforceable orders, to actual prosecution of offences.[14]

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[10]ibid., p.59.
[11]3 & 4 Will. IV, c.104.
[12]Richardson *et al*, *Policing Pollution*, p.vii.
[13]Hutter, B.M., *The Reasonable Arm of the Law? The Law Enforcement Procedures of Environmental Health* Officers (Oxford: Clarendon Press, 1988), p.5. Hutter contends that enforcement should not simply be equated with prosecution. It is a much wider concept, the 'whole process of compelling observance with some broadly perceived objectives of the law.'
[14]Cotterrall, *The Sociology of Law*, p.260.

For example, during his study of the contemporary Factory Inspectorate, W.G Carson discovered that this body utilised six major enforcement methods. These could be arranged on a continuum ranging from 'no formal action' to 'prosecution.'[15]

Over recent years, academics from the sub-discipline of the sociology of law have become increasingly concerned with the activities and procedures of modern day regulatory agencies. If one adheres to the belief that crime is socially constructed, the way in which the law enforcers work and 'construct' crime, through the decisions they take, naturally becomes a focus of interest.[16] Sociologists of law have formulated a typology of enforcement approaches, dividing them into a binary model - composed of either the 'compliance'[17] or the 'deterrence' strategies.[18] Reiss describes the differences between these two approaches, as follows,

> The principal objective of a *compliance* law enforcement system is to secure conformity with the law by means of insuring compliance or by taking action to prevent potential law violations without the necessity to detect, process, and penalise violators. The principal objective of *deterrent* law enforcement systems is to secure conformity with the law by detecting violations of the law, determining

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[15]Carson, W.G. 'White Collar Crime and the Enforcement of Factory Legislation', *British Journal of Criminology*, 10 (1970), 383-398 (p.390). However, it should be noted that not all of these enforcement methods would have been utilised in the nineteenth-century context.

[16]Bartrip, P.W.J and Fenn, P.T, 'The Measurement of Safety: Factory Accident Statistics in Victorian and Edwardian Britain', *Historical Research*, 63 (1990), 58-72 (p.69).

[17]This approach is also known by some commentators as 'negotiated compliance.' See Bartrip, P.W.J. and Fenn, P.T., 'The Administration of Safety: The Enforcement Policy of the Early Factory Inspectorate', *Public Administration*, 58 (1980), 87-102 and *idem*, 'The Evolution of Regulatory Style in the Nineteenth-Century British Factory Inspectorate', *Journal of Law and Society*, 10 (1983), 201-222.

[18]Although such a distinct two-sided model is useful for analytical purposes, Neil Gunningham has contended that 'they can be best regarded as two polar extremes in a continuum.' Gunningham, N, *Pollution, Social Interest and the Law* (Oxford: Martin Robertson, 1974), p.70. Furthermore, Bridget Hutter has remarked that in practice regulatory agencies will often use both enforcement styles, although with a higher level of commitment to either a 'compliance' or a 'deterrence' approach. See Hutter, B.M. 'Variations in Regulatory Enforcement Styles', *Law and Policy*, 11 (1989), 155-174 (p.154).

> who is responsible for their violation, and penalising violators to deter violation in the future, either by those who are punished or by those who might do so were violations not penalised.(emphasis added)[19]

Therefore, the enforcement approach known as 'compliance'strategy is a largely informal approach which relies on strategies other than prosecution, in order to assure observance of the law. [20] It is a co-operative, consensual and conciliatory style which relies upon negotiation between the regulator and the regulated. Keith Hawkins has branded this approach as one of 'bargain and bluff.'[21] Advice is proffered by inspectorates, with the threat of prosecution if this advice is not heeded. However, prosecution is perceived to be a last resort measure. The emphasis of the 'compliance' strategy is basically a positive, reformative one: to prevent the occurrence of offences. Keith Hawkins has maintained that,

> Compliance strategy seeks to prevent harm rather than punish an evil. Its conception of enforcement centres upon the attainment of the broad aims of legislation, rather than sanctioning its breach. Recourse to the legal process here is rare, as a matter of last resort, since compliance strategy is concerned with repair and results, not retribution.[22]

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[19]Quoted in Rowan-Robinson, J., *Crime and Regulation* (Edinburgh: T. & T. Clark, 1990), pp.8-9.
[20]This approach is known as the 'accommodative' approach by several commentators. See Richardson *et al*, *Policing Pollution* and Hutter, *The Reasonable Arm of the Law?*.
[21]Hawkins, *Environment and Enforcement* and *idem*, 'Bargain and Bluff', *Law and Policy Quaterly*, 35 (1983), 35-73.
[22]ibid., p.4.

Sociologists of law have observed that the 'compliance' strategy is the prevalent method adopted by modern regulatory agencies in Britain and North America.[23] Bridget Hutter has remarked that,

> Many regulatory agencies have been found to adopt an enforcement style which relies upon negotiation, bargaining, education, and the offering of advice as the means of gaining compliance with the law, as opposed to an enforcement style which relies upon formal action and the imposition of sanctions.[24]

The 'compliance' approach has recently been split into two sub-sections.[25] The first type is the 'persuasive' strategy:

> ...where officials educate, persuade, coax and cajole offenders into complying with the law...patience and understanding underpin the whole strategy, which is regarded as an open-ended and long-term venture.[26]

The second type of 'compliance' approach is the 'insistent' strategy. Under this strategy, enforcement officials are less flexible and less patient with offenders who are expected to comply quickly with the agencies' recommendations.[27] The prosecution of infractors is

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[23]ibid.

[24]Hutter, *The Reasonable Arm of the Law?*, p.5. For examples of these research findings, see W.G. Carson on the modern Factory Inspectorate, 'White Collar Crime' and Peter Bartrip and Paul Fenn's article about the Victorian Factory Inspectorate, 'The Evolution of Regulatory Style in the Nineteenth-Century British Factory Inspectorate.' Also of interest are Keith Hawkins on Pollution Control Officers, in *Environment and Enforcement*; Matthew Weait on the Industrial Air Pollution Inspectorate, 'The Letter of the Law? An Enquiry into Reasoning and Formal Enforcement in the Industrial Air Pollution Inspectorate', *British Journal of Criminology*, 19 (1989), 57-70. Genevra Richardson *et al* on Trade Effluent Officers, *Policing Pollution*; P.B. Beaumont on the Wages Inspectorate, 'The Limits of Inspection: A Case Study of the Working of the Government Wages Inspectorate', *Public Administration*, 57 (1979), 203-217 and R. Cranston on Trading Standards Departments, *Regulating Business: Law and Consumer Agencies* (London: Macmillan, 1979).

[25]This division was recognised by Bridget Hutter during her study of factory inspectors during the 1980s. See, Hutter, 'Variations in Regulatory Enforcement Styles', pp.155-157.

[26]ibid., p.155.

[27]Between 1984-1986, Hutter studied thirty three factory inspectors and discovered that the dominant enforcement style was in the 'insistent' accommodative style. Inspectors usually utilised informal measures

likely to result more rapidly than within the 'persuasive' strategy. However, the main aim of the agency is compliance rather than punishment. Therefore, this 'insistence' strategy occupies the middle ground in the binary 'compliance'/'deterrence' model.

The second sector of the binary model is the 'deterrence' approach. This method is based firmly on the belief that a breach of the law is intrinsically deserving of punishment. The 'deterrence' approach is a negative, punitive approach. Offenders are actively sought out with a view to the imposition of sanctions. The certainty of punishment within the 'deterrence' model has two aims. Detected offenders will refrain from recidivism, and furthermore, possible offenders will be deterred from committing first offences. Therefore, within this confrontational enforcement method legal coercion and prosecution play a central role.[28] A typical example of an agency which relies upon the 'deterrence' approach is the police.[29]

Since the evolution of the 'nineteenth-century growth of government' debate in the 1950s the body of historical research concerned with central government inspection has grown rapidly. However, the enforcement of the law by nineteenth-century regulatory agencies has received relatively little attention from historians.[30] Bartrip and Fenn have noted that:

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initially, but did not shy from instigating prosecutions, if informal methods failed to produce compliance. See Hutter, 'Variations in Regulatory Enforcement Styles', p.160.

[28]However Reiss and Hawkins have different views regarding the objectives of such an approach. Reiss regards this approach as purely aiming for prevention of offences, whereas Hawkins believes that this approach has wider compliance related aims. See Hutter, 'Variations in Regulatory Enforcement Styles', p.154.

[29]Reiss, A.J., 'Selecting Strategies of Social Control over Organisational Life', in *Enforcing Regulation*, ed. by Hawkins, K. and Thomas, J. (Boston: Kluwer-Nijhoff, 1984). This approach is labelled as the 'sanctioning' approach by some other commentators. See Black, D.J., *The Behaviour of Law* (London: Academic Press, 1976) and Hawkins, *Environment and Enforcement*.

[30]The exception to this is the body of work on the nineteenth-century Factory Inspectorate. See for example, Carson, W.G., 'Early Factory Inspectors and the Viable Class Society', *International Journal of the*

> ...historians have always recognised the importance of the enforcement issue, though few have examined strategies or attempted to gauge the extent of compliance.[31]

Few have analysed or explained the strategies employed by these agencies, taking the existence of an enforcement inspectorate as ample proof of efficient and appropriate law enforcement.

It is also instructive that the sub-discipline of the sociology of law has raised many issues not explored in the historical context. Since Edwin Sutherland's work on white collar crime, there has been a growth of interest in the crimes committed by 'respectable' businesspeople.[32] However, there has been little work on the criminal behaviour of 'respectable' businesspeople in the historical context, with the exception of studies on the implementation of the Factory Acts.[33] Sociological perspectives have not as yet been used to study the enforcement of anti-pollution law in late Victorian Britain. In fact, to date there has been no in-depth study of the enforcement of the Alkali Acts.[34] Therefore,

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Sociology of Law, 8 (1980), 187-191, and *idem* 'The Conventionalisation of Early Factory Crime', *International Journal of the Sociology of Law*, 7 (1979), 37-60. The work of Peter Bartrip and Paul Fenn is also of interest. See 'The Administration of Safety', and the response to Carson's work in *idem* 'The Conventionalisation of Factory Crime: A Reassessment', *International Journal of the Sociology of Law*, 8 (1980), 175-186.

[31]Bartrip and Fenn, 'The Evolution of Regulatory Style in the Nineteenth-Century British Factory Inspectorate', p.201.

[32]Sutherland, E.H., *White Collar Crime* (Holt, Rinehart and Winston, 1949); Carson, 'White Collar Crime', p.383.

[33]See the work of Carson, Bartrip and Fenn, *op. cit.*

[34]Existing work has so far only skipped over these issues. Richard Hawes has provided a valuable, albeit short account of the local context of enforcement of the Alkali Acts in late Victorian St. Helens. He concludes that 'local economic importance proved to be sufficiently powerful to deflect regulation from any source.' Hawes, R.A., 'The Control of Alkali Pollution in St. Helens, 1862-1890', *Environment and History*, 1 (1995), 159-171 (p.159). The most detailed study of the implementation of the Alkali Acts so far has been provided by Roy MacLeod. However, this serves as an overview of the administration of the Alkali Acts as part of the so-called 'nineteenth-century revolution in government' debate, rather than an in-depth study of enforcement procedures. Roy MacLeod's study of the Alkali Acts Administration from 1863-1906 forms one of six case studies in his doctoral thesis entitled 'Specialist Policy in Government Growth' (University of Cambridge: Unpublished Doctoral Thesis, 1967). Most of this has been published in

although it has been pointed out that Britain possesses the oldest system of environmental controls of any industrial society,[35] the effectiveness of one set of these controls, the Alkali Acts, remains to be assessed.[36]

The enforcement of the Alkali Acts is a particularly revealing aspect of nineteenth-century history. One must disagree with Beck's assessment that:

> ...a study of nineteenth-century trends in the British anti-pollution legislation is of minor importance within the framework of the history of Victorian England.[37]

In fact, the enforcement strategy employed by the Alkali Inspectorate is an important research topic on several grounds. Firstly, the Alkali Acts represented the use of the criminal law to regulate business interests. Therefore, the enforcement of this body of legislation gives an insight into the relationship between economics and the environment. An analysis of enforcement approaches will uncover which took priority in practice. As one commentator has contended, 'environmental protection goes to the heart of the relationship between the state and the economy.'[38] For the first time, the regulation of business by the State was justified by the protection of the environment, rather than human welfare. Ashby and Anderson have noted that:

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an article 'The Alkali Acts Administration, 1863-1884: The Emergence of the Civil Scientist', *Victorian Studies*, 9 (1966), pp.85-113. This article has been republished in a collection of MacLeod's work, entitled, *Public Science and Public Policy in Victorian England* (Aldershot: Variorum, 1996).

[35]Vogel, D., 'Cooperative Regulation: Environmental Protection in Great Britain', *Public Interest*, 72 (1983), 88-106 (p.89).

[36]The historical geographer John Sheail has contended that MacDonagh's model of government intervention for the period 1825-1875 may give an overly optimistic image of the ability of the Victorian State to formulate and implement adequate environmental regulation. See Sheail, John, 'Public Interest and Self Interest: The Disposal of Trade Effluent in Interwar England', *Twentieth Century British History*, 4 (1993), 149-170 (p.168).

[37]Beck, 'Some Aspects of the History of Anti-Pollution Legislation in England, 1819-1954', p.475.

[38]O'Riordan, T. and Weale, A., 'Administrative Reorganisation and Policy Change: The Case of Her Majesty's Inspectorate of Pollution', *Public Administration*, 67 (1989), 277-294 (p.277).

> ...for the first time inspectors were empowered to enter factories, not on behalf of workmen (as had been the practice since 1833 under the Factory Act) but on behalf of something inanimate - the atmosphere and property damaged by acid fumes.[39]

The enforcement procedures of the Alkali Inspectorate will highlight how environmental issues were perceived and reacted to.

In addition, the implementation of the Alkali Acts highlights the interaction of a number of social and political factors, such as private property, public health, economic prosperity and social class. This body of environmental legislation has even been described by one commentator as a:

> ...remarkable measure (which) placed the property of manufacturers under the supervision of the state in order to protect the property of landowners.[40]

The implementation of this body of legislation will indicate whether there was a conflict of interests, and to what extent these conflicts were resolved by the inspectors. As Keith Hawkins has argued,

> What tend to be taken for granted as 'pollution' and 'compliance' are the outcomes of organized, sometimes lengthy, social processes.[41]

It is the purpose of this chapter to uncover these processes.

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[39]Ashby and Anderson, *The Politics of Clean Air*, p.23.
[40]Dingle, "'The Monster Nuisance of All", p.529.
[41]Hawkins, *Environment and Enforcement*, p.xiii.

4.2: The Enforcement Approach Adopted by the Alkali Inspectorate

An Advisory Approach

The enforcement technique adopted by the Alkali Inspectorate was defined by an emphasis upon the education of the inspected. The relationship had more similarity to that of teacher-pupil, than policeman-offender. The first Chief Alkali Inspector, Angus Smith, observed in his sixteenth annual report to the L.G.B that,

> Some of the public would have preferred to see [the sub-inspectors] frequently in court with cases of complaint, but I know well that information must grow, and to torment men into doing what required much time to learn would be to return to the old system of teaching by the cane instead of through the intellect.[42]

Therefore, the first Chief Inspector did not perceive himself to be at the helm of an industrial police force. Whilst inspector for the western district, Alfred Evans Fletcher observed that the Alkali Act 'was not being carried out as a police act.'[43] Angus Smith believed that a policy of co-operation and conciliation was a more effective enforcement style than coercion. He argued in his intermediate report for 1876 that:

> I have always said that prosecutions, if required, would increase in time, but first it is necessary that men should learn. I have done something better than mere fining...One manufacturer says that he has spent in changes caused by the new Act as much as 5s. per ton on the Alkali made, an outlay which must appear very great

[42]Report of the Alkali Inspector (hereafter R.A.I) for proceedings during 1879 (3640), p.135 (1879-80), xvi.131. Smith also wrote that the general public .'..are continually confusing or attempting to confound our duties with those of the police...The Government Inspectors have been more as teachers raising up the standard of labour in the works.' See the 18th R.A.I for proceedings during 1881 (c.3583), p.8 (1883), xviii.1.

[43]R.C.N.V (1878), Minutes of Evidence, PP.xliv.43, Q. 6660, p.248.

> to those who know the business. I do not know a more severe mode of fining or one that can be equally advantageous to the community.[44]

In his evidence to the Royal Commission of 1878, Smith stated that he was proud of the fact that there had been few prosecutions under the Alkali Act.[45] Alfred Fletcher, Smith's successor from mid 1884, perpetuated this approach. Fletcher maintained in his annual report for 1887 that the number of prosecutions should not be the measure of the activity of inspectors,

> ...evidence of this should rather be sought in the improved condition of the works, the continued advance that has been made in the adoption of means for preventing the escape of noxious gases.[46]

A dialogue of advice and education was viewed as the vital aspect of the enforcement process. In fact, Russell Forbes Carpenter, the third Chief Inspector under the Alkali Act, believed that inspection would be fruitless without it. Carpenter contended that,

> Visits of inspection of plant should be made at frequent intervals and accompanied by the Manager, if possible, to point out to the person responsible any deficiencies that show themselves, and I cannot characterise as efficient any inspection that does not compromise this as a feature.[47]

The Victorian Alkali Inspectorate justified the cultivation of an advisory approach upon several grounds. Firstly, the alkali inspectors maintained that they possessed greater

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[44]Intermediate Report for proceeding during 1876 (c.165), p.5 (1876), xvi.1.
[45]Only four prosecutions took place under the Alkali Act in the period 1864-1877. See R.C.N.V (1878), Minutes of Evidence, PP.xliv.43, Q.32, p.10. The emphasis on education over prosecution has become a tradition which is adhered to by the modern Alkali Inspectorate. In 1967, Frank Ireland, the Chief Alkali Inspector, boasted that 'only on three occasions in the last forty seven years have court proceedings been brought.'
[46]24th R.A.I for proceedings during 1887 (c.5417), p.21 (1888), xxvi.1.
[47]P.R.O., MH16/4, Russell Forbes Carpenter to Hugh Owen, 29th August 1897.

technical knowledge of condensing processes than the manufacturing interest. Hence, in order to achieve compliance, the inspectors had a duty to guide the manufacturers.[48] This argument was particularly potent during the period after the enactment of the first Alkali Act in 1863. In his first annual report for 1864, Angus Smith commented:

> The knowledge of good modes of condensing was not general among the Alkali makers, the knowledge of the amount of escaping gas and the mode of estimating it was also imperfect; and men who imagined themselves free from all blame were surprised to find that they were sending into the air several times more than the law permitted.[49]

The second justification for the adoption of a predominately educational role was the progressive and technical nature of this body of legislation. Compliance could not be achieved automatically; it was contended by inspectors that manufacturers were reliant upon inspectors for enlightenment about new pollution control methods. Alfred Fletcher argued in 1890 that,

> In the discharge of this duty a constant and ever varied demand is made on the activity and invention of the inspector. New processes of manufacture are constantly brought into operation, the exit gases from which present new problems in the attempt to control them. In this the inspector must go before the

[48]Jeremy Bugler has maintained that from this perception of manufacturers' unawareness of pollution abatement evolved the Alkali Inspectorate's 'self-conceived role as an agency to help industry get on with the job, rather than an air pollution control agency above it.' Bugler, J., *Polluting Britain: A Report* (Harmondsworth: Penguin, 1972), p.17.
[49]1st R.A.I for proceedings during 1864 (c.3640), p.99 (1865), xx.1.

> manufacturer, for he cannot consistently complain of the imperfections in an operation unless he can show the possibility of obtaining a better result.[50]

inspectors would gain respect and secure compliance, not through the use of sanctions, but rather through the application of their technical knowledge and assistance. In the 25th Annual Report for 1888, Alfred Fletcher maintained,

> It is not to be expected that the inspectors can bring about improvements, involving often a reconstruction of expensive apparatus, without encountering the opposition which is so natural to all, but the opportunity they have of bringing to bear knowledge grown of a long experience and collected from a large area, gives them a power which wins in the long run.[51]

The education of manufacturers was further justified as the 'moral duty' of inspectors. The Alkali Inspectorate adhered to the view that escapes of acid were often the result of ignorance or accident. As the offender was perceived as innocent under these circumstances, it would be unethical to prosecute him. Angus Smith contended that,

> If the condition [of the works] could easily be ascertained by the manufacturers there would not be that necessity for great consideration when any excess of escape occurred, and the inspector would know that it would be his duty to prosecute in all cases. As at present he is morally bound to weigh the matter, and not to bring before the public persons who have had a fault committed near them whilst they were perfectly innocent. I have assumed the exercise of this discretion not without some doubts at times, doubts not arising from any uncertainty as to

[50] 26th R.A.I for proceedings during 1889 (c.6026), p.6 (1890), xx.1.
[51] 25th R.A.I for proceedings during 1888 (c.5758), pp.115-116 (1889), xviii.1.

> the plan which ought to be adopted, but doubts as to the right of taking so much upon myself.[52]

Angus Smith also expressed this view in his third annual report for 1866, when he said that,

> The manufacturers have...been guided entirely by the inspectors in ascertaining the condition of condensation in almost all cases. The consequence of this has been that the manufacturer has, in many cases, relied on the inspector informing him if the condensation was sufficient or otherwise. If the letter of the Act had been in the strictest manner adhered to there would have been several prosecutions for infraction of the Act, but, as the inspector and district inspectors have acted as advisers and assistants, any escape of gas which has been instantly remedied has been viewed, unless distinct proof of neglect has been found, as one of those accidents to which all apparatus is subject.[53]

Hence a prosecution was only initiated when distinct proof of culpable neglect was evident to inspectors (see 5.2).[54] Due to this inherent belief that most manufacturers were ignorant of the technical means to comply with the Alkali Act, inspectors often gave manufacturers the benefit of the doubt. Alfred Fletcher maintained that,

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[52]3rd R.A.I for proceedings during 1866 (c.3792), p.48 (1867), xvi.1.
[53]ibid., p.47.
[54]Angus Smith further stated that, 'The intention clearly is to throw all the responsibility on those who make the nuisance, and if I have acted otherwise it is because I find that in many cases there was not a sufficient staff at the works with chemical knowledge to make the requisite examination, and in other cases there was not a habit of examination induced.' See the 3rd R.A.I for proceedings during 1866 (c.3792), p.47 (1867), xvi.1.

> ...it seems somewhat unreasonable that an occasional escape of vapour from one of the works should cause a doubt to be felt as to whether any suppression is exercised at all.[55]

Alkali inspectors did focus upon the detection of breaches of the Alkali Acts. However, in keeping with the advisory approach, detection was for remedial rather than retributive purposes. In 1866, Alfred Fletcher explained that,

> The visits are not made at fixed times, and no notice is given beforehand. When things are going wrong the visits are repeated at short intervals until the desired amendment is reached. Beside the occasions on which an actual test or measurement of the escaping gases is made there are many where a general inspection is sufficient or when a measurement is, at the moment, impossible.[56]

Therefore, it was the duty of an inspector to encourage improvement and to discover and rectify defects before environmental degradation resulted. Alfred Fletcher contended in his 26th annual report that,

> It has on previous occasions been stated that the activity with which the provisions of this Act are enforced is not to be measured by the number of prosecutions that are instituted under it. The duty of an inspector is to encourage improvement, and, by pointing out defects, to get them removed before they have grown by custom

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[55]P.R.O., MH16/1, Alfred Fletcher to Angus Smith, 23rd July 1875. For example on July 31st 1882, Mr Mahoney of Ramelton Works, Wexford wrote to Angus Smith claiming to 'simply work kelp', although the local sanitary authority had reported that he also produced chemical manure and sulphate and muriate of ammonia. Smith wrote on the 2nd August that ' I do not think it very nice to send an inspector to Donegal for the answering of this question by itself...Also I do not wish to throw any doubt on the word of the owner. I know that Sanitary Authorities have not the surest mode of collecting their information frequently.' It was later discovered that Mahoney had deceived the inspectorate. See P.R.O., MH16/5, Angus Smith to the L.G.B, 30th May 1883.

[56]23rd R.A.I for proceedings during 1886 (c.5057), p.7 (1887), xvii.1.

> into so gross a form as to assume the character of a contravention of the provisions of the statute, or to be a nuisance in the surrounding districts.[57]

Although, the enforcement approach was characterised by advice and education, the alkali inspectors were not empowered to force manufacturers to undertake their specific instructions or recommendations. In his first annual report, Smith commented that,

> It has been necessary to be very careful not to give such advice as might appear to be interference; we have no power to decide on the mode of producing the desired result. At the same time, it so frequently happens that the necessary improvement is self-evident to those who are experienced, that any hesitation to advise would be unfair and simple pedantry. This is more especially seen when the manufacturer himself has not at all thought on the subject, and is obliged either to seek advice or remain inactive.[58]

The major aim of the advisory approach was to encourage manufacturers to take responsibility for themselves in terms of pollution control. The alkali inspectors hoped to facilitate and then oversee a type of voluntary self-regulation.[59] Manufacturers could monitor their own pollution abatement methods through the employment of their own chemists to undertake daily emissions tests at their chemical works. In his report for 1876, Angus Smith maintained,

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[57]26th R.A.I for proceedings during 1889 (c.6026), p.9 (1890), xx.1.

[58]1st R.A.I for proceedings during 1864 (c.3640), p.96 (1865), xx.1. This is an interesting comment in the light of the inspectors duties, as outlined in section eight of the first Alkali Act of 1863. This emphasised that inspectors must, under no circumstances, interfere with, or interrupt the process of manufacture. See 26 & 27 Vict. c.124, s.8 and 3.5.

[59]Neil Gunningham has argued that this was a central aim of the New South Wales Mines Inspectorate, during the 1980s. See Gunningham, N.,'Negotiated Non-Compliance: A Case Study of Regulatory Failure' *Law and Policy*, 9 (1987), 69-95 (p.81).

> When the Alkali Act was introduced, few of the Alkali makers had good laboratories, still fewer had chemists sufficiently free to test the gases for themselves, and I may almost say that few had chemists fit to do so. Now things are entirely changed...this never could have been brought about without inspection.[60]

The advisory approach was even seen to have a wider social purpose than the education of Alkali manufacturers. Government officials, through education and advice, were keeping a check on the country's industrial growth and development. Russell Forbes Carpenter reported in 1900 that,

> The very virtues of our national character...self-reliance and native business shrewdness, are often responsible for men embarking in chemical industrial operations with a very slight equipment of industrial knowledge, and with absolute ignorance of the difficulty of the problems ahead of them. Again and again it has fallen to the lot of the staff to have to state that steps proposed to be taken were not only worse than useless, but would conflict with the sections of the Act...and at times the inspector must have appeared heartless in the choking off of ill-regulated enthusiasm...I think I have justified my case in emphasising the importance of a greater spread of knowledge in this branch of applied science if viewed only from the narrow point of the administration of the Alkali Acts.[61]

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[60]Intermediate R.A.I for proceedings during 1876 (c.165), p.2 (1876), xvi.1
[61]36th R.A.I for proceedings during 1899 (c.192), p.324 (1900), x.257.

Repeated Warnings

If the advisory approach failed, and non-compliance remained in evidence, the Alkali Inspectorate made use of repeated warnings, with the threat of prosecution if these were not obeyed. These warnings were often put in the form of standardised infraction letters[62], and were most commonly used in cases of non-registration.[63] The first warning letter usually took the form of a reminder. For example, in 1883 Thomas Scott (owner of a Cork chemical manure works) was informed that he had not renewed his registration, which had expired on the first of April,

> I am further directed to state that, as the owner of any work required to be registered under the Act is liable for a penalty for every day during which the work is carried on without being duly registered in pursuance of the Act, it will be necessary, if you require a certificate of registration for the year which commenced on the 1st April, that the enclosed form of application should be filled up and returned to the Board without delay.[64]

As no reply was received by the Board, on the 11th June, Scott was further threatened,

[62]Records suggest that standardised infraction letters were increasingly used by the Alkali Inspectorate in the period under examination. Obviously, archival sources do not illustrate the frequency of verbal warnings to manufacturers. Matthew Weait has shown that the infraction letter still underpins the whole enforcement process. He looked at three years of correspondence (1983-5), between the Industrial Air Pollution Inspectorate and firms who were sent an infraction letter as the result of rule breaking. He did this in order to examine the decision-making process that inspectors go through, when deciding whether to prosecute offenders. See Weait, 'The Letter of the Law?.'

[63]The absence of infraction letters to offenders who have exceeded emissions limits for noxious vapours, suggests that these cases were more likely to be dealt with by advice and negotiation, rather than in a formal standardised way by the administrators at the L.G.B.

[64]P.R.O., MH16/5, L.G.B to Thomas Scott, 10th April 1883.

> I am directed to add that the Board would regret if owing to further delay upon your part to carry out the requirements of the Act, it should become necessary for them to sanction proceedings for the enforcement of the penalty referred to.[65]

A more strident tone was utilised for long term non-registration. For example, a salt manufacturer of Limerick was sent a second letter warning him to register under the Alkali Act. This read,

> I am directed by the L.G.B to [direct you] to their letters of the 16th January, the 21st April and the 18th April in last year, with reference to the registration of your salt works...In their letter of the 18th May last the Board pointed out that salt work in which the extraction of salt from brine is carried on is required to be registered; and they called your attention to the penalty which by subsection six of s.11 of the Act is imposed when the owner of any work for every day during which it is carried on in contravention of the section. The Board have not received any reply to this letter; and as they have no evidence that your works are of such a nature as to exempt you from the necessity of obtaining the certificate for which you applied on the 4th of January last. I am directed to call your attention to their letter of the 16th January last requesting you to remit to this office a P.O Order for the amount (£3) of the stamp duty prescribed by the Act, in respect of salt works, and to impress upon you the necessity of attending to this matter at once.[66]

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[65]P.R.O., MH16/5, Samuel Provis, Assistant Secretary at the L.G.B, to Thomas Scott, 11th June 1883. This threat was effective; Scott paid the overdue registration fee two days later.
[66]P.R.O., MH16/5, C.W. Dalton, Assistant Secretary at the L.G.B to Mr. Purcell of Nelson Street Salt Works, Limerick, 22nd January 1883.

It is vital that infraction letters to persistent offenders offered them the chance to explain their non-compliance, or describe any mitigating circumstances, before a decision was made regarding prosecution. For example, in September 1882, Messrs Boyd and Son, a Dublin chemical company was advised by an Assistant Secretary at the L.G.B that,

> Before deciding what action should be taken in consequence of your omission to register the Work above referred to, the Board will be willing to consider any observations or explanation which you may wish to offer on the subject.[67]

If no reply was received then a more threatening tone was employed. For example, the third infraction letter sent to the Cork Gas Consumers' Company read,

> If your work has been in operation since the 31st March the Board request to be furnished, within four days, with any reasons which you may desire to submit to them why proceedings should not be taken against you for the recovery of the penalty incurred.[68]

In this way, through the provision of repeated warnings and 'last chance' opportunities, resort to the prosecution process was avoided.

[67]P.R.O., MH16/5, Walter Sandall, Assistant Secretary of the L.G.B to Boyd and Son, 6th September 1882.
[68]P.R.O., MH16/7, L.G.B to Cork Gas Consumers' Company, 13th April 1887.

An Incremental Approach

In keeping with this emphasis on educating manufacturers about pollution abatement methods, inspection was viewed as a gradual, incremental process. In a letter about the state of alkali works in Runcorn and Widnes following the Act of 1874, Angus Smith argued that,

> On the first of March we had power to begin and we begun. I have already shown that I went as far as I considered it prudent, for violence may delay the next important step. But already...improvements at great expense have been made and new inventions are growing or being tried in order to make improvements permanent, for it may not be known that works in the best condition go wrong suddenly without the fault of anyone. This is the search for the constant inspection required.[69]

Hence, efficient inspection and law implementation was illustrated by Smith as an unhurried, piecemeal process. Immediate success could not be anticipated, when the operation of the Alkali Acts was totally dependent upon the state of technical knowledge of new condensing processes, and the invention of scientific apparatus. In 1875, in a letter to John Lambert, the Permanent Secretary of the L.G.B, Angus Smith further maintained that:

> ...an act of a progressive character like that of 1874 cannot be brought to perfection on an appointed day. A factory act which said that children should not work above six hours per day might be made complete in its efficiency at once.[70]

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[69]P.R.O., MH16/1, Angus Smith to John Lambert, 24th July 1875.
[70]ibid.

Partnership and Negotiation

The enforcement approach adopted by the Victorian Alkali Inspectorate was also based upon an idea of 'partnership.' Inspectors endeavoured to establish a cordial working relationship with the manufacturers in his district.[71] The third Chief Inspector, Russell Forbes Carpenter contended in his report for 1906 that,

> I certainly trust that the confidential relationships of the inspectors with the manufacturers, relationships based on mutual respect, may be a matter of sure, if of gradual, growth. This has been the case in the past, and I have every confidence it will prove so in the present instance. Those who have been longest acquainted with the methods of inspection have, from time to time, borne public testimony to the condition of respect being a firmly established one.[72]

Hence, the relationship between inspector and inspected was perceived to be a two-way relationship grounded in mutual respect. Negotiation between the two parties had an important role to play. Angus Smith stated in his third annual report that:

> ...in many cases the mode of examination has rendered the inspection somewhat more of a mutual agreement between the inspector and manufacturer to do the utmost towards condensation...[73]

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[71]Hartley contends that the idea of 'partnership' naturally springs from a long-term advisory relationship between two parties. He argues .'..over time there is created a symbiotic relationship between the inspectors and the inspected. This is most notable if the inspectorate has advisory functions, for these naturally involve elements of friendship and partnership, or there is a common professional discipline shared by the inspectors and the inspected.' See Hartley, O.A.,'Inspectorates in British Central Government', *Public Administration*, 50 (1972), 447-466 (p.455).

[72]The late twentieth century Alkali Inspectorate view the inspection process in the same way. In his annual report for 1971, Frank Ireland, the Chief Inspector commented that 'co-operation between all parties is an indispensable part of a successful anti-pollution policy. The Alkali Inspectorate have evolved such a policy over more than one hundred years and a good deal of time is now spent in educating individuals to be good neighbours.' Quoted in Rowan- Robinson, *Crime and Regulation*, p.212.

[73]3rd R.A.I for proceedings during 1866 (c.3792), p.48 (1867), xvi.1.

This 'gentleman's agreement' was dependent upon the belief that the manufacturer was truly committed to the condensation of noxious gases and the installation of pollution abatement equipment. The formation of an inspectorial relationship based upon trust and mutual respect was viewed by alkali inspectors as the most efficient way to enforce the law. [74] For example, in 1875, Mr. Robert Holland (a Runcorn land agent) accused the alkali inspectors of not being sufficiently vigilant, especially with regard to the prevention of nocturnal escapes of acid gas. Angus Smith replied that,

> There may be a little more carelessness at night than during day... I have always (thought) an unsuspicious inspection is not a negligent one, if policemen or other inspectors went about at night...both workmen and owners would readily deceive them. If the work cannot be done by what may be called an open gentlemanly inspection it cannot be done at all.[75]

Evidently, Smith's reasoning was that a respected and trusted manufacturer would be more likely to comply with the law.[76] It was essential that the regulated did not feel alienated or patronised. Angus Smith further argued in his 12th Annual Report that,

> There are two modes of inspection, one is by a suspicious opponent, desirous of finding evil, and ready to make the most of it. The other is that of a friendly

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[74]The belief that trust and partnership is the most efficient way of ensuring compliance is also adhered to by the contemporary Alkali Inspectorate. For example, Frank Ireland, Chief Inspector during the late 1960s and 1970s claimed that, 'We look on our job as educating industry, persuading it, cajoling it. We achieve far more this way. The Americans take a big stick and say "solve your problem". We say to industry "Look lads, we've got a problem". In this way we've got industry well and truly tamed.' Quoted in Bugler, *Polluting Britain*, p.11.

[75]P.R.O., MH16/1, Angus Smith to John Lambert, 24th July 1875.

[76]Russell Forbes Carpenter also adhered to this view, contending in his report for 1899 that, 'It cannot be too strongly pointed out that unless this feeling of mutual confidence exists and is cultivated, inspection becomes much less efficient in protecting the interests of the public. See the 36th R.A.I for proceedings during 1899 (c.192), p.10 (1900), x.257.

adviser, who treats those whom he visits as gentlemen desirous of doing right...If people are treated as evil doers they will not hesitate to deceive those who come with what they consider unjust suspicions. There would then be necessary constant attention, and the number of inspectors would be too great to be permissible. The character of the inspection which I have instituted is one caused partly by my own inclination, and partly by the nature of the circumstances.[77]

In this way, Smith aimed to make inspection effective by ensuring that it was palatable for manufacturers. This was critical, as a faction of the manufacturing interest was initially hostile to the concept and practice of central government regulation of the chemical industry.[78]

However, as with the advisory approach, the element of long term partnership between government and industry made it difficult for inspectors to employ the machinery of the law when offences were detected.[79] As an alternative, inspectors tended to indulge in patient negotiation with their industrial 'partners'/detected offenders until compliance was achieved. For example, one case which involved the non-registration and emission of noxious vapours from an Irish tar work spanned a period of two years and four months. H.J. Fenner's tar distillery was branded unfit for registration in June 1895, and continued advisory visits were undertaken by the district inspector, Edward Ballard.[80]

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[77]12th and 13th R.A.I for proceedings during 1875 and 1876 (c.2199), p.26 (1878-1879), xvi.1.
[78]Bartrip and Fenn have noted that the first factory inspectors also attempted to avoid conflict with mill-owners. Early factory inspectors preferred to present a 'discreet and conciliatory' demeanour in order to enforce the law. Quoted in Bartrip and Fenn, 'The Evolution of Regulatory Style in the Nineteenth-Century British Factory Inspectorate', pp.204-205.
[79]In the contemporary context, Matthew Weait argues that, 'The longer and closer a policing body relates to the policed population, the easier it is to employ proactive preventive techniques, and the harder it would be to employ the reactive and alienating machinery of the law. It signals a break in the essentially symbiotic relationship, which could prove hard to heal in the future. See Weait, 'The Letter of the Law?', pp.63-64.
[80]P.R.O., MH16/9, G.H. Kennedy memorandum to Hugh Owen, 1st July 1897.

However, it was discovered in March 1897, after such lengthy consultation, that Fenner had been operating without a registration certificate, and had failed to use the 'best practical means' to prevent noxious emissions. Russell Forbes Carpenter applied to the Irish L.G.B for sanction to proceed with a prosecution.[81] The case was heard by the Recorder of Cork on June 5th 1897, and it was decided that Fenner should pay a fine of 6/- a day in respect of the charge of non-registration. The case was then adjourned for the collection of expert evidence on both sides in regard to the charge of failure to use the 'best practical means' to prevent an emission of noxious gases. However, the Chief Inspector continued to negotiate with Fenner, commenting that his letters:

> ...appear to have brought Mr. Fenner into a more reasonable frame of mind and show that by further negotiations the presence of one expert might be avoided, if not both. I have the honour now to report, as result of these negotiations, the last of which were conducted by myself personally at Cork on the 12th and 13th July, with the solicitors on each side and with Mr. Fenner present - that Mr. Fenner agrees to let the decision as to what is necessary be in my hands after I have with the aid of my assistant made a personal examination and testing of the working of the still. Mr. Fenner admitted that on 18th March last there was a slight escape of noxious gases to be found on search by Mr. Ballard, but said it was entirely accidental, and that I should test his system for myself and if I found it defective he would do whatever I wished to make the plant effective in dealing with the foul gases evolved.[82]

[81]P.R.O., MH16/9, Russell Forbes Carpenter memorandum, 7th April 1897.
[82]P.R.O., MH16/9, Russell Forbes Carpenter to the Irish L.G.B, 20th July 1897.

Carpenter again personally visited Fenner's works from the 6-8th October 1897 and persuaded him that noxious gases were present and his condensation was inadequate. He sketched out a plan to illustrate what changes should be made.[83] Fenner wrote to Carpenter on the 9th of October 1897 promising future co-operation and compliance and thanking him for:

> ...the great pains you took and the care, skill and courtesy which characterised the examination. Your action in this case seems to me to indicate that your Department, while regarding the public, is anxious to cooperate with manufacturers for the general good.[84]

On the 12th October, Carpenter informed the L.G.B that he wished to drop legal proceedings as,

> The cost of pursuing it further would possibly not be recouped by the penalty recovered and I would respectfully urge that now Mr. Fenner has undertaken to carry out the requirements of the Act in a loyal spirit it would not conduce to the cooperation I hope to receive from him in the future if action that he might feel conceived in a vindictive spirit were to be carried further.[85]

The decision regarding prosecution was left to Carpenter's discretion.[86] Proceedings were dropped, and Carpenter commented in his annual report for this year that he did not think that 'the Board will have cause to regret the leniency that was shown in this case.'[87]

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[83]P.R.O., MH16/9, Russell Forbes Carpenter to the Secretary of the Local Government Board, 12th October 1897.
[84]P.R.O., MH16/9, H.J. Fenner to Russell Forbes Carpenter, 9th October 1897.
[85]P.R.O., MH16/9, Russell Forbes Carpenter to the Secretary of L.G.B, 12th October 1897. Carpenter commented that 'friendly relations of confidence are happily now established between us as the result of my visit.' Prosecution was often an unattractive option due to the expense it incurred and the low penalties inflicted on offenders. For in-depth discussion of these constraints see 6.4.
[86]P.R.O., MH16/9, Hugh Owen to Russell Forbes Carpenter, 16th October 1897.

Hence, alkali manufacturers were perceived to be respectable, law abiding citizens at heart.[88] Inspectors were not willing to perceive manufacturers as potential criminals or consider that manufacturers would attempt to deceive them. In his evidence to the Royal Commission during 1877, Alfred Fletcher maintained that,

> I have really always refused to believe that manufacturers were guilty of small tricks. I do not believe that they are guilty of them at all. I think that they have very great difficulty in complying with the terms of the Act, but that straight-forwardly and openly they all strive to do it.[89]

In fact, Angus Smith believed that alkali manufacturers, as part of the general public, shared the same community interests. Therefore, manufacturers could be trusted to regulate themselves for the common good.[90] Smith expressed this somewhat benign view in a conference paper presented in 1861, several years prior to the first Alkali Act,

> It would probably be the cause of greatest pleasure in the country if the reform began with an association of manufacturers themselves. They are of necessity a body of enlightened man-they belong to the public, and desire for themselves and their families pure air; why do they not combine and settle this question for themselves? If the union for this purpose is pretty general and successful, they will

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[87]34th R.A.I for proceedings during 1897 (c.141), p.232 (1898), xiii.221.

[88]In her study of four groups of Environmental Health Officers, Bridget Hutter has noted that most business people were seen by the regulatory agency as honest, law-abiding and respectable, although often requiring advice and guidance. Hutter, *The Reasonable Arm of the Law?*, pp.61-66. Roger Cotterrall has asserted that this view of the regulated contrasts greatly with the negative view that the police take of the community that they regulate. See Cotterrall, *The Sociology of Law*, p. 270.

[89]R.C.N.V (1878), Minutes of Evidence, PP.xliv.34, Q.6610, p.246.

[90]In her study of four groups of Environmental Health Officers, Hutter noted that most business people were seen by the regulatory agency as honest, law-abiding and respectable, although often requiring advice and guidance. Hutter, *The Reasonable Arm of the Law?*, pp.61-66. Cotterrall notes that this view of the regulated contrasts greatly with the negative view that the police take of the community that they regulate. See Cotterrall, *The Sociology of Law*, p.270.

find means to prosecute those who are careless. I am not without hopes of seeing such a union...It would be a fine sight to see the manufacturers...foremost in the struggle for an improvement.[91]

Understanding and Discretion

The enforcement approach adopted by the early Alkali Inspectorate was characterised by an emphasis on understanding. Inspectors exhibited great appreciation for the pressures and constraints which stood in the way of manufacturers' compliance.[92] In his Annual Report for 1877 and 1878, Smith contended that,

> The public can scarcely imagine what a step in advance signifies to the manufacturer, what expense, what change of apparatus, what teaching of men, what annoyance to foremen, what trouble to chemists, what complicated disturbances in the mind of managers, and what anxiety to owners, but it must be taken occasionally.[93]

Inspectors were particularly understanding of the financial pressures attendant upon the installation of pollution abatement equipment. Alfred Evans Fletcher, whilst inspector for the North West district, wrote that the 1874 Alkali Act:

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[91]Smith, R.A., 'How Far are Smoke and the Products of Combustion arising from various Manufacturing Processes Injurious to Health?', *Transactions of the National Association for the Promotion of Social Science* (1861-1862), 429-440 (p.438).

[92]This sympathy with the problems which faced manufacturers may have been partly based on the fact that all of the inspectors, with the exception of Angus Smith, had gained industrial experience before their recruitment to the Alkali inspectorate. It is also relevant that many had links with the manufacturing interests, either through professional organisations or personal friendships. See chapter two for further examination of this issue.

[93]14th and 15th R.A.I for proceedings during 1877 and 1878 (c.2300), p.137 (1878-1879), xvi.131.

> ...is working great changes in this district and has already led to a large reduction in the quantity of acid vapour escaping from several of the works. Its pressure is indeed severely felt by the manufacturers, many of whom have gone to great expense in order to comply with its requirements...The pressure put upon them is really very great, perhaps as much as could be born. The provisions of the new act are now only observed by keeping the apparatus in a very high state of repair, involving probably an expense of £500 additional for each furnace in the year.[94]

The financial pressures of compliance with the Alkali Act were especially insistent in times of trade depression.[95] Inspectors found it difficult to enforce the statute in such circumstances. Alfred Fletcher pointed out in his Annual Report for 1881, that,

> The manufacturer is in great difficulty to know what he should do. His trade at present is in a very bad condition. In many cases the alkali makers scarcely know whether it would be better for them to continue or cease entirely, and it seems to be a very cruel thing to insist upon any one process, or even on any process, for removing the sulphur from waste heaps.[96]

Inspectors were also understanding of the difficulties caused by unreliable workmen, Smith argued during his evidence to the Royal Commission in 1878, that,

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[94]P.R.O., MH16/1, Alfred Fletcher to Angus Smith, 23rd July 1875.

[95]It has been noted that the factory inspectorate were also less likely to prosecute in times of trade depression. See Carson, 'White Collar Crime and the Institutionalisation of Ambiguity: The Case of the Early Factory Acts', ed. by Fitzgerald, McLennan and Pawson, *Crime and Society: Readings in History and Theory* (London: Routledge, 1981), pp.134-147 (p. 141), and Bartrip and Fenn, 'The Evolution of Regulatory Style in the Nineteenth-Century Factory Inspectorate', p.210.

[96]18th R.A.I for proceedings during 1881 (c.3583), p.79 (1883), xviii.1. Angus Smith also recognised the strain that economic depression placed upon compliance, commenting in his eighth annual report that 'the escape of hydrochloric acid cannot be said to have further diminished this year. There has been great activity in the trade, and perhaps greater carelessness, since it had a long time of depression.' See his 8th R.A.I for proceedings during 1871 (c.582), p.18 (1872), xvi.1.

> At present the manufacturer is put to great disadvantage, because he is in the hands of extremely rough and ignorant workmen; but I expect that that will also to a large extent to be done away with, because the introduction of new processes may relieve the manufacturers from the responsibility which they now incur by the employment of these rough men whom they cannot help employing at present.[97]

Inspectors also displayed patience with regard to time limits for compliance with the terms of the Alkali Acts. The central aim was results, to be found in low emissions tests, even if these took time to achieve. Alfred Fletcher contended in his twenty fourth annual report that,

> If on the occasion of an inspector's visit the work is found to be in an unsatisfactory condition, the object kept in view is not the obtaining evidence to support a prosecution, but the speedy improvement of the work. To this end the visits are repeated, and examination is made of the escaping gases so as to indicate the source of the difficulty and assist in finding means for the removal. Usually such action on the part of the inspector, though not always welcome at the time, is ultimately acknowledged with satisfaction by the manufacturer, and the expense that may have been incurred is felt in the end to be money well spent.[98]

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[97]R.C.N.V (1878), PP.xliv.43, Q.209, p.52.

[98]24th R.A.I for proceedings during 1887 (c.5417), p.7 (1888), xxvi.1. In the 25th Annual Report, Fletcher reiterates this point, claiming that '...the object of an inspector's visit to a chemical work is not to seek and collect the materials on which to base a prosecution, but rather to assist the manufacturer in keeping up with the requirements of the Act... It is looked on as one of the best features of a report when it is stated that in a work which has given cause for complaint, a system of regularly testing the escaping gases has now been adopted under skilled hands'. See 25th R.A.I for proceedings during 1888 (c.5758), p.9 (1889), xviii.1.

This patience was not everlasting, however. In 1890, in response to Widnes' manufacturers' continued inability to follow advice about the control of escapes of sulphuretted hydrogen, Fletcher distributed the following warning circular,

> It is well known that great difficulties have arisen in carrying out this new process, so as to control effectually the noxious gases thereby called into play. For this reason I have considered it consistent with my duties under the Alkali Act to allow a considerable time to elapse before taking action therein provided. It will however be conceded by all that this time of probation must now be brought to a close. The nuisance caused by the escape of acid referred to is so great that the public have a right to demand that, even at the cost of stopping the process, the evil shall cease. I must therefore ask you to accept this as a formal notice that unless within a reasonable time steps are taken to prevent the escape into the air of the noxious gases produced in carrying out the Chance-Claus process, the discharge of such gases into the air will be considered a contravention of section 9 of the Alkali and Works Regulation Act. The Resident Inspector of your district has instructions to report to me at once what steps you are taking in this matter.[99]

The patient approach was continued by Fletcher's successor, Russell Forbes Carpenter, who operated a 'black list' system for detected offenders, following his rise to Chief Inspector in 1895. Carpenter described this system in 1897,

> At the end of each year a Black List is prepared, showing works in which condition is not satisfactory either as regards working or adequacy of plant. This is

[99]P.R.O., MH16/3, Fletcher circular to Widnes manufacturers, 21st November 1890. The Chance-Claus process was a method for extracting sulphur from the alkali waste heaps which built up in the vicinity of works. For further discussion of this process see the glossary of technical terms and 6.3.

> filed after comparison with that of the preceding year. The plan is my own, and is one of considerable service. Proprietors are informed if their works are on the Black List by the District Inspector and are told they must not be on a second year or prosecution may follow for further neglect.[100]

Again, repeated warnings and the threat of prosecution were utilised to secure compliance. However, this 'black list' system gave manufacturers a minimum of one year to comply with the requirements of the Alkali Act by the district inspector, with prosecution a vague future possibility.

It has been contended elsewhere that the Alkali Inspectorate often interpreted the spirit of the law, rather than obeying the letter.[101] In fact, Chief Inspectors could be so understanding, to the extent that in certain circumstances they were prepared to overlook the legal requirements of the Alkali Act. Angus Smith recognised that discretion was a central component of his enforcement approach. In his fourth annual report for 1867, he discusses the prosecution of a St. Helens firm for an escape of acid in the following terms,

> It is extremely important that neither the inspector nor the manufacturer should view these matters too coolly. An inflexible rule would be hurtful and

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[100]P.R.O., MH16/4, Russell Forbes Carpenter to Hugh Owen, 29th August 1897. Even persistent offenders were often allowed additional time to comply with legislation. For example, during spring 1887, John Lambert adhered to a request for extra time for the payment of the registration fee from James Oakes, a Dundalk salt manufacturer. This manufacturer had been threatened with prosecution for persistent non-registration only two years previously. John Lambert commented that 'I suppose the Board must give this man a little more time. He does not greatly deserve consideration as for a great many years he avoided paying the duty.' P.R.O., MH16/7, John Lambert to Alfred Fletcher, 15th April 1887.

[101]Ashby and Anderson, *The Politics of Clean Air*, p.27. In an agency such as the Alkali Inspectorate, the use of discretion is widespread as it is implementing highly technical and specialised legislation. Therefore the Alkali Inspectorate has the power to set and interpret legal standards of behaviour for the regulated. See Cotterrall, *The Sociology of Law*, p.263.

> unmanageable at present, so that we must use our judgment carefully after considering each particular case.[102]

The exercise of discretion was commonplace in the implementation of the Alkali Acts. Inspectors showed particular understanding about the costs of compliance for small works, to the extent that small Irish salt works were unofficially exempted from the requirements of the Act. In 1883, Angus Smith commented that:

> I very much wish that I could get the charges removed altogether from a few small salt works - especially those in Ireland. I think there ought to be a limit of size. Some are giving up I believe rather than pay. I think it would be quite safe to let an isolated work pass, when it was doing no harm and making less than ten tons a week.[103]

By the mid 1880s it was standard procedure to not send circulars or application forms for registration to Irish salt manufacturers which produced less than two tons of salt a week.[104] Hugh Owen, the Permanent Secretary of the L.G.B, commented in 1885 that,

> We have not in our letters admitted that there is any exemption in any case - but have simply dropped any action in cases where the product is less than two tons per week.[105]

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[102]4th RAI for proceedings during 1867 (c.3988), p.5 (1868), xviii.1

[103]P.R.O., MH16/2, Angus Smith to John Lambert, 6th June 1883.

[104]For example, in January 1885, Charles Blatherwick wrote to Mr. Oakes, an Irish salt manufacturer who produced between five and seven tons a week, 'I wish to remind you that the L.G.B have determined to prosecute and fine all manufacturers of Salt who are working without the licence, prescribed in the "Alkali & c. Works Regulation Act". All makers producing more than two tons per week must register their works and obtain a licence, or a prosecution will be established.' P.R.O., MH16/6, Charles Blatherwick to James Oakes, 19th January 1885.

[105]P.R.O., MH16/2, Hugh Owen to Charles Blatherwick, May 2nd 1885.

However, in several instances, the discretionary judgments of Chief Inspectors were overruled by the L.G.B. For example, in 1883 an Irish tar distiller pleaded exemption from the Alkali Act on the grounds that he produced only three to five tons of sulphate of ammonia a year.[106] Alfred Fletcher was keen to grant exemption in this case, commenting that,

> I believe the statements here made are correct. The amount of sulphate of ammonia is so small that the registration fee of £3 is a heavy tax upon it. Yet I do not see how to draw a line between this and a larger work. Though small it is capable of causing nuisance. If however on account of its small extent the L.G.B will ignore this work the Inspector can still keep a check and see that no harm is done. Should it at any time be found necessary the proprietor might be called upon to register the work.[107]

Hugh Owen, Permanent Secretary at the L.G.B responded that:

> I think that it is very undesirable that the Board should assume the right of making exceptions when the works are clearly within the terms of the act. Say that the Board consider that registration is expected by the statute.[108]

The manufacturer was told that he had to register, and promptly gave up manufacture.[109]

Another case of this type occurred in January 1893. Henry Lyne of the Carlow Gas Joint Stock Company enquired whether the registration certificate just paid for

[106]P.R.O., MH16/7, John Stoer to the Secretary of the L.G.B, 13th November 1889.
[107]P.R.O., MH16/7, Alfred Fletcher minute, 21st November 1889.
[108]P.R.O., MH16/7, Hugh Owen minute, 27th November 1889.
[109]P.R.O., MH16/7, C.W. Dalton, Assistant Secretary at the L.G.B, to John Stoer, 2nd December 1889 and P.R.O., MH16/7, Alfred Fletcher memorandum, 13th February 1890.

(which would expire on 1st April 1893) could be extended until April 1894.[110] Alfred Fletcher commented,

> I think on the grounds stated the registration fee for 1892-3 might be excused for probably but little work will be done before April 1st. Can perhaps the certificate now granted be extended for one for 1893-1894?[111]

Hugh Owen's reply was again negative,

> I do not quite see how this arrangement can be carried out. If the works had not been registered, no doubt the Board might refrain - but here the certificate has been issued...and I do not see how the Board could issue another certificate, without payment of a fee, for a subsequent period.[112]

This decision was final, and the manufacturer was informed that the L.G.B had no power to issue certificate without payment of the fee.[113]

Chief Alkali Inspectors were also prepared to exercise discretion in cases where manufacturers were experimenting with new condensing methods. On the 2nd of November 1879, Angus Smith wrote to the administrators at the Board informing them that Tennant and Co. of Glasgow intended to experiment on a new type of furnace which could be used to decompose salt. The experiment was expected to last between eight and seventeen hours. Smith commented,

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[110]P.R.O., MH16/8, Henry Lyne to the Secretary of the L.G.B, 14th January 1893.
[111]P.R.O., MH16/8, Alfred Fletcher memorandum, 23rd January 1893.
[112]P.R.O., MH16/8, Hugh Owen memorandum, 25th January 1893.
[113]P.R.O., MH16/8, C.W. Dalton, Assistant Secretary, to Henry Lyne, 7th February 1893. In January 1894, D.L. Campbell of the North West of Ireland Bone Manure Company requested that as his works were closing in May, could he have a certificate for two months at a reduced rate. He was informed by the L.G.B on the 17th February that it 'was not empowered to grant a certificate for less than one year or accept a reduced duty in consideration of a work being carried on for a short period only.' See P.R.O., MH16/9, L.G.B to D.L. Campbell, 17th February 1894.

> I was inclined to propose as a reply the Board agrees that the inspection should not consider any increased escape during the proposed experiment as an infringement of an Alkali Act, but that the Board could not be responsible for any other consequence. It is desirable that a suitable day should be chosen for the purpose since the acid does not injure in a very dry day unless the amount be very great...[114]

The Board replied that although 'they are desirous of affording every facility in their power for trying the experiment in question', such an enforcement decision would be illegal. Therefore, Smith's claim for immunity on behalf of Tennant & Co. was rejected.[115]

Compromise

Finally, it is evident that the enforcement approach adopted was intended as a compromise between two interests - environmental and economic. The enforcement approach was designed to avoid conflict between these two interests. Alkali inspectors believed that they formed a bridge between environmental and economic interests, preventing an extreme in either direction. They contended that as a certain standard of living was expected in the modern world, then a certain amount of environmental degradation must be accepted by legislators and general public alike. In a paper presented to the National Association for the Promotion of Social Science, Angus Smith argued:

[114]P.R.O., MH16/1, Angus Smith to the L.G.B, 2nd November, 1879.
[115]P.R.O., MH16/1, L.G.B to Angus Smith, 27th November, 1879.

> ...we cannot afford-rich as the nation may be, to destroy manufactures in order to preserve the beauty of our fields, or prevent a village of busy people from growing up because it will destroy a few pounds of fish. We must remember that in all such cases there must be a compromise between two interests...It is, however, quite clear that there is to be found occasionally a small work in a position rendering many persons quite uncomfortable without doing to the community an equivalent benefit, and large works, relying on their magnitude, doing evil without fear and not from necessity...We should be able to make the best compromise permitted between health, wealth and amenity. The compromise does take place in a way...but it is severely obstructed...by the extreme views taken by both sides. We lose by these means the advantage of the men who would willingly aid sanitary reform.[116]

Inspectors also believed that they had a duty to protect the economic well-being of manufacturers and their dependents. For example, in his annual report for 1876, Angus Smith discussed his dilemma when it was admitted by one of the largest works in the kingdom that they could not comply with the demands of the Alkali Act, 1874. Smith asked,

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[116]Smith, 'How far are Smoke and the Products of Combustion Injurious to Health?', pp.439-440. Alfred Fletcher made a similar point in a journal article, .'..almost all the good things we enjoy, the clothes we wear, the houses we live in, and much of the food we eat, are the outcome of some manufacturing process, during the progress of which smoke or vapour is discharged, to the detriment of the air we breathe. Shall we, then, stop all this work, and, clothed in skins and such rough garments as may have sufficed for our savage ancestors, at once gain repose and a clean atmosphere? Few, indeed, would counsel such a course; rather would we strive to elaborate as much as is possible from the materials nature has given us, striving the while to carry on our industry with such added skill as shall, as far as possible, diminish the evils liable to accompany it. See Fletcher, A.E., 'The Present State of the Law Concerning the Pollution of Air and Water', *Journal of the Society of Arts*, 36 (1882-3), 567-581(p.569).

> What was to be done in a case like this? Was I to attempt to stop such a large work on which the living of...some thousands of individuals depends? The answer to myself was simply this, certainly not at present. The next question was: If these are allowed to go on, how can others be consistently required to stop? This was a cause of great anxiety. It was a threatened deadlock or failure of the Act, and it was one which I could not explain to the public, because it would be confessing a failure prematurely, and I had the fullest belief that time would remove the obstruction. All I could do therefore was advise more attempts and be as reasonable as possible. The same quality of pressure was similarly extended to all who were desirous of doing their best.[117]

Therefore, this and other works were allowed to continue operation, whilst experimentation was underway.

Details of another case of this type exist in the files of the L.G.B. This involved the Seaham Chemical Company, where a condenser fell in February 1880. As a result of this, the works did not have sufficient condensing power to keep within the set legal limits. The manager of the works had inquired whether operation would be allowed under these conditions, and threatened that if his works were closed, he would send a petition to the Home Secretary from Seaham tradespeople. [118] Angus Smith decided that the work should be allowed to continue to operate during westerly winds, during the day only.[119]

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[117]Intermediate R.A.I for proceedings during 1876 (c.165), p.5 (1876), xvi.1. In her study of the modern environmental health officers, Bridget Hutter discovered that officers were liable to be less stringent with the regulated when the offender's business was central to the economic well-being of the geographical area. See Hutter, *The Reasonable Arm of the Law?*.
[118]P.R.O., MH16/1, Brereton Todd to Angus Smith, 17th February 1880.
[119]P.R.O., MH16/1, Angus Smith to the L.G.B, 17th February 1880.

Therefore, the pollution of the sea by acid emissions was permitted. Brereton Todd, inspector for the eastern district received further correspondence from the manager of Seaham Chemical Company. This letter requested technical advice, and assured the inspector that new condensers would completed in ten weeks. Furthermore,

> Since our accident we are thankful to say we have had a prevalence of westerly winds and have been stopped very little. This morning our furnaces were stopped as the wind had got round to the east, we have however set them away again on the wind changing. Although we are aware we are not at present working according to the strict wording of the act we are however acting up to the spirit of it, in so much as we avoid running the chance of doing any damage. You may rest assured we will get right as speedily as possible for the wind is fickle and occasional stops even are very objectionable.[120]

However, Smith's exercise of discretion was overruled by the Local Government Board, on the grounds that his decision was illegal.[121] The Seaham Chemical Company was thus ordered to stop working until the appropriate condensing equipment had been installed.[122]

Therefore, the inspectorate's enforcement approach was based upon a type of 'cost/benefit' analysis. The economic cost of strict regulation was weighed against the environmental damage that was being inflicted upon the surrounding area. The economic cost of strict enforcement was often perceived to be too great by inspectors and they

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[120]P.R.O., MH16/1, Messers Watson and Co., Seaham Chemical Co. to Brereton Todd, 11th February 1880.
[121]P.R.O., MH16/1, L.G.B to Angus Smith, 20th February, 1880.
[122] The issue of exemption in practice is interesting, as a different picture is painted by the then Chief Inspector, Alfred Fletcher, in his Annual Report for 1886. 'The result of each visit and test is duly reported, those in excess of the limits fixed in the Act are very few. When such occur they are usually the result of some temporary derangement of the apparatus, or slight accident, which is corrected as soon as discovered. On no occasion is a known emission of an excessive quantity of noxious gas allowed to continue.' See the 23rd R.A.I, for proceedings during 1886 (c.5057), p.8 (1887), xvii.1.

utilised discretion to avoid the letter of the law. [123] Angus Smith believed that discretion was central to the enforcement approach. He argued that:

> ...we must remember that there must be discretionary power. It would be unfair to make a general law fixing the meaning of a nuisance to be the same in all conditions. Why should a manufacturer established in a deserted part of the country be treated like one in a crowded thoroughfare? Or when no one complains, or, rather, when no one is hurt, why should the mere formality of keeping a law be observed? [124]

Therefore, inspectors often assessed and balanced environmental and economic factors before making enforcement decisions, thus attempting to reach a compromise.[125]One year prior to his death, Angus Smith made an empassioned defence of discretionary enforcement. He repeated that it was absurd to demand the same level of compliance of all manufacturers, despite differing environmental conditions. Smith continued,

> Some discretion must be allowed to the administrators of law regarding nuisance. Discretion is often exercised even when illegal and it has the appearance of carelessness in one case and despotism in another. The more that medical and

[123]Crucially, Fletcher commented to the Royal Commission that, 'In treating with a manufacturer, it should never be forgotten that his works are established not to condense gases, not to suppress vapours, but to make money, and all fancy processes which interfere with this result stop the works, and thus defeat their own object.' R.C.N.V (1878), PP.xliv.Qs 6743, 6859, p.?. Neil Gunningham has contended that the strict enforcement of pollution law is unacceptable because it 'would attack the very root of capitalism (profit making and the self expansion of capital, large and small).' Therefore, economic considerations will always appear more reasonable than the demands of those affected by pollution, and pollution law will be drafted and enforced in a way that does not effect economic interests. See Gunningham, *Pollution, Social Interest and the Law*, p.83.

[124]8th R.A.I for proceedings during 1871 (c.582), p.5 (1872), xvi.1. Smith also made similar comments in his 3rd R.A.I for 1866 (c.3792), p.53 (1867) xvi.1. In Napoleonic France, a decree categorised noxious businesses into 212 types and enacted regulations about where such trades could be carried on, in relation to urban areas. See *The Times*, 12th May 1862, 8e.

[125]For discussion about the extent of inspectors' dedication to environmental protection see chapter two.

other inspectors learn the more will they be able to act according to circumstances. The hard expressions brought into laws and not meant to be carried out are to be objected to. In order to avoid the extreme demands of the law there is frequently an inclination to prove absolute innocence when it is well known that such does not exist. Allowance must be made for graduation of offence.[126]

Therefore, compliance was not a black and white issue for the Alkali Inspectorate. Smith and his successors believed that they should be able to utilise their discretion to define the level of compliance that was expected in each individual case, and often this was not necessarily the strict adherrence to legal rules by the manufacturer.

4.3: Summary

Therefore, the enforcement approach adopted by the world's first central government anti-pollution agency displays all of the characteristics of the 'compliance' type of enforcement approach. One commentator has noted that modern British pollution control relies upon persuasion and voluntary agreements to a greater extent than any other industrialised democracy. The roots of this tradition were sown by Angus Smith and his successors.[127]

The advisory approach adopted by alkali inspectors was characteristic of many nineteenth-century government inspectorates. The first adviser on mines, H.S Tremenheere advocated conciliation rather than coercion[128], as did the Chief Inspector of

[126]P.R.O., MH16/1, Angus Smith to the Local Government Board, 13th April 1883.
[127]Vogel, 'Cooperative Regulation: Environmental Protection in Great Britain', p.83.
[128]Oliver MacDonagh remarks that 'Tremenheere's conception of the inspector's utility...was that of teaching by superior knowledge and soft words, rather than coercion.' See MacDonagh, O.O.G.M., 'Coal

Factories, Alexander Redgrave.[129]In the 'Instructions for Inspectors', Education Inspectors were directed to act only as a stimulus to a school and to draw attention the evils observed.[130] Therefore, to an extent, Angus Smith and his successors were following a precedent when they selected the tactics of 'negotiated compliance.'

However, this precedent is not coincidental. It appears that 'negotiated compliance' was the way that the State's agencies could best regulate trade. This approach did not depress profit margins and job opportunitities, whilst at the same time it increased protection of the general public (legislation on factories and mines), the environment (the Alkali Acts), satisfied interest groups and encouraged the acquiescence of manufacturers.

The tradition of negotiated compliance was also suited to the constraints under which these inspectorates operated. Low levels of budget and manpower, in conjunction with various legislative constraints made the prosecution of offenders an unattractive option. This is a crucial issue which will come under the spotlight in chapter six.

Mines Regulation: The First Decade 1842-1852', in *Ideas and Institutions of Victorian Britain*, ed. by Robson, R. (London: Bell, 1967), pp.58-86 (p.64).

[129]Redgrave stated in his 1876 report to the Home Office that, 'In the inspection of factories it has been my view always that we are not acting as policemen, ... that in enforcing this Factory Act, we do not enforce it as policemen would check an offence which he is told to detect. We have endeavoured not to enforce the law, if I may use such an expression, but it has been my endeavour ... that we should simply be the advisors of all classes, that we should explain the law and that we should do everything we possibly could to induce them to observe the law, and that a prosecution should be the very last thing we should up.' Quoted in Carson, 'The Conventionalisation of Early Factory Crime', p.52.

[130]Inspectors were instructed that .'..you are in no respect to interfere with the instruction, management or discipline of the school, or to press upon them any suggestion which they may be disinclined to receive...this inspection is not intended as a means of exercising control, but of affording assistance.' Quoted in Hartley, 'Inspectorates in British Central Government', p.448.

Whilst the preceding discussion has focused upon the nature of the enforcement approach adopted by the Alkali Inspectorate, the following chapter will assess the role of prosecution - the end point of the enforcement process.

Chapter Five: Prosecution

5.1: Introduction

It was contended in the preceding chapter that the alkali inspectors possessed two main enforcement strategies; namely persuasion and prosecution.[1] As the conciliatory tactics utilised by the Alkali Inspectorate have already received adequate attention, the following discussion will scrutinise the place of the legal sanction within the enforcement process.[2]

The Alkali Act,1863 stated that in England and Wales penalties for offences were recoverable through a criminal action brought in County Court.[3] Any legal action was to be initiated within three months of the occurrence of the detected offence, and any penalty recovered was deemed to be a debt due to the Chief Inspector.[4] The penalty for the emission of any amount of hydrochloric acid that exceeded five percent was set at:

> ...not exceeding fifty pounds; and in respect of every offence after a previous conviction, not exceeding one hundred pounds: provided always, that no such owner shall be convicted of more than one such offence in respect of any one day.[5]

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[1]The early factory inspectorate possessed the same enforcement options. See Bartrip and Fenn, 'The Administration of Safety', p.95.
[2]It should be noted that the Alkali legislation did not immunise manufacturers from civil liability.
[3]The Alkali Act, 1863, (26 & 27 Vict. c.124) PP.1863.i.61, p.71, s.14. In Scotland, cases were to be heard by the County Sheriff. Upon non-payment of the penalty or costs imposed, offenders could be imprisoned for up to six months. In Ireland, penalties were recoverable by Civil Bill at the instance of the inspector, with the sanction of the Irish Board of Trade (later the Irish L.G.B). See The Alkali Act, 1863, (26 & 27 Vict. c.124) PP.1863.i.61, p.72, s.15 & 16.
[4]The Select Committee of 1862 recommended the appointment of an inspector with sole powers of prosecution and appeal. However, in the face of opposition from manufacturers these dictatorial powers were modified. See MacLeod, 'The Alkali Acts Administration 1863-1884', p.93. The Bill of May 1863 was amended in the House of Lords. Offences were to be tried in County Court with a jury and right of appeal, rather than in Quarter Sessions without a jury. See PP.1863, p.63, s.12. For the powers of the inspector regarding prosecution see the Alkali Act, 1863, (26 & 27 Vict. c.124) PP.1863.i.61, p.71, s.14.
[5]The Alkali Act, 1863, (26 & 27 Vict. c.124) PP.1863.i.61, p.68, s.4. Before amendment in committee, the Bill of May 1863 attached a penalty to continuing offences. The penalty was set at a maximum of £30, with

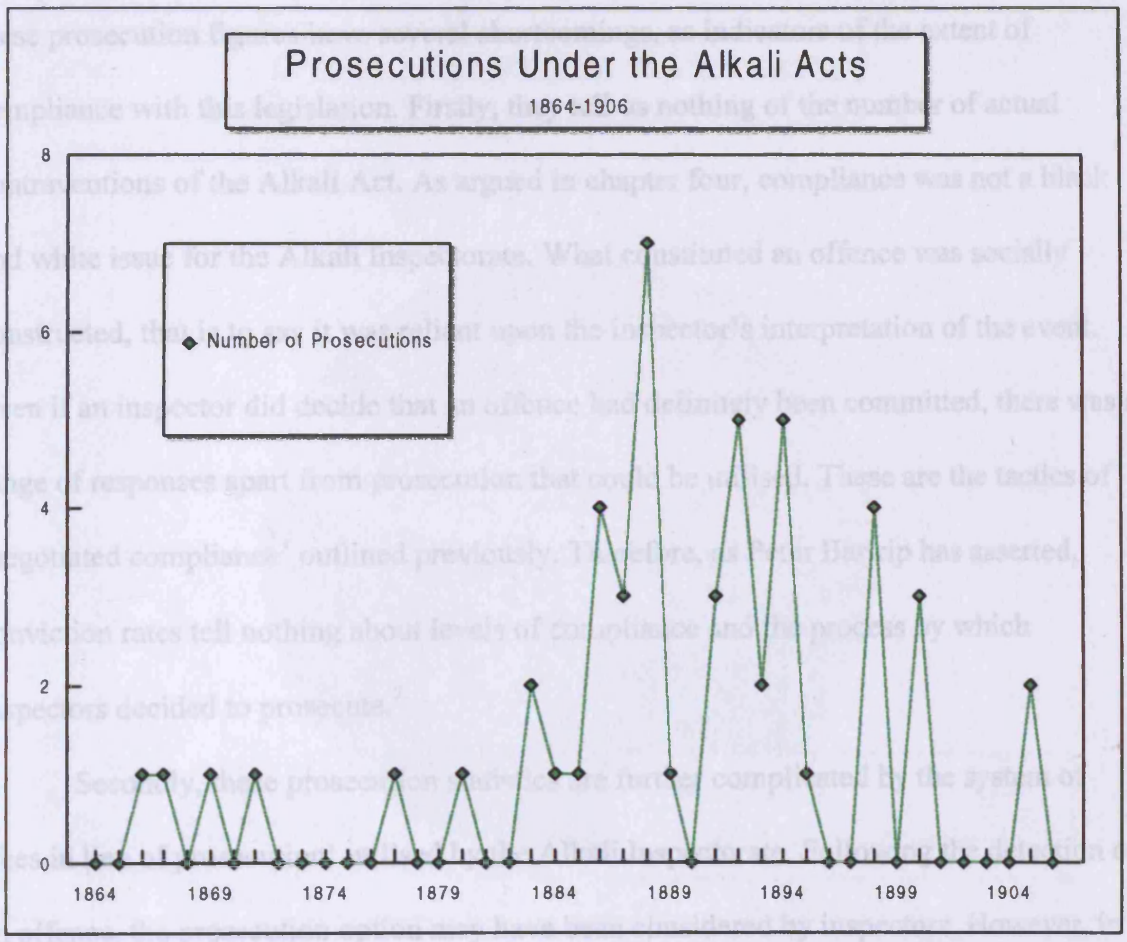
These penalties were little altered throughout the period under analysis, although many other chemical manufacturing processes were added to the schedule and the penalty clauses of the Alkali legislation.[6]

It has been asserted in chapter four that the early Alkali Inspectorate utilised an approach of 'negotiated compliance' in the enforcement of the Alkali Acts in late Victorian Britain. Inherent in this approach was the use of prosecution only as a last resort. Despite the existence of set emissions standards for some gases and the obvious nature of offences, which may have made prosecution an attractive option, legal action against offenders remained a rarely invoked sanction. An analysis of existing statistics of prosecutions initiated by the Alkali Inspectorate bolsters this assertion (see figure seven).

£5 for every day during which the alkali work was carried on in contravention of the section. This penalty was removed before the final draft of the Bill, in July 1863.

[6]Section five of the Alkali Act of 1874 stated that owners of works must also use the 'best practical means' to prevent the emission of noxious vapours. The penalty attached to this clause was twenty pounds for the first offence, and fifty pounds for the second offence. A further sum of two pounds was chargeable for every day during which the offence continued. See the Alkali Act, 1863, Amendment 1874 (37 & 38 Vict. c.43) PP.1874.1.17, p.20, s.5. In 1881 the penalty for every day that the offence continued was raised to five pounds a day. See the Alkali, e.t.c., Works Regulation Act, 1881 (44 & 45 Vict. c.37) PP.1881.1.25, p.28, s.4. In 1892, a penalty of five pounds a day was attached to the offence of operation without a registration certificate, see the Alkali, e.t.c., Works Regulation Act, 1892 (55 & 56 Vict. c.30) PP.1892.1.67, p.69, s.6. In 1906, this penalty was increased to fifty pounds, Alkali, e.t.c., Works Regulation Act, 1906 (6 Edw. 7 c.14) PP.1906, p.6, s.8.

Figure Seven



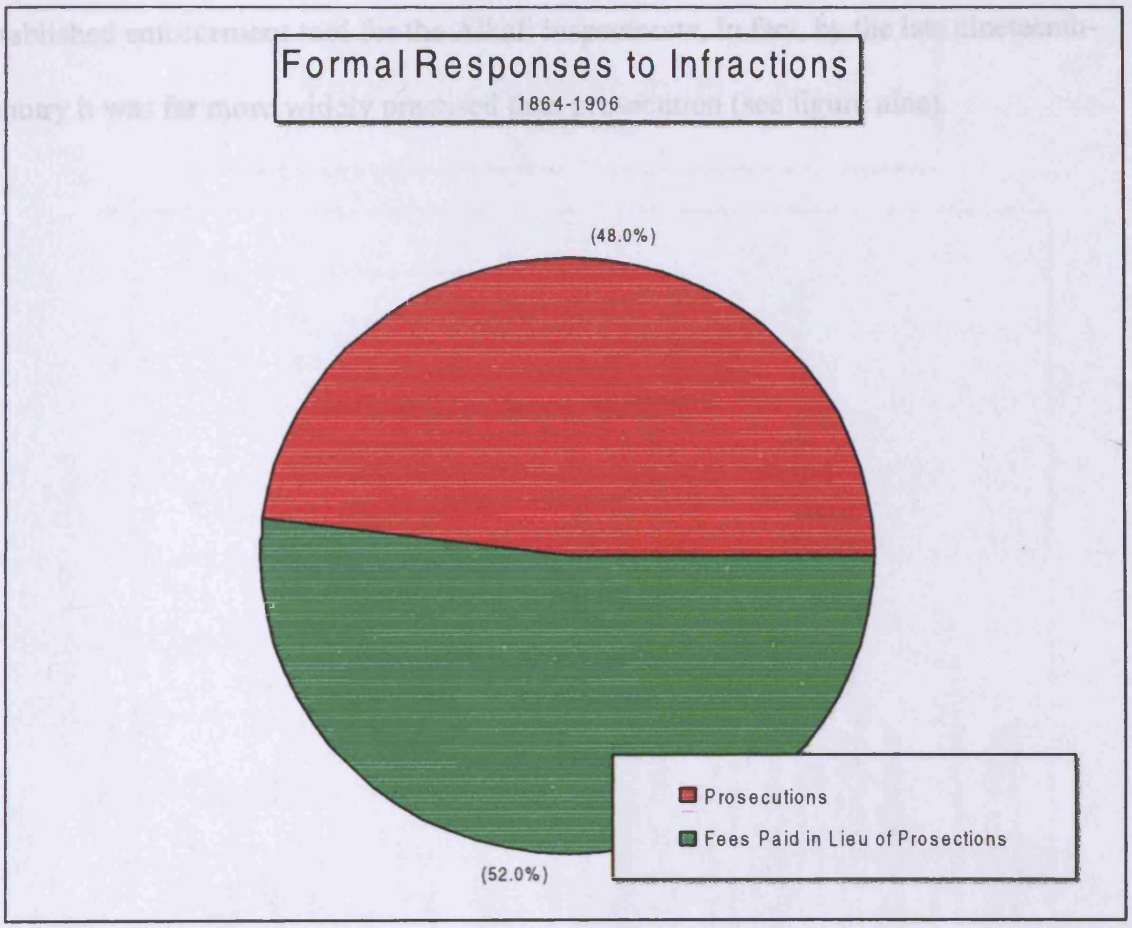
Taken from statistics given in the Annual Reports of the Chief Inspector 1864-1907.

As figure seven indicates, the annual number of prosecutions remained low throughout the period under consideration, reaching a high point of only seven in 1888. However, these prosecution figures have several shortcomings, as indicators of the extent of compliance with this legislation. Firstly, they tell us nothing of the number of actual contraventions of the Alkali Act. As argued in chapter four, compliance was not a black and white issue for the Alkali Inspectorate. What constituted an offence was socially constructed, that is to say it was reliant upon the inspector's interpretation of the event. Even if an inspector did decide that an offence had definitely been committed, there was a range of responses apart from prosecution that could be utilised. These are the tactics of 'negotiated compliance' outlined previously. Therefore, as Peter Bartrip has asserted, conviction rates tell nothing about levels of compliance and the process by which inspectors decided to prosecute.[7]

Secondly, these prosecution statistics are further complicated by the system of 'fees in lieu of prosecution' utilised by the Alkali Inspectorate. Following the detection of an offence, the prosecution option may have been considered by inspectors. However, in cases where the offender admitted the offence and agreed to pay the penalty attached to the infraction, then the Chief Inspector would exercise his discretion and halt legal proceedings. Hence the offender was only punished in a relatively minor way. This 'bargaining' procedure was common. In fact, the system of 'fees in lieu of prosecution' was used in 52% of formal responses to infractions in the sample for the period 1864-1906 (see figure eight).

[7]Bartrip, P.W.J., 'Success or Failure? The Prosecution of the Early Factory Acts', *Economic History Review*, 38 (1985), 423-427, p.424.

Figure Eight

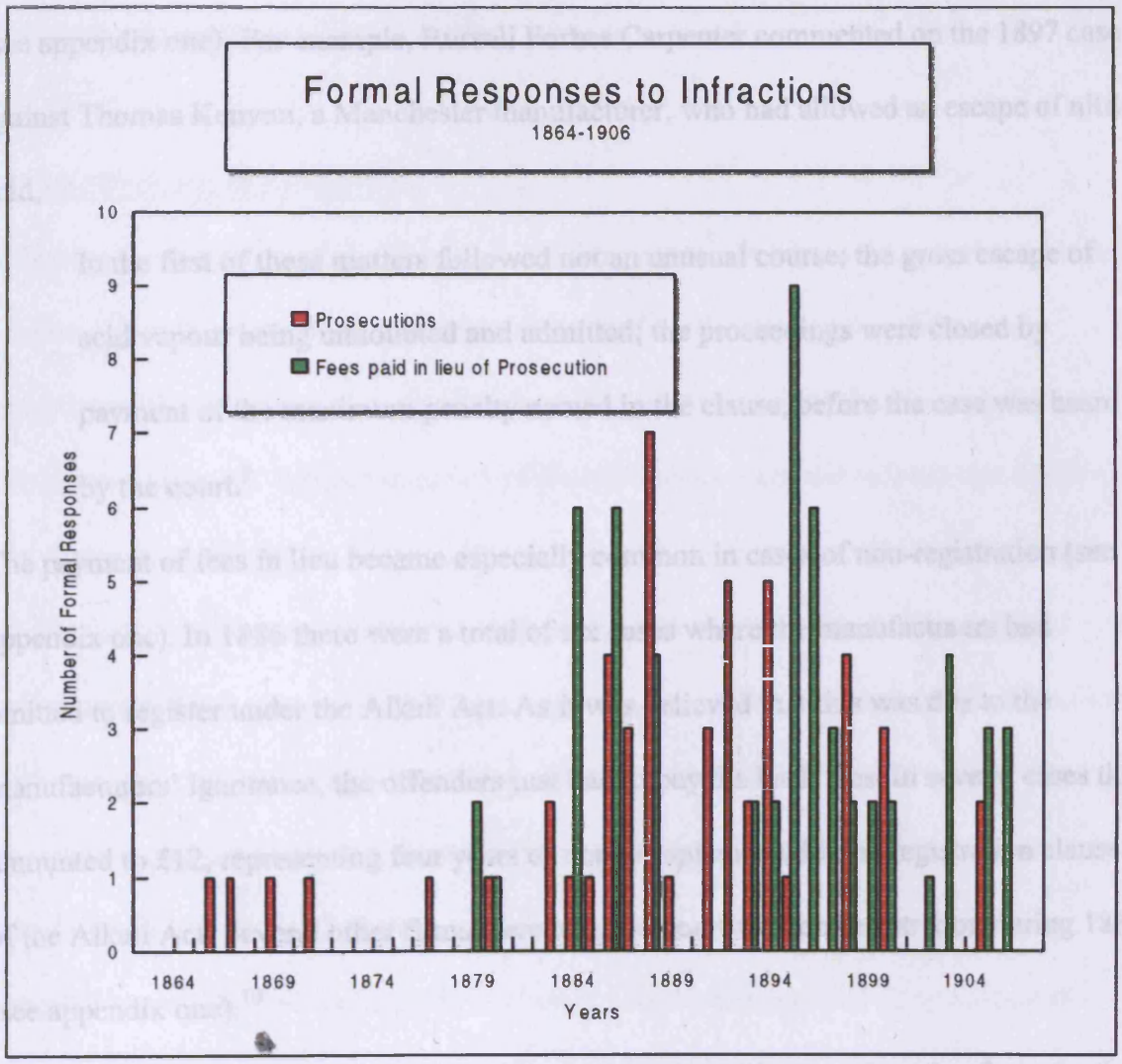


Taken from the Annual Reports of the Chief Inspector 1864-1907.[8]

[8]There are a total of 102 cases noted in the reports; 49 of which were dealt with by prosecution, whilst the remaining 53 were settled by the payment of a fee or a penalty in lieu of a criminal prosecution.

It should be noted that this procedure of 'fees in lieu of prosecution' became more widely practised towards the end of the period under analysis, indicating that it had become an established enforcement tool for the Alkali inspectorate. In fact, by the late nineteenth-century it was far more widely practised than prosecution (see figure nine).

Figure Nine



Taken from the Annual Reports of the Chief Inspector 1864-1907.

The payment of a fee in lieu of prosecution occurred in all types of cases, including those of the failure to use the best practical means to prevent noxious emissions (see appendix one). For example, Russell Forbes Carpenter commented on the 1897 case against Thomas Kenyon, a Manchester manufacturer, who had allowed an escape of nitric acid,

> In the first of these matters followed not an unusual course; the gross escape of acid vapour being undoubted and admitted; the proceedings were closed by payment of the maximum penalty named in the clause, before the case was heard by the court.[9]

The payment of fees in lieu became especially common in cases of non-registration (see appendix one). In 1886 there were a total of six cases where the manufacturers had omitted to register under the Alkali Act. As it was believed that this was due to the manufacturers' ignorance, the offenders just had to pay the back fees. In several cases this amounted to £12, representing four years of non-compliance with the registration clause of the Alkali Act. Several other firms were taken to court for non-registration during 1886 (see appendix one).[10]

Despite these statistical difficulties, this chapter will assess the role of prosecution in the enforcement approach adopted by the Alkali Inspectorate. Although prosecution

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[9]34th R.A.I., for proceedings during 1897 (c.141), p.9 (1898), xiii.221. Russell Forbes Carpenter mentions several instances of this type. For example, the cases against H.J. Fenner (1897) and The Commercial Gas Company (1897), and all four cases listed in the Annual Report for 1906 were settled in this way. See the 34th R.A.I., for proceedings during 1897 (c.141), p.9 (1898), xiii.221, and the 43rd R.A.I., for proceedings during 1906 (c.161), p.9 (1907), ix.219.

[10]23rd R.A.I., for proceedings during 1886 (c.5057), p.8 (1887), xvii.1. Alfred Fletcher further commented that 'in six other cases where it was believed that the omission to register resulted from ignorance manufacturers have been allowed to pay the registration fees due on account of the past years in which they had been omitted.' See P.R.O., MH16/3, Alfred Fletcher memorandum, 27th March 1889.

was an atypical response to detected infractions, this issue deserves detailed attention, as discretionary decision-making, case assessment and selection provides a valuable insight into nineteenth-century pollution control.

5.2: The Decision to Prosecute

Following the detection of an offence, every alkali inspector was faced with the decision whether or not to recommend a prosecution to the Chief Inspector.[11] It should be remembered that inspectors laboured under various resource-related and legislative constraints which discouraged their use of prosecution as a general enforcement policy (see chapter six). However, in individual cases prosecution was considered as an option, but this consideration was dependent upon certain conditions. Peter Bartrip and Paul Fenn have analysed the factors which played a role in these crucial decisions, and their findings have been suggestive. According to these commentators, nineteenth-century factory inspectors based their prosecution decisions upon their perception of the offender's attitude towards the law. Under these circumstances, prosecutions became largely restricted to cases where the 'compliance' tactics of advice, negotiation and repeated warnings had failed to secure adherence to legal standards, or to cases where there was an obvious victim. Hence, these offences were perceived as willful and deliberate breaches of the 'code of honour' between regulator and regulated.[12] Therefore, the concepts of

[11]The final decision regarding the prosecution of offenders lay entirely with the Chief Inspector. See Angus Smith's evidence to the R.C.N.V (1878), Minutes of Evidence, PP.1878.xliv.43, Q.12,300, p.533.
[12]Bartrip and Fenn, 'The Evolution of Regulatory Style in the Nineteenth-Century British Factory Inspectorate', p.205. Such findings are in line with those of modern social scientists. During his study of the Government Wages Inspectorate in the period 1966-1976, Beaumont found that prosecution was perceived to be a last resort measure, taken in cases where employers were found to be deliberately obstructionist, awkward or unco-operative. See Beaumont,'The Limits of Inspection: A Case Study of the Workings of the Government Wages Inspectorate', p.214. In addition, Richardson *et al's* study of contemporary trade

mens rea[13] and moral culpability have been given a central position in the decision making process. In the late twentieth-century context, W.G Carson has asserted that the prosecution decisions taken by the factory inspectorate were based as much upon perceptions of moral liability than upon the seriousness of the actual offence committed. He has demonstrated that, in the late 1960s, strict liability rules in factory legislation were enforced so that only those considered morally culpable were prosecuted. Carson has contended,

> It would seem that the informal rules governing attitudes of occupiers and the promptness of their response to pressure from the inspectorate plays a crucial part in the determination of appropriate enforcement decisions. Relatively serious offences escaped severe action when these rules were not breached; comparatively minor ones could provoke legal proceedings when they were. The methods adopted by the inspectorate to secure compliance could depend as much on an employer's position in respect of these unwritten 'constitutive norms' as upon the substantive nature of his offences against the Factories Act.[14]

Such assertions can be readily applied to the enforcement of the Alkali Acts in Victorian Britain. This study suggests that the concept of moral culpability was so powerful that even serious offences could escape prosecution by the Alkali Inspectorate. A clear example of this is found in the 1879 case concerning Messrs Snape and Company of the

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effluent officers discovered that prosecutions were only initiated in cases where a firm's attitude towards pollution control was perceived as unsatisfactory. See Richardson *et al*, *Policing Pollution*, p.215.

[13]An act committed 'with a criminal/guilty mind.'

[14]Carson, 'White Collar Crime',p.394.

Phoenix Alkali Works, Widnes (see appendix one). In September 1879, Angus Smith reported details of the detected offence at this works,

> At the works of Messers Snape & Co. of Widnes a constant aspiration was applied and an average escape of more than 0.2 of a grain [of hydrochloric acid] per cubic foot of chimney gases [the legal limit] was found in a time of more than a week. Mr. Snape is a careful man, but he was absent from home and when he returned and heard the result he stopped the works immediately and began the necessary changes - so I do not fear him. Still the arrangements for men on apparatus must have been defective. Mr. Fletcher [the district inspector] pleads for him as having been careless. Still I do not remember a case like this when the constant aspiration was used, and prefer to advise an action.[15]

Therefore, Smith's rationale for seeking permission to instigate a prosecution was the serious nature of the offence, rather than the moral culpability of the offender. George Sclater-Booth, then President of the L.G.B, was initially unwilling to launch proceedings.[16] However, his Permanent Secretary, John Lambert persuaded him to sanction legal action against Messers Snape, with the comment that

> You know how often it has been alleged that the Inspector omits to take proceedings, and you will be able to say whether or not Messrs Snape should be allowed to escape on the present occasion...[17]

[15]P.R.O., MH16/1, Angus Smith to the L.G.B, 18th September 1879.
[16]P.R.O., MH16/1, George Sclater-Booth to John Lambert, 22nd September 1879.
[17]P.R.O., MH16/1, John Lambert to George Sclater-Booth, 26th September 1879.

Crucially, almost immediately following authorisation to initiate proceedings[18], the Chief Inspector began to present the offender as unfortunate, and to plead mitigating circumstances on Thomas Snape's behalf. Angus Smith contended that Snape was

> ...in great anxiety and the disgrace of being brought before a court is apparently making him ill.[19]

Angus Smith also suggested the imposition of a mitigated penalty in this case, stating that,

> So far as I see the matter must come to the court but I see no reason for making the penalty large : if a mitigated penalty could be paid to the court without the full openness of a trial I should not object, because there would still be publication of the fact, but I suppose that the mitigation can be made only by a judge in open court.[20]

Hence, Angus Smith expressed concern regarding the deterrent effect of prosecution, wishing for 'publication of the the fact.' Yet, he believed that prosecution in this particular case would be inappropriate. Smith commented that

> ...having been so much blamed for clemency I have no desire to compensate by an act of cruelty.[21]

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[18]P.R.O., MH16/1, J.F Rotton, Assistant Secretary at the L.G.B, to Angus Smith, 4th October, 1879.
[19]P.R.O., MH16/1, Angus Smith to the L.G.B, 14th October, 1879.
[20]ibid. Interestingly, the modern Alkali Inspectorate operates in a similar way. Matthew Weait has shown that the modern Alkali inspectorate operates in a similar way. He has argued that, 'the decision whether or not to recommend further action is made within a framework constructed from the inspector's perception of the work and its circumstances. The decision not to recommend prosecution is justified by presenting the offender as unfortunate and in need of help. Although such behaviour cannot be 'overlooked', its moral character is interpreted leniently.' See Weait, 'The Letter of the Law?, p. 65.
[21]P.R.O., MH16/1, Angus Smith to the L.G.B, 14th October 1879.

The Chief Inspector's change of heart seems to have stemmed from further correspondence received from Snape. The beleaguered manufacturer had written expressing deep remorse regarding the offence, and offering further circumstances for Angus Smith's consideration,

> The cause was not only purely accidental, but was very difficult to trace to its source, arising as it did from acid which had slowly accumulated during a long period, at the bottom of the condensers. This acid had percolated through the ground, and suddenly broken through into a flue. The moment we discovered the excessive escape of gas, we at once endeavoured to find out the cause. But as we naturally supposed it came from the furnaces or imperfect condensation some days elapsed before we discovered the real cause. We then, immediately constructed new flues, and at considerable expense made other alterations.[22]

Snape further stressed his previously unblemished record of compliance with the Alkali Acts, and claimed that the company had spared neither energy nor money in the pursuit of low emissions tests,

> When we took the works three years ago we spent several thousands of pounds, in order to make the plant efficient, and a large amount of this was expended with the view of carrying out the requirements of the Alkali Act. Since then we have not spared expense in the same direction, having during the last winter spent upwards of £350 in improving our well, so that there might be a superabundance of water for condensing purposes.[23]

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[22]P.R.O., MH16/1, Thomas Snape to Angus Smith, 10th October 1879.
[23]ibid.

Yet, such pleas for leniency from both the Chief Inspector and the manufacturer did not persuade the L.G.B to drop legal proceedings. The Permanent Secretary of the L.G.B, John Lambert, wrote to its President, George Sclater-Booth, regarding the Snape case and the prosecution of another Widnes firm. Lambert commented that,

> The Board regret the majority of proceedings in these cases but so much blame has been incurred by the supposed indisposition of the Board to enforce the provisions of the Act that they do not feel justified in dispensing with these actions.[24]

Criticism of the lack of prosecutions under the Alkali Act in the Royal Commission report of the previous year, had urged John Lambert towards a policy of prosecution.[25] In the light of these developments, Thomas Snape visited Smith's Manchester laboratory, and sent a further desperate plea for leniency. Snape asked Smith to use his influence to reduce the penalty to a nominal sum. The manufacturer again emphasised his good intentions regarding future compliance, informing Smith of the new pollution abatement equipment that had been installed at the Phoenix Works,

> The expense of doing this is very great, and we are doing it to prevent to our utmost the slightest transgression of the Alkali Act, though otherwise we do not expect to receive any advantage from this large outlay.[26]

This letter persuaded the Chief Inspector to accept the payment of the fine in full (£50) and costs to stop the legal proceedings against Thomas Snape. This pacified both the

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[24]P.R.O., MH16/1, John Lambert to George Sclater-Booth, 22nd October 1879.
[25]The Commissioners commented that the policy of non-prosecution 'at first expedient, has been unnecessarily prolonged.' See R.C.N.V (1878), PP.1878.xliv.1, Q.32, p.16.
[26]P.R.O., MH16/1, Thomas Snape to Angus Smith, 14th November 1879.

manufacturer and Smith's superiors at the L.G.B.[27] Angus Smith commented on this case that,

> Had the matter gone to court I should very gladly have done my part in diminishing the fine, but I have told Mr. Snape that I do not think it is the part of the Board much less of the inspectors to mitigate the penalty although the opinion of the latter might be taken in cases as representing the Board.[28]

Smith's actions in this case reveals the crucial point that the detection of a serious offence did not assure prosecution under the Alkali Acts. As the manufacturer exhibited sufficient remorse and promised future compliance, he was regarded as unfortunate and in need of assistance, rather than morally culpable. The Chief Inspector responded by being as lenient as he could have possibly been, under the circumstances.[29] This indicates again that the alkali inpectors wished to see a willingness to comply, rather than the strict adherence to legal rules on the part of manufacturers.

There are instances throughout the inspectorate reports of cases where emissions standards repeatedly exceeded those set out in the Alkali Acts, yet prosecution was not considered a suitable option. In his 1873 report, Dr. Hobson, sub-inspector for the middle district, listed repeated escapes of hydrochloric acid of over five per cent per cubic foot of

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[27]The lenient treatment of Thomas Snape obviously engendered good feeling towards the Alkali Inspectorate. Whilst member of Parliament for Widnes he visited the President of the L.G.B in order to praise Alfred Evans Fletcher, and request that the Board retain the Chief Inspector's services. See P.R.O., MH16/4, Hugh Owen to the President of the L.G.B, 21st January 1893.

[28]P.R.O., MH16/1, Angus Smith to the L.G.B, 16th November 1879.

[29]Angus Smith's attempts to shield the manufacturer in this case link in with Paulus's comments on the enforcement of the Food and Drugs Acts. Paulus has contended that 'the high status of possible law breakers ensured that the enforcement of their law breaking was fraught...with reluctance on the part of primary and secondary law enforcers to invoke the existing legal machinery against them. The chances for effective law enforcement were *minimised* at crucial stages in order that the offender's *status* was not degraded.' Paulus, I., *The Search for Pure Food: A Sociology of Legislation in Britain* (London: Martin Robertson and Co., 1974), p.117.

chimney gases, which was the legal threshold. For example, infractions had occurred repeatedly throughout the year at alkali works number forty two (works were identified by number not name, in order to assure anonymity). Hobson's only comment was that the annual report for this work:

> ...gives an average escape of 2.53 per cent. The first large escape was on the 7th of January, this was no doubt caused by an insufficient supply of water on the condensers. For other excessive escapes I could not find any satisfactory reason at all. I made every inquiry, and did everything I could to get solution of the mystery as to why the escape should vary so much and so rapidly, but all my efforts were vain, and I am still unable to account for it.[30]

Later in the his district's annual report for 1873, John Hobson reported on work number one hundred and twelve. Crucially, fifty percent of the emissions tests made during the year exceeded the five per cent limit for hydrochloric acid emissions that was set in 1863. In fact, they ranged from between 5.60% - 9.18% in February, and reached 7.84% in May. The annual average for this works even exceeded the five percent limit (5.07%). Dr. Hobson remarked that:

> ...this is a very small work, in fact the smallest under my inspection. It has ever since the commencement worked very irregularly, being stopped first for one thing then another. Moreover during the year the owner has died. I have made many visits besides those I mention, but on account of the frequent stoppages and

[30]Appendix to the 10th R.A.I., for proceedings during 1873 (c.1071), p. 402 (1874), xxv.395.

other reasons I have not been able to ascertain the amount of acid escaping except on the above mentioned dates.[31]

Dr. Hobson's comments suggest that inspectors were concerned with problem solving and results, rather than punishment and prosecution.

The Alkali Inspectorate also tended not to initiate legal proceedings when infractions were perceived as the result of either accident or ignorance of the requirements of the legislation. Under these circumstances, even if the detected offence was a serious infraction, the offender could not be held to be morally culpable and deserving of punishment. In his fourth annual report, Angus Smith reported an 'accident' at number nine works, in the following terms,

> On June 19th I saw a great escape of acid vapour from the chimney - on searching for the cause I found a hole in the arch of the roasting furnace - two bricks had fallen in; the manager had been away owing to ill health, and the furnace had been allowed to go too long without repairs. As it was plain that this escape of acid was occasioned by a sudden accident, and was set right again immediately, no action was taken against the firm.[32]

Manufacturers often claimed to be ignorant of the occurrence of offences, in order to avoid being branded 'morally culpable.' A common tactic was to blame the offence upon disobedient workmen.[33] For example, in 1883, Angus Smith commented on hydrochloric and sulphuric acid escapes at works number 107, that,

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[31]ibid, p.404.
[32]4th R.A.I., for proceedings during 1867 (c.3988), p.21 (1868), xviii.1.
[33]Such claims were legally sanctioned. Section five of the first Alkali Act of 1863 held that the owners of works were to be held liable for offences and the penalties attached in the first instance. However, an owner was entitled to 'have any agent, servant or workman whom he shall charge as the actual offender brought by

> With regard to the high tests of muriatic acid, prosecution was threatened, but on improvements with a view to prevent a recurrence of high escapes being carried out, it was considered that more time might be allowed for amendment. It was impossible to view these excessive escapes in any other light but that of carelessness on the part of those in charge of the process, and an action could have been brought accordingly. However, the circumstances were of such an exceptional character as to call for sympathy with those officially responsible, whose orders had been repeatedly disobeyed.[34]

In another case during 1896, an Alkali Inspector was obstructed in the course of his duty.[35] After the works had been passed for registration on the basis of plans supplied by the manufacturer, by-pass pipes were installed. These prevented the inspector from examining various effluent gases. On these grounds, proceedings were instituted against G. Millard, a carbon bisulphide manufacturer of Clayton, near Manchester (see appendix one). The then Chief Inspector, Russell Forbes Carpenter commented that proceedings were dropped in this case because the proprietor argued that he was completely ignorant of the deception. He alleged this was practised by his manager. The Chief Inspector later said,

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due process of law before the court at the time appointed for hearing the case against such owner.' If the owner could prove to the Court that the 'agent, servant or workman had committed the offence in question without his knowledge, consent, or connivance', then the workman would be convicted, and would become liable for any penalties set. The Alkali Inspector was also empowered to proceed against any workman believed to be the offender, without first proceeding against the owner. See Alkali Act, 1863, (26 & 27 Vict. c.124) PP.1863.i.61, p.68, s.5.

[34]20th R.A.I. for proceedings during 1883 (c.4096), p.101 (1884), xviii.1.

[35]Under the terms of the Alkali Act, 1863, the offence of the obstruction of an inspector could automatically incur a maximum penalty of £10. The Alkali Act, 1863 (26 & 27 Vict. c.124) PP.1863.I.61, p.70, s.11.

> As, in consequence of the offence, "the agent, servant or workman" was discharged by the owner of the work, a warning was felt to have been given, and proceedings were withdrawn from the Court.[36]

Therefore, Millard escaped prosecution by taking rapid action which assured future compliance. The Chief Inspector also commented on this obstruction case that,

> It is much to be regretted that, after the publicity given to the two cases already alluded to, a third should have arisen, and I desire to emphasize the view expressed by my predecessor in office, that such conduct introduces a spirit 'much at variance with this open-handed confidence that has generally been maintained between the inspectors and the manufacturers.'[37]

However, the seriousness of the 'obstruction' charge was not sufficient to ensure the prosecution of the offender.

As implied above, inspectors often exhibited a concern that the instigation of legal proceedings would damage the cordial long-term relationships - the 'open-handed confidence' built up with manufacturers. For example, when discussing the prosecution of the Sheffield Chemical Company in 1899 (see appendix one), Carpenter commented that the district inspector's warnings had been disregarded by the management, and that the works had continued to operate even when an escape of acid had been discovered on the previous day. It was thought that either:

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[36] 35th R.A.I. for proceedings during 1898 (c.160), p.163 (1899), xi.133.
[37] 33rd R.A.I. for proceedings during 1896 (c.199), p.129 (1897), xvi.120.

> ...no proper system of communicating with the manager appeared to exist, or the matter was not considered of sufficient importance for anyone to wait to tell him of it.[38]

Such disregard of warnings could not be tolerated and legal proceedings were initiated. Carpenter further observed that,

> The duty was a very painful one for me to have to carry out, and I am glad to say that the relations of confidence between the inspector and the firm have been in no way impaired. It cannot be too strongly pointed out that unless this feeling of mutual confidence exists and is cultivated, inspection becomes much less efficient in protecting the interests of the public.[39]

As the Alkali Inspectorate were involved in the regulation of a long-term 'state of affairs', they were concerned that prosecution could alienate manufacturers, and discourage future compliance with the law.[40]

Decisions regarding moral culpability also hinged upon the offender's adherence to advice. In the eyes of the alkali inspectors, the continual disregard of their suggestions and warnings made the manufacturer morally culpable and deserving of legal punishment. Therefore, the Inspectorate tended to resort to prosecution when it was believed that the tactics of 'negotiated compliance' had failed. For example, Carpenter spoke of the prosecution of the Burndon Tar Company in 1899 (see appendix one) in the following terms,

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[38]36th R.A.I., for proceedings during 1899 (c.192), p.266 (1900), x.257.
[39]ibid.
[40]See Bartrip, 'Success or Failure? The Prosecution of the Early Factory Acts', p.424.

> I regret to say that the first name on this list has already once appeared in similar tables presented in former years. Very full warning was given, but protracted and deliberate neglect to re-erect and replace previously existing appliances could only be adequately met by commencement of proceedings. Mr. Porter [the district inspector] exercised much forbearance.[41]

The cases illustrate that alkali inspectors were most likely to prosecute in cases where their advice and warnings were continually disregarded by manufacturers.[42] In such cases, it was believed that only prosecution could secure future compliance with the law. In this way, Angus Smith commented in 1883 that alkali works number fifty three had continued to cause disruption,

> Eight times during the year has the Act limit for muriatic acid been exceeded. On one occasion an opening was discovered between the fire flue and that conveying the muriatic acid gas to the condensers, and thus a portion was passing direct to the chimney without being subjected to washing, the manager informed me that this must have been done by the men to secure a better draught on the furnace, the chimney test at the time was .32 [the legal level was .2 of a grain of muriatic/hyrochloric acid per cubic foot of chimney gas]. On the same date two high tests were found at another chimney, at an interval of four and a half hours, .27 and .38 respectively. On examining the condensers it was discovered that the

[41] 36th R.A.I., for proceedings during 1899 (c.192), p.265 (1900), x.257.

[42] In contrast, adherence to advice made prosecution unlikely, however serious the offence. For example, in 1903 it was decided not to prosecute a chlorine works in Edward Ballard's district, despite a serious nocturnal escape of acid gas. Carpenter commented that 'there is great vigilance exercised at the works in question, and every desire exists on the part of the management to minimise escapes of this gas which, indeed, is too valuable to be neglected.' 40th R.A.I. for proceedings during 1903 (c. 213), p.203 (1904), viii.193.

water supply had been turned off at the time when hydrochloric acid was being evolved in great quantity from a charge in the furnace. The directors were written to, but prosecution was delayed (although the work had repeatedly given trouble) on the understanding that greater care would be taken in future. In November, however, the escapes were again very irregular, and on the 28th, .44 of a grain of hydrochloric acid per cubic foot [of chimney gases] was found escaping from one of the chimnies [sic]. Under these circumstances, prosecution could be no longer delayed, and an action was accordingly brought.[43]

Therefore, the directors of this works had broken the 'gentleman's agreement' with inspectors by not complying in the allotted time, and a prosecution resulted.

The disregard of advice was also central to the prosecution of the Sutton Lodge Chemical Company in 1884 (see appendix one). In contravention of section five of the Alkali Act 1881, acid liquor was allowed to flow from their works and come into contact with drainage from alkali waste heaps.[44] In June 1884, the resident inspector, Edward Ballard informed the new Chief Inspector, Alfred Fletcher, that,

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[43]20th R.A.I. for proceedings during 1883 (c.4096), p.96 (1884), xviii.1. The prosecution of a Newcastle copper works number in 1883 was initiated by Angus Smith on similar grounds. He commented that 'this work has given cause for much anxiety, and has a very bad report Some very high escapes have been found in the chimney. There was a very similar report for last year. On several occasions a considerable quantity of chlorine was present in chimney gases, this occurred at the beginning of the year. Again on May 3rd, the test was .55 and on visiting the work at night on the 4th, .60 of a grain was found (the legal level was .2 of a grain); more time was given and no action was brought In November, however, .44 grain was discovered of muriatic acid, and it was felt that prosecution could not longer be delayed. An action was therefore brought. See the 20th R.A.I., for proceedings during 1883 (c.4096), p.107 (1884), xviii.1.

[44]This was a particularly serious offence, reflected in the fact that it carried the heaviest penalty set under the Alkali Act. Section five of the 1881 Act provided for penalties of fifty pounds for allowing acid liquor to come into contact with 'tank waste', one hundred pounds for any subsequent offence of this type and five pounds for every day that this offence continued. See the Alkali, etc., Works Regulation Act, 1881 (44 & 45 Vict. c.37) PP.1881.I.25, p.28, s.5.

> This is by no means the first time lately I have had to complain of the acidity of the drainage at these works. On the 6th, 8th, 9th and 21st I had to make similar complaints.[45]

In response to these allegations, the manager claimed that the escape was purely accidental. It was the result of a breakdown of an acid pipe to the stills, whilst a still was being changed.[46] The Chief Inspector asserted that,

> Mr. Gentles is clever at excuses, but when on 7th July, I, with Mr. Ballard, spoke with him on the subject he made none, admitting the whole offence, but throwing the blame on a workman. The complaint is not that some feebly acid liquor was run away but that on several occasions, notably on June 10th, a quantity of strong acid was allowed to flow causing a great nuisance.[47]

Alfred Fletcher received sanction to proceed against the Sutton Lodge Chemical Company,[48]and the offender was found guilty when the case was heard at St. Helens County Court in October 1884, despite the defence's contention that the foreman, Johnson, 'alone was liable', and that the escape was accidental.[49]

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[45]P.R.O., MH16/2, Edward Ballard to Alfred Fletcher, 16th June 1884.
[46]P.R.O., MH16/2, Sutton Lodge Chemical Company to Alfred Fletcher, 11th July 1884.
[47]P.R.O., MH16/2, Alfred Fletcher to the Secretary of the L.G.B, 16th July 1884.
[48]P.R.O., MH16/2, L.G.B to Alfred Fletcher, 29th July 1884.
[49]For further discussion of the legislative loopholes which made it difficult for the inspectorate to achieve convictions, see 6.3.

5.3: Case Assessment and Selection

As with all enforcement agencies of this type, the Alkali Inspectorate was involved in a process of selection regarding prosecution. This was particularly necessary in the light of the various constraints which made prosecution a difficult, expensive and time-consuming option (see 6.4). The exercise of discretion in decisions taken over which offenders to prosecute was explained in the following way by Angus Smith,

> It will be seen that I still keep to the policy of repression by advice and using little violence. This year [1870] such a system has been carried out perhaps more than previously, and the effect is on the whole good, although it has made a few less careful. The conclusion, therefore, is that it is good in some cases and not in others, and it is of course one of the most difficult duties of an inspector to decide which is the best mode of attaining the end.[50]

Therefore, Smith argued that the inspectorate should adopt whichever course would assure the greatest compliance in each particular case. Three types of justification were advanced by the Alkali Inspectorate to bolster their selective, discretionary and infrequent use of prosecution - deterrence, education and successful convictions. Firstly, the alkali inspectors were aware that prosecution possessed great deterrent power, especially in relation to the stigmatising effect that a prosecution could have on a 'respectable' manufacturer. Angus Smith also believed that a small number of successful prosecutions would maximise the deterrent effect of the law. In 1879, Angus Smith wrote to the L.G.B that,

[50] 7th R.A.I., for proceedings during 1870 (c.354), p.508 (1871), xiv.43.

> To be found fault with causes a most serious commotion. If trials were frequent this delicacy of feeling would disappear.[51]

Prosecution by the Alkali Inspectorate marked the gravity of the detected offence, precisely because it was a rarely invoked sanction. The shame of being singled out by the Alkali Inspectorate for legal action was seen as powerful enough to scare 'respectable' manufacturers into compliance.[52] The deterrent power of prosecution had two effects. If particularly serious or 'morally culpable' offences were subjected to prosecution, this would serve to deter repeated infractions by the manufacturer in question. Furthermore, prosecution also discouraged other manufacturers/potential offenders from contravening the Alkali Act. This is the theory of 'general deterrence.' In 1870, Angus Smith discussed a sharp increase of acid escapes in Runcorn and St. Helens,

> Perhaps I have done wrong to bring only one of them before a law court for infraction of the Alkali Act; but it was believed that by choosing the worst there would be a change effected amongst the others.[53]

The Chief Inspector maintained that not every escape of acid vapour which exceeded the statutory limit would be responded to with a prosecution. From three works in serious contravention of the legislation in Runcorn and St. Helens:

> ...only one alkali maker was proceeded against; he was chosen simply because he allowed most to escape and paid least attention to the advice given.[54]

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[51]P.R.O., MH16/1, Angus Smith to the L.G.B, 14th October 1879.
[52]During his evidence to the Royal Commission in 1878, Lord Aberdare asked Angus Smith if the law was enforced against one manufacturer in a town, this would pressurise the others into compliance. Smith replied 'Yes. I think if it were enforced in that general way by the central Government, better methods would come into operation rapidly and easily.' R.C.N.V (1878), Minutes of Evidence, PP.1878.xliv.43, Q.113, p.48.
[53]6th R.A.I., for proceedings during 1869 (c.152), p.55 (1870), xv.1.
[54]ibid, p.66.

Therefore, the Inspectorate used its most powerful sanction as a weapon to deter detected or possible offenders. The selection of prosecution (a public punishment) was perceived to encourage compliance amongst the regulated as a whole.[55]

The second justification for prosecution, was that in some cases it would serve to educate manufacturers regarding the requirements of the Alkali Act. Public prosecution would advertise the expectations that the inspectorate had of pollution abatement standards. This became especially necessary as the Alkali Act was amended and extended, and new chemical processes became subject to government regulation. In 1899, Carpenter commented on the prosecution of Hamor Lockwood and Co., a Manchester sulphate of ammonia works:

> ...much complaint of escape of sulphuretted hydrogen in the district in which these works are situated had reached me, and it was necessary to mark the offence, which occurred in an old established works, so that the proprietors were fully cognisant of the requirements of the Alkali Act of 1881.[56]

The prosecution of the Electro-Chemical Company in 1900 (see appendix one) was justified in a similar way. Carpenter commented that as escapes of chlorine from this bleaching powder works had caused serious damage to local crops,

> It was impossible to overlook escapes of such gross nature, the product of previous carelessness and negligence on the part of those responsible for the conduct of operations, even after making due allowance of mitigating factors in a

[55]This idea is still apparent in the behaviour of modern anti-pollution officials. Genevra Richardson's study of the enforcement policy of two British Regional Water Authorities found that 'general deterrence of law-breaking through exemplary prosecutions of carefully chosen cases was seen by personnel as the most efficient way to enforce the law.' See Richardson *et al*, *Policing Pollution*, pp.139-141.
[56]35th R.A.I., for proceedings during 1898 (c.160), p.141 (1899); xi.133.

novel manufacture. I am glad to be able to state that the case has led to the establishment of better means for dealing with the residual chlorine in the bleach chambers, and of utilising this, as should be done. A salutary and, unfortunately, needed lesson in responsibility for the conduct of chemical operations will not, I feel confident, be thrown away.[57]

Thirdly, prosecution was selected only in cases where there was extremely powerful evidence against the offender.[58] The worst offenders would be subjected to legal action because the Inspectorate did not wish to lose cases that were carried that far. Angus Smith displayed especial concern with the clarity of evidence, which had to be presented to an unscientific audience in the courtroom. In his third annual report, he stated that,

> The first prosecution under the Act was one for allowing the escape of gas with, as I supposed, full knowledge of the fact. There was no defence and the penalty was paid into court. There are other cases where I believe the knowledge of the escape was equally clear, but I had no desire to fail in the first attempt, and there are some difficulties about the interpretation of the Act which might in a court have produced uncertainty. I chose a case where no uncertainty as to the result could be anticipated. It was at the Bridgewater Smelting Works of St. Helens.[59]

Another case of this type is described in Angus Smith's seventh annual report to the L.G.B. It had been discovered by the district inspector that a work was sending out

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[57]37th R.A.I., for proceedings during 1900 (c.242), p.266 (1901), x.423.

[58]Peter Bartrip has also found that the Victorian Factory Inspectorate were highly selective in bringing prosecutions, only initiating legal proceedings in clear-cut cases. It was reported by the inspectors in their joint report for 1847-1848 that, 'We are most cautious in never prosecuting unless we feel convinced that the act complained of constitutes an offence clearly pointed out by the law, nor unless we believe we can satisfactorily prove the commission of the offence.' See Bartrip, 'Success or Failure? The Prosecution of the Early Factory Acts', pp.425-426.

[59]3rd R.A.I., for proceedings during 1866 (c.3792), p.5 (1867), xvi.1.

emissions exceeding the statutory five percent limit for hydrochloric acid prescribed by the Alkali Act, 1863. However, the measurement of the chemist at the works had indicated a lesser amount. The Chief Inspector commented that,

> I do not doubt that our measurement is correct, but then it is because we have attained such facility or refinement in our work, and those not accustomed to it cannot find quite so much. In a case like this I have been most unwilling to prosecute. It is not pleasant to lose such a suit, and I prefer to go on with that kind of certainty which shall approve itself to those unacquainted with chemistry.[60]

Therefore, the Alkali Inspectorate appeared to be keen to foster a reputation for invincibility.[61] Inspectors were determined that where prosecutions were initiated they must be successful, otherwise the deterrent effect of the law would be lessened.

In addition, the low number of prosecutions under the Alkali Acts may be in part explained by Angus Smith's personal abhorrence of trials. In several papers published during his service as Chief Inspector, Smith outlined the unsatisfactory nature of the existing legal system of redress for the damage caused by pollution. He focused particularly upon the problems faced by scientific witnesses in courts of law.[62] For example, in an 1876 lecture to the *National Association for the Promotion of Social Science*, Angus Smith contended,

> I am sorry to say that I have obtained no reverence for the forms of law in these contests; it seems to be that they come in frequently to interrupt the simple

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[60]7th R.A.I., for proceedings during 1870 (c.354), p.507 (1871), xiv.43.
[61]Bartrip, 'Success or Failure? The Prosecution of the Early Factory Acts', p.424.
[62]For a further discussion of this issue and of Smith's views see Hamlin, C., 'Scientific Method and Expert Witnessing: Victorian Perspectives on a Modern Problem', *Social Studies of Science*, 16 (1986), 485-513.

> conclusions of common sense. Besides this, the position in which scientific men are placed as witnesses debars many from appearing. They refuse to be made to stand up and be questioned like criminals, or be treated like inferiors, at the best, by men who, however eminent in their own branches, know nothing of the subject discussed. The practice before Courts has become so painfully unpleasant to scientific men, that to a large extent it has practically prevented scientific opinion from influencing judgment in courts.[63]

Smith especially resented the way in which evidence could be twisted by lawyers, and witnesses were 'made to appear as they were not.' He argued in favour of a scientific assessor to sit beside the judge and answer queries on scientific matters, and believed that scientific witnesses should be enabled to present their evidence in writing.[64] Gibson and Farrar have suggested that Angus Smith's attitude towards court cases stemmed from his experience as an expert witness in an action against Peter Spence in Liverpool in August 1857. Spence's Pendleton alum works had allegedly produced copious amounts of ammonia, hydrogen sulphide and sulphur dioxide. However, despite Smith's testimony for the defence case, Peter Spence lost the case and was forced to move his works to Miles Platting.[65] According to Gibson and Farrar, Angus Smith:

> ...took it very hard that he had given expert testimony in a court of law on a scientific matter, and it had been rejected. He had had to submit to cross-

[63]Smith, Robert Angus,' What Amendments are required in the Legislation necessary to Prevent the Evils arising from Noxious Vapours and Smoke', *Transactions of the National Association for the Promotion of Social Science* (1876-1877), pp.495-534 (p.504).
[64]Gibson and Farrar, 'Robert Angus Smith, F.R.S., and 'Sanitary Science'', p.248.
[65]See the account of Regina v. Spence given in Fenwick Allen, J., *Some Founders of the Chemical Industry: Men to be Remembered* (London: Sherratt & Hughes, 1906), pp.278-280.

> examination like any other witness, instead of presenting his evidence fully and in his own way; and a judge and jury ignorant of science had then, in effect passed a verdict on his probity...it is said after *Regina v. Spence* Smith never again appeared in a court of law.[66]

In avoiding prosecution, Smith and his successors developed a range of enforcement practices which enabled them to control the law, through negotiated complaince and discretion, rather than be controlled by it.

5.4: Summary

It has been contended that prosecution was an enforcement tool little used by the Alkali Inspectorate.[67] As noted in section 4.3, the Alkali Inspectorate continued a trend towards a non-confrontational enforcement approach, generally evident in the nineteenth-century regulation of business activity. Peter Bartrip has noted that prosecutions were rare under the early factory acts, and tended:

> ...to occur where convictions are virtually guaranteed, where previous cautions have proved ineffective, where there is a clear moral culpability, and where the consequences of the infraction threaten to be severe (e.g....undermining the inspectors authority).[68]

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[66]ibid., pp.247-248.

[67]Sarah Willmot has argued that local nuisance inspectors were far more likely to proceed by prosecution. In this way, the existence of the Alkali Inspectorate and its policy of conciliation protected manufacturers from litigation from local authority inspectors and landowners. See Willmot, S.,'Pollution and Public Concern: The Response of the Chemical Industry in Britain to Emerging Environmental Issues, 1860-1901', in Homburg, E., Schröter, H.G., & Travis, A.S. (eds.), *The Chemical Industry in Europe, 1850-1914: Industrial Growth, Pollution and Professionalization* (Boston: Kluwer Academic Publishing, 1998), p.17.

[68]Bartrip, 'Success or Failure? The Prosecution of the Early Factory Acts', p.424. This author has further contended that the early Factory Inspectorate lost their appetite for prosecution as an enforcement tool. Bartrip and Fenn have observed that in 1836 the statistical likelihood of a factory being prosecuted was one

Such assertions are easily applied to the prosecution policy of the Alkali Inspectorate. The notions of *mens rea* and moral culpability appear to have been central to the decision-making process.[69] The alkali inspectors defined compliance as manufacturers' willingness to comply rather than their strict adherrence to the letter of the law. Therefore, offences that were perceived as the deliberate flouting of legal standards resulted in prosecution.

The level of criminal intent required to initiate a prosecution varies from one regulatory agency to the next. From the evidence presented in the preceding discussion, it must be concluded that a high level of criminal intent and moral culpability would have to be perceived by the Alkali Inspectorate, before it would embark upon legal proceedings. The regulated had to deliberately or repeatedly flout the law, for inspectors to feel that they had no other option except prosecution.[70] To a great degree, the inspectorates most powerful sanction remained a threat, a last resort to be invoked only when the tactics of 'negotiated compliance' had failed.[71]

The Inspectorate's dedication to a tradition of 'negotiated compliance' has been explored in the two preceeding chapters. However, there are other deep-rooted reasons for the Alkali Inspectorate's frequent dismissal of prosecution. As Angus Smith himself

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in four, by 1870 this was one in forty. See Bartrip and Fenn, 'The Evolution of Regulatory Style in the Nineteenth-Century British Factory Inspectorate', p.206.

[69]It has been noted that it is a basic principle of the common law that no act is punishable unless it was performed with a criminal mind. Rowan-Robinson, *Crime and Regulation*, p.192. Modern regulatory legislation has abandoned concept of *mens rea* and notions of individual guilt and moral culpability. In the modern context, most pollution crimes are ones of strict liability, and criminal intent need not be established in court by the prosecutory body. Hutter, *The Reasonable Arm of the Law?*, p.11.

[70]A modern day pollution control officer, has been quoted by Hawkins as saying, .'..we don't take people to court just like that. It's a *history* of problems. We've tried everything with them: negotiation, discussion, etc. When we take them to court it's like all other methods have failed.' See Hawkins, 'Bargain and Bluff.'

[71]Keith Hawkins has commented in his study of trade waste inspectors that prosecution becomes 'a kind of *eminence grise*, a shadowy entity lurking off-stage, often invoked, however discreetly, yet rarely revealed.' Hawkins, *Environment and Enforcement*, p.191.

acknowledged 'the character of the inspection which I have instituted is one caused partly by my own inclination, and partly by the nature of the circumstances.'[72]It is to these circumstances or constraints that attention will turn in the following chapter of this thesis.

[72]12th and 13th R.A.I for proceedings during 1875 and 1876 (c.2199), p.26 (1878-1879), xvi.1.

Chapter Six: Constraints on the Enforcement of the Alkali Acts

6.1: Introduction

This thesis has explored the themes that surround the personnel, the fiscal and geographical organization, and the routine operation of the Alkali Acts administration. However, the difficulties attendant upon the work of the nineteenth-century Alkali Inspectorate have yet to be considered, and it is these constraints that form the focal point of this chapter. The following analysis of various constraining factors will provide more than just an overview of the negative aspects of the alkali inspectors' task. Significantly, it has been argued that the practical constraints faced by central government inspectorates during the nineteenth-century provide the explanatory framework for the way in which law was implemented - the enforcement strategy of 'negotiated compliance'.[1]

Since the publication of Oliver MacDonagh's contentious re-evaluation of the nature of the nineteenth-century revolution in government, historians have sought to test his assertions regarding the extent of nineteenth-century state intervention through a series of legislative case studies. As the introduction of central government inspectorates to implement legislation is placed as the central motivating component in the MacDonagh model of the growth of state intervention, many studies have focused primarily upon the nature and operation of these bodies. However, Peter Bartrip and Paul Fenn have contended that historians have paid only limited attention to the harsh reality within

[1]Bartrip and Fenn's examination of the enforcement of the early factory acts has led them to conclude that the problems of limited budget and the constraints on its effective deployment prompted the nineteenth-century Factory Inspectorate to choose a strategy of negotiated compliance to achieve maximum compliance. They state that 'an inspectorate faced with these problems was forced to utilize its resources by prosecuting certain offences and relying upon alternative strategies, namely persuasion and threats, in order to encourage compliant behaviour.' See Bartrip and Fenn, 'The Evolution of Regulatory Style in the Nineteenth-Century British Factory Inspectorate', pp.218-9.

which central government inspectors operated. This is despite the fact that, for them, the problems faced by central government inspectorates had a far-reaching, if not decisive, impact upon the implementation of policy. According to Bartrip and Fenn, the constraints faced by the early factory inspectorate 'were the crucial determinants of inspectorial policy and practice'.[2] A comparison of constraining factors such as low budgetary and staffing levels, within a variety of central government inspectorates, has led Bartrip to conclude that the successes of central government inspectorates and, therefore, the extent of state intervention during the nineteenth century have been over-emphasized by historians. Bartrip has asserted,

> The resources allocated to the new agencies were too small to allow them to achieve much in terms of enforcement. Furthermore, for a variety of reasons, their impact on government policy was limited. Overall, therefore, it is argued that historians have over-emphasized the significance of inspectors and inspection.[3]

Three types of difficulties which confronted the early factory inspectorate have been identified. These are the size of the inspectorate relative to its workload, the complexities and shortcomings of the law, and the extent of opposition to the law. The subsequent discussion will reveal that the Alkali Inspectorate suffered similar predicaments, which have not been detailed or analysed in-depth elsewhere. So far, studies of the implementation of the Alkali Acts have come to optimistic conclusions about the impact and success of the Alkali Inspectorate. For example, Roy MacLeod has argued that 'central control in alkali administration was achieved with relative ease', and furthermore

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[2]ibid., p.218.
[3]Bartrip, 'British Government Inspection, 1832-1875', p.605.

that this administration was 'one of the most fruitful instances of Victorian social policy'.[4]

This chapter seeks to reassess these conclusions, by focusing in detail upon the constraints that undoubtedly affected the enforcementn of the Alkali Acts. As Angus Smith himself said,

> The character of the inspection which I have instituted is one caused partly by my own inclination, and partly by the nature of the circumstances.[5]

It is these circumstances that this chapter will assess, focusing particularly upon the effect of resource-related and legislative constraints, as well as the problems and pitfalls associated with prosecution and opposition. This will shed light upon the efficiency of the Alkali Inspectorate, and the extent of Victorian state intervention to protect the environment from chemical pollution.

6.2: Resource-Related Constraints

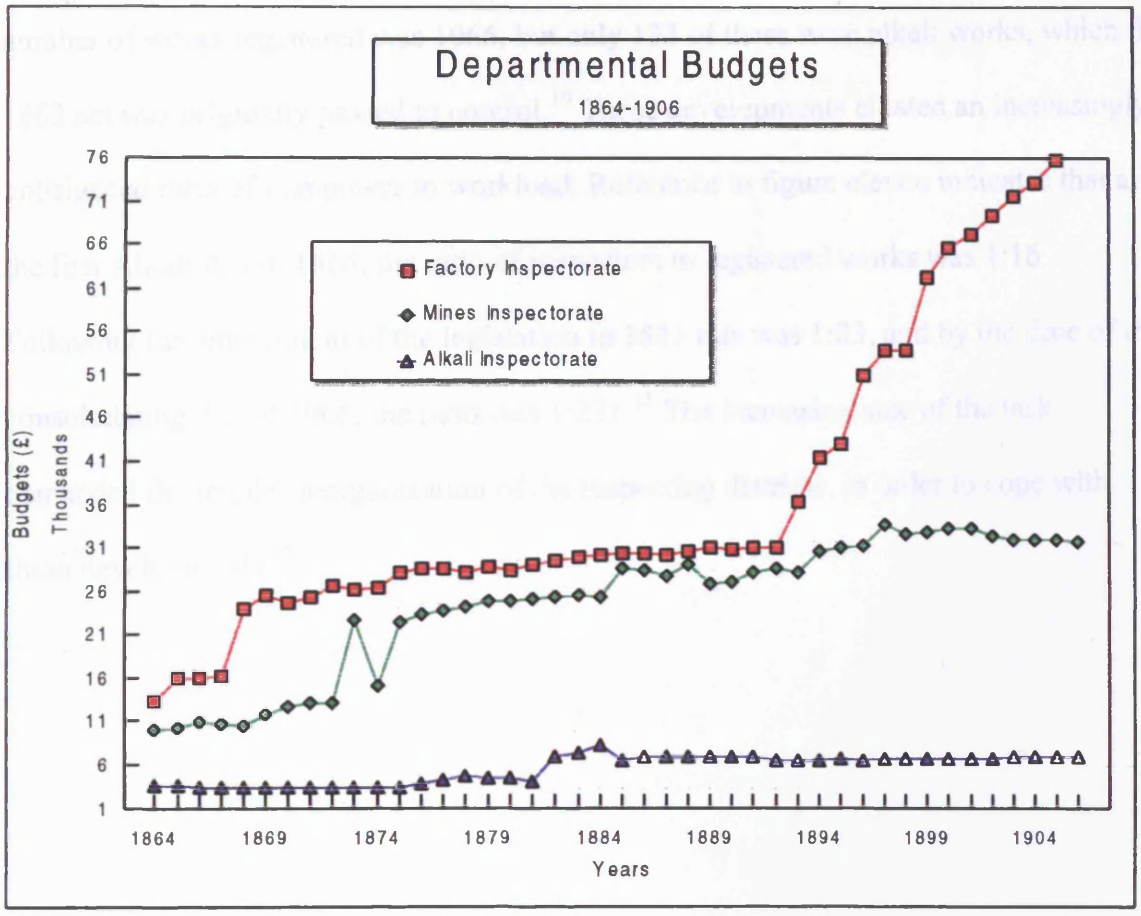
The most fundamental constraint upon the implementation of the Alkali Acts was the level of funding at the inspectorate's disposal. It was argued in chapter three, with reference to salaries and expenses, that the Alkali Inspectorate was granted a noticeably lower level of funding than other similar bodies. An analysis of the total budget granted to the Alkali Inspectorate in the years 1864-1906 also indicates a continuously low level of state funding for environmental protection, in comparison to the other arguably under-funded central government inspectorates of factories and mines (see figure ten). The only

[4]MacLeod, 'The Alkali Acts Administration, 1863-84', p.113.
[5]12th Annual Report (hereafter R.A.I) for proceedings during 1875, (c.2199), p.26 (191878-9), xvi.1.

notable increase in the budget of the Alkali Inspectorate occurred after the 1881 Act, when the number of staff, and therefore aggregate salary level, doubled (see figure eleven). The continual low level of funding illustrated in figure ten had detrimental implications for the implementation of the Alkali Acts in the period 1864-1907, the most important being the insufficient number of alkali inspectors employed to enforce the law.[6] As figure eleven indicates, the number of staff in the department remained low in relation to the departments of factories and mines, rising from 5 to 10 during the period 1864-1906.[7] However, in these years the number of registered chemical works and processes requiring inspection rose sharply. For example, in 1863 the works registered numbered 82; following the 1881 Act, 990 works were registered. By 1906, the number of works registered had increased further to 1,221.[8]

[6]In February 1880, *The Times* reported the then President of the L.G.B, George Sclater-Booth's comment that 'one of the reasons why the Alkali Acts had been somewhat restricted had been the difficulty of asking Parliament to provide a larger establishment of inspectors.' See *The Times*, 13th February 1880, 7f.
[7]By way of comparison, the number of staff serving in the factory department rose from 24 to 155 during the period 1864-1906, whilst the number of mines inspectors increased from 12 to 39 during the same period. See the Civil Service Estimates 1864-1906.
[8]43rd R.A.I for proceedings during 1906, (c.161), p.18 (1907), ix.219.

Figure Ten



Taken from the Civil Service Estimates 1864-1906.[9]

[9]These figures were calculated by the addition of all amounts listed under the sub-headings of inspectors' salaries, travel and personal expenses, laboratory instruments, incidental and prosecution expenses for the departments of factories, mines and alkali works. It should also be recalled that after 1881, the cost incurred by the Alkali Inspectorate was actually recovered by funding from external sources, such as local authorities and registration fees. Effectively, therefore, the Government was spending even less on the control of pollution. However, the inspectorates of factories and mines did not generate any external funding. For further discussion, see 3.4.

The workload of the inspectors was further increased because of the widening of the schedule to include a number and variety of chemical processes. By January 1889 the number of works registered was 1066, but only 133 of these were alkali works, which the 1863 act was originally passed to control.[10] These developments created an increasingly unbalanced ratio of manpower to workload. Reference to figure eleven indicates that after the first Alkali Act in 1864, the ratio of inspectors to registered works was 1:16. Following the amendment of the legislation in 1881 this was 1:83, and by the time of the consolodating Act of 1906, the ratio was 1:221.[11] The increasing size of the task demanded the regular reorganization of the inspecting districts, in order to cope with these developments.[12]

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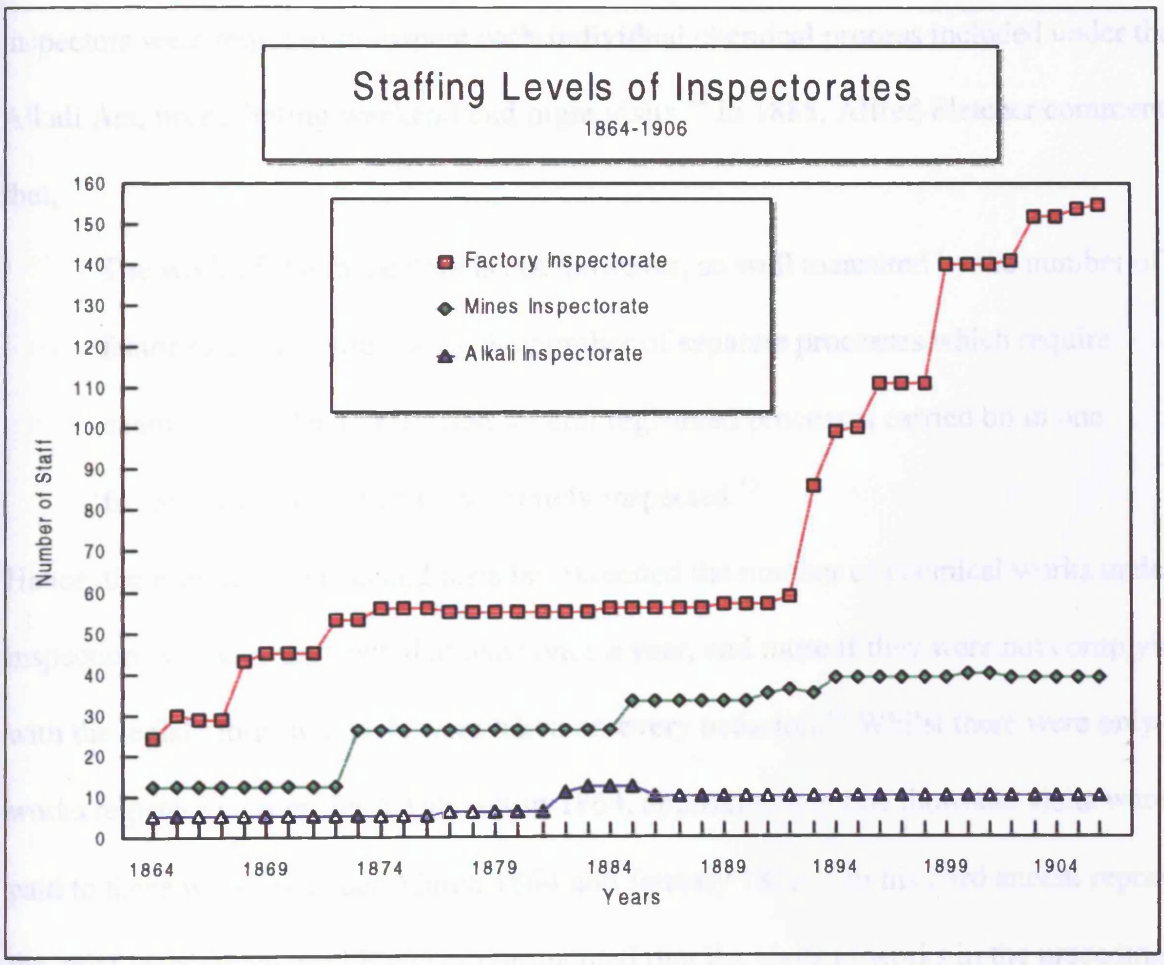
[10]P.R.O., MH16/3, Alfred Fletcher to the L.G.B, 24th January 1889.

[11]Peter Bartrip and Paul Fenn have illustrated that the early factory inspectorate was also confronted with a heavy workload. In 1844, the ratio of inspectors to factories was 1:263, and by 1874 it have risen to 1:540. See Bartrip and Fenn, 'The Conventionalisation of Factory Crime - A Reassessment', p.181. The mines inspectorate also faced the problem of an inadequate number of inspectors, in relation to workload. By the mid 1860s, a total of twelve inspectors oversaw 3,195 mines. This created a ratio of 1 inspector to 266 mines. See Pellew, *The Home Office, 1848-1914* pp.129-130.

[12]Following the 1892 Act, Alfred Fletcher explained 'this great increase in the number of processes which now come under the Act has brought much additional work on the inspectors. To meet the great pressure felt in district iv, which embraces East Lancashire and Yorkshire, 23 works have been transferred to the neighbouring district ii, that embracing Northumberland and Durham. It may, however, be necessary to make some further adjustment, as the number of processes to be inspected in district iv is still excessive. I cannot but express my satisfaction at the large amount of arduous work the inspectors have this year accomplished in bringing so great a number of new works already into conformity with the requirements of the new Act. See the 30th R.A.I for proceedings during 1893 (c.7367), p.573 (1894), xix.537.

Figure Eleven



Taken from the Civil Service Estimates 1864-1906.[13]

[13]These figures include all staff in the departments of factories, mines and alkali works who performed inspection duties.

The vast workload placed on the alkali inspectors becomes even more apparent when one considers what the inspection process at each work actually required. First, the inspectors were required to inspect each individual chemical process included under the Alkali Act, necessitating weekend and night visits.[14] In 1888, Alfred Fletcher commented that,

> The work of the inspectors is not, however, so well measured by the number of factories to be visited as by the number of separate processes which require examination. There are often several registered processes carried on in one factory, and each must be separately inspected.[15]

Hence, the number of visits and tests far exceeded the number of chemical works under inspection. Works were visited at least once a year, and more if they were not complying with the legislations, and tests were taken on every occasion.[16] Whilst there were only 82 works registered under the Alkali Act in 1864, approximately one thousand visits were paid to these works between March 1864 and January 1865.[17] In his 23rd annual report, the chief inspector Alfred Fletcher commented that the visits to works in the preceding year numbered 4,090, whilst the actual number of processes inspected was 4,786.[18] The amendment of the schedule of the Act to include more chemical processes further increased the number of tests necessary for efficient regulation. Alfred Fletcher complained in his district report for 1875 that,

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[14]For example, in order to bring chlorine works under control, the inspectors had to take tests from 2am onwards. See Ashby and Anderson, *The Politics of Clean Air*, p.75.
[15]25th R.A.I for proceedings during 1888 (c.5758), p.6 (1889), xviii.1.
[16]When not engaged on official business, the inspectors often spent their weekends making solutions and getting their laboratory work in order. See P.R.O., MH19/86, Angus Smith to Clare Sewell Read, 10th November 1874.
[17]1st R.A.I for proceedings during 1864 (c.3640), p.96 (1865), xx.1.
[18]23rd R.A.I for proceedings during 1886 (c.5057), p.7 (1887), xvii.1.

> In conclusion perhaps a word may be said regarding the increased labour the new Act [1874] has put upon the inspectors. In most of the works increased condensing apparatus presents more numerous points where chemical tests must be applied in order to complete inspection. In some of the works the labour has thus been increased fourfold. New methods of examination have also to be devised in order to meet the altered circumstances.[19]

In his district report for the same year, John Hobson (sub-inspector for the middle district) mentioned the same predicament,

> I find, in consequence of the new Act that two, three, and sometimes more tests have to be made when one was sufficient before, and also that the work in my laboratory is very considerably increased. Three new works come under inspection, and experiments have become necessary in several others that previously required superficial examination only.[20]

In his eighth annual report, Angus Smith described the enormity of the task which faced the inspectors when they arrived to inspect a chemical works, which in some cases covered more than twenty acres of land, and had ten large factory chimneys. According to the Chief Inspector, every high chimney and certain underground flues had to be checked with apparatus to assess the levels of hydrochloric acid present. After which the inspector was expected to determine the number of cubic feet of gases passing through the chimney in a given time (the speed of the current) in order to assess whether the manufacturer had

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[19]Intermediate R.A.I for proceedings during 1876 (c.165), p.10 (1876), xvi.1.

[20]ibid., p.11. Hobson repeated these complaints in a private letter to the Chief Inspector, writing that .'..the new Act has given me a considerable amount of trouble in having to alter my method of testing the escape of muriatic acid...I find my laboratory work at home very considerably increased.' See P.R.O., MH16/1, John Hobson to Angus Smith, 23rd July 1875.

complied with the statutory requirement for hydrochloric acid per cubic foot of chimney gases.[21] In a letter to the Local Government Board in November 1874, Angus Smith further emphasised the responsibilities of the sub-inspectors,

> They are expected to make an examination of at least one work every day...when the work is in good order the work is confined to drawing a certain amount of the escaping gas through a solution and examining a the solution, which can be done in an hour for one outlet of gas...When there are several outlets the work must be done at each. Until lately the places examined were often numerous because the flues were opened and the gases examined before they entered the chimneys...It is nearly always needful to speak on the condition of the works to the manager and to see that the apparatus is kept in good order, to consult, to advise or to object.[22]

As the Alkali Acts were extended then this process would have to be repeated for each noxious manufacturing process listed in the schedule.

Furthermore, the inspectors could be misled by deceptions practised by chemical manufacturers in order to procure low test results. In a paper presented to the *Chemical Society of Newcastle-Upon-Tyne*, David Hill, a Newcastle manufacturer, asserted that manufacturers stopped the decomposing process when inspectors were on the premises, and after 1874, admitted air into the chimneys in order to achieve the state of dilution required by the Alkali Act.[23] Evidence presented by workmen to the *Royal Commission*

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[21]28th R.A.I for proceedings during 1891(c.582), p.7 (1892) xx.139. Until 1874, the statutory limit for hydrochloric acid gas was one fifth of a grain per cubic foot of chimney gases. After this date, the statutory level was tightened to .2 of a grain per cubic foot of chimney gases.
[22]P.R.O., MH19/86, Angus Smith to Clare Sewell Read, 10th November 1874.
[23]Hill, D., 'On Noxious Vapours-Part II', *Transactions of the Newcastle-Upon-Tyne Chemical Society*, (1879) 239-271 (pp.252-253).

on the Condition of Labour in 1893-4, corroborated these assertions regarding the deception of alkali inspectors. Apparently, prior notice was given to chemical workers of the imminent approach of an inspector, and workmen were given orders not to charge the burners when the inspectors were present.[24]

The workload of the alkali inspectors was further increased by their role as arbitrators in private disputes between landowners and manufacturers. Inspectors often complained that the difficulty of proving offences opened the way for allegations motivated by malice, and furthermore that they were summoned in to examine cases of chemical pollution, only to discover that the cause was a nuisance over which they had no legislative control.[25] One particularly contentious dispute took place in Castleford, West Yorkshire over the period 1881-1883.[26] Local landowners, the Reverend W. Sylvester, a Mr. Hollins and Dr. Adam Jessop complained that the alkali works of Messrs Hunt Brothers had caused great damage to the surrounding rural environment. After several thorough investigations in September 1883, George Davis and Russell Forbes Carpenter (inspectors for the middle district) discovered that the nuisance was actually sulphuric acid emitted from a local glassworks which was exempt from state regulation.[27] Jessop, later a Justice of the Peace, denied the validity of the inspectors' findings, and accused

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[24]*Report on Conditions of Labour in Chemical Works, Dangers to Life and Health of Workpeople and proposed Remedies, by Committee of Inquiry* (1893-1894), PP.1894.xxxiv.1, p.10.
[25]According to Smith, the difficulty of proving offences allowed 'a way for an unjust man to do great injury to another, as no man can prove whether the senses of another are affected or not in many cases, and we cannot doubt that some men are bad enough to take advantage of this uncertainty. The manufacturer therefore stands quite unprotected on this side, and may at any time be attacked and in many cases ruined.' 3rd R.A.I for proceedings during 1866 (c.3792), p.52 (1867), xvi.1.
[26]For a detailed chronological account of this case and test results obtained in August 1883, see the 20th R.A.I for proceedings during 1883 (c.4096), pp.28-30 (1884), xviii.1.
[27]Wakefield District Archives (hereafter W.D.A), John Goodchild Loan Collection, MS copy of *The Castleford Complaints*, 12th September 1883.

Davis and Carpenter of neglect of duty, alleging that they had given prior notice of inspections to manufacturers and accepted bribes.[28] Angus Smith believed that 'no reasoning or observations will have influence in causing [Dr. Jessop] to alter or modify his opinion.'[29] Smith commented that,

> I do not in my own mind think well of the complaint by Dr. Jessop. He is said to have offered to be quiet for £200.[30]

George Davis later painted this case as one of 'systematic persecution', and implied that the motive for Jessop's ongoing harassment was that he owed Hunt Brothers a large sum of money, which was due for repayment.[31] Indeed, it does appear that there was a financial motivation for calling in the Alkali Inspectorate, as Dr. Jessop had written to Hunt Brothers in August 1883, threatening that:

> ...unless I can have a friendly interview about compensation, I shall be constrained to resort to other means of redress, which I shall much regret.[32]

In an earlier case in 1874, pressures of workload actually caused Angus Smith to refuse to continue an investigation into crop damage on Sir Richard Brooke's estate at Norton, Runcorn. When Francis Ellis, a land agent for the estate, wrote to request further examination of the damage, Smith retaliated,

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[28]W.D.A, John Goodchild Loan Collection, Dr. Adam Jessop to Angus Smith, 30th November 1883. In reply to these accusations Carpenter stated that he 'does not give notice of his ordinary visits to the works beforehand, and that he has carefully abstained from accepting even the smallest hospitality from the owners of these works.' P.R.O., MH16/2, Angus Smith to the L.G.B, 22nd April 1884.
[29]P.R.O., MH16/2, Angus Smith to the L.G.B, 22nd April 1884.
[30]ibid.
[31]Davis, G.E, 'Chairman's Address', *Journal of the Society of Chemical Industry*, 15 (1896), 782-786 (p.784).
[32]W.D.A, John Goodchild Loan Collection, Dr. Adam Jessop to Hunt Brothers, 16th August 1883.

> I took a good deal of trouble to assist you when crops were injured, and I did not find the result satisfactory on my side. I may say that the trouble I took was quite voluntary and I much doubt the propriety of showing any zeal...having done more than my duty required, I am in such cases generally...obliged to suffer inconveniences which I desire not to experience again. I cannot promise to examine the alleged damage.[33]

Smith later added that he had recently thoroughly investigated the damage allegedly caused to crops on the estate by fumes emitted from the works of Messrs Steele and Company. The Chief Inspector explained,

> I am not an inspector of crops and when I examine them I do it as a guide to myself...I wish the distinction to be clear...I was much amazed to find that evil had been done by men who refused to make compensation and threw aside any exact limitations of my duties. Personal unpleasantness in connection with my work should not [be] alluded to, but when it arises from any work done beyond my duty, I may avoid it if possible. You must know also that the works were a mixed copper and alkali work and my right of inspection only partial.[34]

The stresses caused by the inspectorate's workload were multiplied by the perilous nature of the inspection process. In 1873, Angus Smith explained that John Hobson's health had suffered twice as a direct result of his duties. Hobson's district (the middle district, see figure one) was:

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[33]Cheshire Record Office (Hereafter C.R.O), Brooke of Norton Collection, Angus Smith to Francis Ellis, 17th June 1874, DNB/D/24D/8.
[34]C.R.O, Brooke of Norton Collection, Angus Smith to Francis Ellis, 22nd June 1874, DNB/D/24D/9.

> ...very widely scattered, and demands a great deal of travelling...The great amount of travelling and long journeys demanded have brought an unpleasant result to Dr. Hobson, who was considerably shaken in a railway accident when coming from Oldbury. The previous year he had the misfortune to hurt himself by a false step which caused him to fall in a very dark spot of a chemical work where he could not be expected to know his way well...still is he obliged to be very careful on account of the effects of the last accident. With an apparently fine constitution and youth on his side, I hope that he will soon be as energetic as ever. These are some of the dangers of our work, shared with many other persons.[35]

The testing procedure could also cause health risks. Angus Smith described how Brereton Todd, inspector for the Eastern District, had to 'give up the new aspirator; indeed, he broke a blood vessel by the exertion required in shaking it to absorb the vapours.'[36] It is also notable that inspectors were expected to climb in all types of weather conditions to the top of acid towers, perhaps as high as 50-60 feet, in order to gather test results. Apparently, acid towers were even higher in the Eastern district, where samples had to be taken from an opening at the top of condensers, and inspectors had to cope with:

> ...the difficulty of mounting to the summit, and when there of working calmly at a height of 125 feet on a platform slenderly railed under a strong wind and even rain. One may occasionally stand for an hour under these conditions...and as a rule it may be said that inspectors who are not equal to sailors in climbing cannot make examinations at the summit of the towers. Even sailors could not take up the

[35]Appendix to 10th R.A.I for proceedings during 1873 (c.1071), p.405 (1874), xxv.395.
[36]ibid, p.406.

> apparatus. This, however, is only an inspectors' difficulty which must be overcome.[37]

The Mayor of Newcastle was driven to claim that Brereton Todd 'cannot climb up to the spots necessary to be reached and...has not sufficient interest in the matter.' Angus Smith commented,

> It must be remembered that the places to be reached in Mr. Todd's district are quite different from those in any other district and I doubt if any of the inspectors would habitually go to them...However [his] assistant does this part of the work requiring activity...The point of view taken by the Mayor has caused me much anxiety and indeed the whole matter is such to annoy me exceedingly, and to cause me to look more than ever to methods of inspection which will at least allow me to live in peace for some time.[38]

The health problems which resulted from their duties continued to plague the inspectors throughout this period. Other casualties included Adrian Blaikie, inspector for the Northern district (see figure two). In February 1883, he fell seriously ill and later died, after he caught an infection following two days inspecting chemical works in the rain.[39] Edward Jackson, inspector for the South Midlands, was also plagued by ill health during his government service. In December 1896, he slipped and fractured his leg whilst inspecting a chemical works, and was absent on sick leave for over six months. Edward

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[37]Quoted in Ashby, and Anderson, *The Politics of Clean Air*, p.26.
[38]P.R.O., MH16/1, Angus Smith to the L.G.B, 28th September 1880.
[39]P.R.O., MH16/5, Angus Smith to the L.G.B, 21st February 1883. Angus Smith commented that 'Dr. Blaikie, my assistant, young, ardent and effective in work and of apparently fine physique has been seized with illness, presumably aggravated if not caused by exposure when doing work for the district of an inspector who required aid. One of them had said that Inspection was slavery.' P.R.O., MH16/2, Angus Smith to the L.G.B, 20th February 1883.

Jackson was again granted four months sick leave again in May 1898, after he strained his knee whilst inspecting a salt works. Eustace Fletcher, sub-inspector for the South Midlands, was burdened with inspection duties for the entire district, as he was again when Jackson fell ill in 1903 (see figure two).[40]

Another resource-related pressure on the inspectors was the amount of travelling that was required of the staff. As Angus Smith explained in November 1874,

> A long journey must often be made for even a short visit. The travelling constitutes the most laborious [sic.] part. Dr. Hobson [sub-inspector for the middle region] says he travelled 12,500 miles on official business in 1873 and would have done more had a railway collision rendered him very uncertain in health for some time.[41]

Travel presented a particular problem in the case of Scottish and Irish chemical works.[42] For example, in December 1882, Angus Smith wrote to the L.G.B explaining that he needed to gather more information about a cement works in Wexford for the purposes of registration. However, he reminded the L.G.B,

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[40]P.R.O., MH16/4, Edward Jackson to the L.G.B, 21st December 1896. See also P.R.O., MH16/4, Edward Jackson to the L.G.B, 11th May 1898. Jackson received half his salary for four months sick leave. See MH16/4, the Treasury to the Secretary of the L.G.B, 22nd July 1898. 40th R.A.I for proceedings during 1903 (c.213), p.199 (1904), viii.193.

[41]P.R.O., MH19/86, Angus Smith to Clare Sewell Read, 10th November 1874.

[42]In the year 1873-4, Dr. Charles Blatherwick made over 200 visits to Scottish and Irish chemical works, and this amount of travelling was 'long and disagreeable.' See P.R.O., MH19/86, Angus Smith to Clare Sewell Read, 10th November 1874.

> Inspectors have been afraid of Ireland. I shall have to send Dr. Blaikie again - he was not afraid but he went when special work was wanted and the others could not go.[43]

In January 1886, Alfred Fletcher mentioned the burden of travelling to inspect small Scottish and Irish salt works,

> The time occupied by the Inspectors in visiting them must be considered as unwisely employed. So also the travelling expenses incurred. These expenses amount to a large proportion of the registration fees paid.[44]

The amount of travelling, often laden with heavy testing apparatus, was a constant source of complaint for the alkali inspectors.[45] For example, in his district report for 1881, George Davis (sub-inspector for the middle district, see figure one) complained,

> The new Act is giving us plenty of work; I do not see how it is to be done with the assistance now accorded me; under the old Act I could just manage to keep the 38 works I had then in order, but now with Mr. Carpenter's assistance I have over 260, and the railway travelling has been correspondingly increased. The writing alone takes up a very considerable portion of my time, and I am afraid that the

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[43]P.R.O., MH16/5, Angus Smith memorandum, December 1882. In May 1883, Smith also commented that 'I am often unwilling to send to an isolated works unless there is something to do on the way, as the expense exceeds the whole registration fee.' P.R.O., MH16/5, Angus Smith memorandum, 30th May 1883.

[44]P.R.O., MH16/2, Alfred Fletcher to the L.G.B, 7th January 1886. Fletcher repeated this complaint in April 1892, 'The inspection, though useless, is expensive in travelling expenses and the time of an Inspector. It has been the cause of much irritation.' See P.R.O., HLG29/40, Alfred Fletcher to the L.G.B, 30th April 1892.

[45]Travelling was such a central part of the inspectors duties, that they had to reside near a railway station and gain the permission of the Board prior to any relocation. See P.R.O., MH16/2, Circular from Hugh Owen to L.G.B Inspectors, 15th November 1888.

work will fall into arrear unless more help is given. The travelling occupies much more time than the actual duty, and in this district the works lie very far apart.[46]

Neither did the Chief Inspector avoid the stresses of constant travel. The amount of travelling required is indicated by some examples from Alfred Fletcher's timetable for the year from August 1889-August 1890. In August 1889, Fletcher travelled from London to Devon and Cornwall and was away from home for fifteen nights. During October and November, he visited works in Leicester, Derby and Lancashire for nearly three weeks. In March 1890, the Chief Inspector travelled twice to Staffordshire, Lancashire and Somerset, spending a total of sixteen nights away from home. In June 1890 Fletcher made three journeys to oversee inspectors in Essex, Lancashire, Staffordshire, Buckingham, Nottinghamshire, Somerset and South Wales. These duties demanded three journeys and twenty five nights away from home.[47]

A further constraint faced by Chief Inspectors was the supervision of the inspectors. There was one corrupt inspector in the period under consideration. Bernard E. Smith was appointed to replace Adrian Blaikie and became sub-inspector for the South Eastern district in 1884, and inspector of the Eastern district in 1885. In August 1897, the then chief inspector, Russell Forbes Carpenter reported discrepancies in Smith's monthly report for July to Hugh Owen. He wrote,

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[46]18th R.A.I for proceedings during 1881 (c.3583), p.43 (1883), xviii.1. Angus Smith explained that 'Mr. Davis' district is very large, it contains 255 works at present and more must come in and the amount of travelling is very great. At first sight it might be said that this would apply also to Mr. Fletcher's, but it is not so as the concentration of works in the north demands all the experience we can find. The same concentration does not occur in Mr. Davis' district.' P.R.O., MH16/1, Angus Smith to the L.G.B, 10th May 1882. This year was one of particular strain for the inspectors, due to the inclusion of several new chemical processes under the Alkali Act of 1881. Angus Smith complained in the report for 1881 that 'the strain put upon us is very great, and we earnestly hope it will not be permanent.' See the 18th R.A.I for proceedings during 1881 (c.3583), p.100 (1883), xviii.1.

[47]P.R.O., MH16/3, Alfred Fletcher memorandum, 26th August 1890.

> ...a weekly diary reaches me, which...gives an account of moneys expended and of work undertaken each day. At the end of the month a report is sent to me which is filed in my office for reference after I have examined it, and I instituted the plan not observed by my predecessor, that my assistant enters in a register against each work date of visit paid so that I can at once turn to the page and know how many visits each work has received in the year, at what date, and also whether anything abnormal has occurred. In this manner when Mr. Smith's annual report for 1896 came in ...I had the registers of the Salt Works examined, as I had grave doubts about so many tests as 83 having been taken at the limited number of works that, judging from the monthly reports, had received visits and were tested.[48]

Russell Forbes Carpenter concluded after a thorough investigation that 'Mr. Smith has been unfaithful to his duty', as the inspector had failed to visit many works and had invented test results.[49] For example, Bernard Smith reported an inspection visit to West Hartlepool Chemical Manure Works on the 20th July 1897, although this work had closed down in November 1888. He offered several excuses for such discrepancies, such as the claim that he performed the tests alone, unseen by managers of works. Smith admitted to inventing some test results in order to keep up the district average. As Smith did not give

[48]P.R.O, MH16/4, Russell Forbes Carpenter to Hugh Owen, 29th August 1897.

[49]Bernard Smith had previously been warned to inspect certain areas of his district more closely. In February 1897, Carpenter told Smith to pay greater attention to the area near the Tees and Haverton Hill. Carpenter wrote, .'..as I told you in Middlesborough in September I want you to pay more attention to that portion of your district, and in the year upon which we have now entered I hope to find that this is the case, and I may not have again to mention the matter.' P.R.O, MH16/4, Russell Forbes Carpenter to Bernard Smith, 15th February 1897.

the L.G.B a sufficient explanation for his behaviour, his resignation was requested and received in November 1897.[50]

Therefore, it is clear that the heavy workload and great amount of travelling required was mainly due to the small number of inspectors, in conjunction with the large districts and time-consuming testing duties which they were assigned (see figures one, two and eleven).

6.3: Legislative Constraints

The Alkali Acts were not a general measure for the control of industrial pollution, and the Alkali Inspectorate encountered many difficulties which were caused by omissions and anomalies in the legislation that they were intended to enforce. The most far-reaching legislative constraint upon the effectiveness of the Alkali Inspectorate was unregulated pollutants. Throughout his service as Chief Inspector, Angus Smith campaigned for the extension of the Alkali Acts to include a broader spectrum of noxious by-products. As early as 1865, Smith complained that under the 1863 Act the inspectors

[50]Smith was informed that due to his .'..continued failure to furnish the Board with any explanation notwithstanding the repeated communications which have been addressed to you, the Board feel that they have now no alternative but to call upon you to resign your office as a sub-inspector under the Alkali & c. Works Regulation Act.' See P.R.O, MH16/4, Samuel B. Provis to Bernard Smith, 23rd October 1897. Smith replied with his resignation. See P.R.O, MH16/4, Bernard Smith to the L.G.B, 11th November 1897. Smith was later requested to return all official books, apparatus and papers to the Board. See P.R.O, MH16/4, L.G.B to Bernard Smith, 17th November 1897. It has been noted elsewhere that several of the appointments to the early factory inspectorate were unsatisfactory. One superintendent was dismissed for circulating a pamphlet which criticized the inspectors and for insolence to millowners. He was later reappointed at £250 per annum, but was dismissed again for borrowing money from millowners, which he could not repay. Another was an undischarged bankrupt. One resigned after criticizing the inspectorate in his evidence to a Select Committee. A fourth was dismissed for leaking a Home Office letter which instructed the inspectors to report on the state of trade and political opinion in their districts. See Henriques, *The Factory Acts and their Enforcement*, pp.11-13.

could only enforce a statutory limit for hydrochloric (muriatic) acid (five grains in each cubic foot of chimney gases). Smith commented,

> It is not for myself and colleagues to become general accusers, and we do not think it proper to point out the offence even when it is known to us, unless we find muriatic acid. A strange result therefore takes place; we become defenders of the alkali works, and appear also to defend the right of sending out 5 percent of gas: whereas the case is merely this: we cannot publicly object until this amount is attained. We are very unwillingly to appear to be defending the escape of any gases...[51]

Angus Smith also complained that the limitations of the legislation prevented the inspectorate from adequately protecting the interests of the general public, who, Smith argued, believed that the Alkali Act of 1863 would represent the end of chemical pollution. Smith stated that,

> The latter idea has been a little annoying to the inspectors, and has occasionally put them in a false position when complaints are made of the escape of gas; the inspector may know very well that there is good cause, but he may know...that the gas is one which does not come under his control. In such a case as this he is apt to be misunderstood, as he must be silent on the subject of escapes which he has been allowed to see as a privileged person, but which do not come under his control. He is therefore unable to lend the public all that aid which he would be able to give if he were allowed full liberty of speech.[52]

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[51] 2nd R.A.I for proceedings during 1865 (c.3701), p.60 (1866), xvii.53.
[52] 3rd R.A.I for proceedings during 1866 (c.3792), p.50 (1867), xvi.1.

Many pollutants were unregulated due to technological constraints such as the absence of suitable abatement methods. However, even where statutory limits existed for specific gases, they became increasingly redundant as a growing number of works in close proximity to one another caused an aggregate rise in pollution levels. In his ninth annual report for 1872, Angus Smith argued that,

> Chemical works generally are greatly on the increase, and the power to repress escapes of gas does not increase with them...The Alkali Act, which was excellent for a time and has done some good, is becoming less valuable daily. When alkali works accumulate in one place they make even one percent of escape a great evil, and it is impossible practically for all injured persons to receive compensation. I cannot avoid thinking that some relief will be found in the suggestion...to allow no more of the same manufactories at the place. This will give a maximum limit of bad air.[53]

As a solution, in 1872, Angus Smith unsuccessfully proposed the amendment of the law to include new powers to "enter and examine" non-alkali works which produced hydrochloric acid, in order to apply a more precise volumetric test for hydrochloric acid and to place sulphuric and nitric acid works under "interrogative and tentative" inspection.[54] This would have allowed pollution control to progress more rapidly, by facilitating the inspectorate's research into possible abatement techniques for the future. In 1876, Smith repeated this proposal in vain, stating that:

[53]9th R.A.I for proceedings during 1872, (c.815), p.35 (1873), xix.1.
[54]MacLeod, 'The Alkali Acts Administration, 1863-84', p.96.

> ...all chemical works or works giving out offensive gases, such as acids sulphuric, sulphurous, muriatic, or nitric, nitrous gases, sulphuretted hydrogen, chlorine, or offensive compounds of any of these gases or of fluorine, should, on complaint being made, be put for a certain time under inspection. This prevents the demand, at least for the time, of a great number of inspectors.[55]

There were several specific types of unregulated pollutants which caused repeated problems for the alkali inspectors, but until 1874, they had no power to assess or comment upon the emission of any acid gas except hydrochloric acid.[56] Even after the inclusion of increasing numbers of pollutants in the Alkali Act's schedule after this date, the inspectorate still encountered difficulties from several sources of chemical pollution.[57] The first of these was alkali waste heaps. For every ton of soda made by the Leblanc process, approximately double its weight of 'galligu', as it was locally known, was created and dumped in heaps in the vicinity of chemical works. This was a thick mud, which dried into a sludge, frequently caught fire and gave off sulphur dioxide, an irritant and corrosive gas. In February 1891, Alfred Fletcher asserted that 7,000,000 tons of alkali waste had been dumped around chemical works and another 1,000 tons of waste was added every day, which it was impossible to ascribe to any specific manufacturer.[58] A further problem was the drainage from these waste heaps. In the annual report for 1891, Alfred Fletcher explained the difficulties,

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[55]Intermediate R.A.I for proceedings during 1876, (c.165), p.8 (1876), xvi.1.
[56]In his ninth annual report, Angus Smith stated 'I hesitated a good deal about speaking of gases other than muriatic acid from alkali works, but gradually felt more the necessity of speech. Chemical works generally are greatly on the increase, and the power to repress escapes of gases does not increase with them.' 9th R.A.I for proceedings during 1872 (c.815), p.35 (1873), xix.1.
[57]However, fixed statutory standards were set for sulphuric and nitric acid by the Alkali Act, 1881.
[58]P.R.O., HLG29/40, Alfred Fletcher to the L.G.B, 11th February 1891. For further discussion see Fletcher, A.E, 'The Present State of the Law Concerning the Pollution of Air and Water', p.568.

> If this drainage could be collected in sufficient quantity it might be economically dealt with, but unfortunately that cannot often be done; it is found in numberless places, trickling down from the face of the embankments, fouling the ditches at their base, polluting the streams, and occasionally percolating injuriously into colliery workings and into stone quarries. All that can be done is to facilitate its passage seawards, and prevent any admixture with acid drainage.[59]

Even the Committee of the Alkali Manufacturers' Association agreed that this nuisance was intolerable. As early as 1877, the Association resolved that it was necessary in the public interest for inspectors to be enabled to prevent the discharge of this acid into drains and watercourses, contending that powers should be bestowed upon inspectors or local authorities to force manufacturers to provide another outlet for the acid drainage.[60] A decade after this demand the inspectors' powers over alkali waste remained negligible, prompting Alfred Fletcher to complain,

> The inspectors are instructed by section 16 to enter and inspect any place where this material is deposited, with a view to insure the adoption of suitable treatment. As, however, alkali works are not registered under the Act, but only those which are also acid works, this deposition of alkali waste from such works does not come officially to the knowledge of the inspectors, and cases have occurred where public complaint of the nuisance arising from such deposits has given the first

[59]28th R.A.I for proceedings during 1891 (c.6681), pp.153-4 (1892), xx.139.
[60]C.R.O, Papers of the Lancashire Section of the Alkali Manufacturers' Association, DIC/UA/12/3. This demand was met by section 3 of the 1906 Act, although not in an environmentally friendly way. This section empowered sanitary authorities to compel manufacturers to build and maintain a channel, at their own cost, to carry their alkali waste into the sea or an available watercourse. See the Alkali, etc., Works Regulation Act, 1906 (6 Edw.7 c.14.) PP.1906.i.1 (p.2).

intimation of their existence. It would seem right, therefore, that all deposits of alkali waste should be registered under the alkali Works Act.[61]

The problem of alkali waste was tackled by the widespread introduction of the Chance-Claus recovery process from the late 1880s. This process removed the sulphur from the waste, which could be sold on at a profit by the manufacturer.[62] However, the Chance-Claus recovery process was not without harmful by-products, particularly sulphuretted hydrogen (hydrogen sulphide). In a paper presented to the chemical section of the *National Association for the Promotion of Social Science* in 1876, Angus Smith outlined the deleterious effect of this gas upon the environment around the North West, North East and Glasgow. The Chief Inspector was also quick to highlight the risks for human health, stating that 'perhaps no gas is more deadly when it is strong...a cubic inch would kill a man'.[63] In his annual report for 1890, Alfred Fletcher commented that between 10-20% of the sulphur from the Chance-Claus recovery process was being emitted from the air as sulphuretted hydrogen or sulphurous acid.[64] Apparently, the weekly production of sulphuretted hydrogen gas was expected to be 4.5 million cubic feet in one works.[65] In 1891, Fletcher described the result when many works in the same locality began to work the Chance-Claus recovery process simultaneously:

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[61]24th R.A.I for proceedings during 1887 (c.5417), p.16 (1888), xxvi.1.
[62]For the history, development and details of the Chance-Claus Recovery Process, see Chance, A., 'The Recovery of Sulphur from Alkali Waste by Means of Lime-Kiln Gases', *Journal of the Society of Chemical Industry*, issue 188 (1888), 162-179. This was an expensive process. In 1891, Alfred Fletcher notes that over £500,000 had been spent on this process over the last two years. See P.R.O., HLG29/40, Alfred Fletcher to the L.G.B, 11th February 1891.
[63]Smith, 'What Amendments are required in the Legislation Necessary to Prevent the Evils arising from Noxious Vapours and Smoke', pp.521-523.
[64]27th R.A.I for proceedings during 1890 (c.6357), p.12 (1891), xix.119.
[65]P.R.O., MH16/3, Alfred Fletcher to the L.G.B, 25th November 1889.

> ...unfortunately, the same imperfections were repeated in each [work]. There was a loss of the sulphuretted hydrogen with which they were intended to deal...Although the amount of this may have been considered small...in the aggregate the quantity was sufficient to cause a very great nuisance. Had it been one work only that was concerned in this trouble, an obvious course would have been to stop the process till means of curing the defects were found. In this case, however, 15 large works were concerned in it, all started within a few months of one another, with apparatus costing in the aggregate £500,000.[66]

The environmental degradation caused by sulphuretted hydrogen was the cause of particular complaint in and around Widnes.[67] In December 1890, Alfred Fletcher attempted to attack this problem by sending a strident circular letter to Widnes manufacturers operating the Chance-Claus recovery process.[68] Alfred Fletcher also wrote to Widnes Local Board informing them that it had more power than the inspectors to act against sulphuretted hydrogen, as such a nuisance was an indictable offence under the Public Health Act, 1875. Fletcher pointed out that the inspector's right to interfere would be challenged when this process was operated in a work not classified as an alkali work, or where the apparatus for the process was detached from the main alkali work.[69] Widnes Local Board, in conjunction with the Associated Sanitary Committees, retaliated by demanding that the L.G.B pass a provisional order so that the Alkali Inspectorate was

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[66]28th R.A.I for proceedings during 1891 (c.6681), p.9 (1892), xx.139.
[67]Richard Hawes has provided an informative study of the difficulties faced by the inspectorate in controlling the emission of sulphuretted hydrogen (hydrogen sulphide) in St. Helens, concluding that 'local economic importance proved to be sufficiently powerful to deflect regulation from any source.' See Hawes, 'The Control of Alkali Pollution in St. Helens, 1862-1890.'
[68]For further details of this circular, see 4.2.
[69]P.R.O., MH16/3, Alfred Fletcher to Widnes Local Board, 6th December 1890.

empowered to control this nuisance.[70] Sulphuretted hydrogen emissions from certain types of chemical works were accordingly brought under central government control by the Alkali Act, 1892.[71]

Central government control over copper works was even more difficult for the Alkali Inspectorate to achieve. The 'wet' copper process of alkali manufacture, which was distinct from copper smelting and did not produce copper smoke, was regulated under the Alkali Act, 1874. However, copper works which roasted sulphurous ores continued to cause massive amounts of environmental damage, unhindered by legislation. The acid gases of sulphur dioxide and hydrogen fluoride, and the particles of copper, sulphur, arsenic, lead and antimony given off by copper smelting caused particularly great environmental problems around Swansea, as this area produced approximately 90% of British copper in the period 1690-1920.[72] One metallurgist calculated in the mid-1840s that 92,000 tons of sulphurous acid was emitted into the atmosphere each year by the copper smelters of Swansea.[73] In the absence of State controls, the resulting environmental degradation was the cause of contentious private litigation in South Wales.[74] Accordingly, the regulation of the copper industry was a central concern for the Inspectorate throughout this period. During the 1860s, two types of furnace (the Muffle furnace and the Gerstenhöfer furnace) were devised which tackled the problems posed by

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[70]P.R.O., MH16/3, Memorial from the Associated Sanitary Committees to the L.G.B, 5th January 1891.
[71]See section one of the Alkali, etc., Works Act, 1892 (55 & 56 Vict. c.30) PP.1892.i.67 (p.67) and Alfred Fletcher's comments in his 28th Annual Report for proceedings during 1891 (c.6681), p.156 (1892), xx.139.
[72]Newell, E., 'Atmospheric Pollution and the British Copper Industry, 1690-1920', *Technology and Culture*, 38 (1997), 655-689 (p.657).
[73]ibid., p.661.
[74]For further details see Rees, R., 'The Great Copper Trials', *History Today*, December (1993), and *idem*, 'The South Wales Copper-Smoke Dispute, 1833-95', *Welsh History Review*, 10 (1981).

copper smoke pollution. However, the furnaces could only remove 33-40% of the sulphur, could not smelt ores of more than 20% sulphur content, and were expensive to install.[75] To work around these technical difficulties, in 1871, Angus Smith contended that copper works should be subjected to partial inspection, with a view to their eventual inclusion under the Alkali Act. The Chief Inspector argued that this occasional inspection should occur when complaints arise and:

> ...the works giving gases out [could] be put under inspection for a time, say a year or part of one, and the results could then be used in order to estimate the amount of damages payable in any action raised thereon. If any work were so examined where others also existed around, the examination of the whole would require to be made in order to find the proportionate liability of each.[76]

Smith's efforts were in vain, despite the recommendation in the report of the Royal Commission of 1878, which favoured the introduction of "interrogative and tentative" inspection, on the grounds that economically practicable means for the abatement of copper smoke were unavailable at that moment in time.[77] The problems presented by unregulated copper works continued to haunt the inspectorate throughout this period. In 1900, Russell Forbes Carpenter complained that copper works were a class of works where:

> ...definition has been <u>lamentably</u> inadequate, but it is a class where I see no chance of applying any adequate remedy. Mr. Fletcher failed; I have failed hitherto, I may get better light by and bye [sic] but I see no prospect yet, so though Dr. Fryer, my

[75]Newell,'Atmospheric Pollution and the British Copper Industry, 1690-1920', pp.677-678.
[76]8th R.A.I for proceedings during 1871 (c.582), p.10 (1872), xvi.1.
[77]Newell, 'Atmospheric Pollution and the British Copper Industry, 1690-1920', p.686.

> Bristol inspector, presses me at our staff meetings, I have hitherto turned a deaf ear, though I fully recognize the extent of the nuisance caused.[78]

Despite the failure of parliamentary bills in 1904 and the following year, progress was achieved when copper works were finally brought under the 'best practicable means' clause of the Alkali Act, 1906.[79]

Best Practicable Means

Aside from pollutants excluded from the statutes, there were pitfalls in the existing legislation which made it problematic for the inspectors to implement. One of these was the formula of 'best practicable means', which was introduced by the Alkali Act of 1874 as a prerequisite for registration under the Act. Section five of this statute stated that,

> In addition to the condensation of muriatic acid gas...the owner of every alkali work shall use the best practicable means, within reasonable cost, of preventing the discharge into the atmosphere of all other noxious gases arising from such work, or of rendering such gases harmless when discharged.[80]

In cases where a fixed standard of acid gas emission could not be set, owing to financial or technical difficulties, the formula of 'best practicable means' was often substituted. 'Practicable' was taken to mean reasonably practical, having regard to considerations such as local conditions, financial implications and the current state of technical

[78]P.R.O., HLG29/87, Russell Forbes Carpenter to Alfred Adrian, Legal Advisor at the Local Government Board, 2nd February 1900.
[79]See section 27 of the Alkali, etc., Works Regulation Act, 1906 (6 Edw.7 c.14.) PP.1906.i.1 (p.13).
[80]Alkali Act, 1863, Amendment 1874 (37 & 38 Vict. c.43) PP.1874.i.17 (p.20).
Alkali Act 1874. Penalties for not utilising the best practicable means were set at £20 for a first offence, and rose to £50 for a second infraction, with additional fines for each day the nuisance continued.

knowledge.[81] The term 'means' included the design, installation, maintenance, periods of operation of plant and machinery and the design, construction and maintenance of buildings. Therefore, the phrase did not refer to the best available method, but instead meant the method which the manufacturers felt that they could install at a cost they believed reasonable.[82] Angus Smith wrote that the phrase 'best practicable means' was a useful temporary expedient, a precursor to definite fixed standards that may:

> ...be applied to everything relating to the condensation of the gases, that is to the total quantity escaping from any part or parts of the works or to the method of escape, but no objection shall be taken to any escape from a chimney or flue on the basis of the amount per cubic foot when that amount is in accordance with the demands of Section three.[83]

Alfred Fletcher believed that the phrase 'best practicable means' gave the inspectors enormous scope for controlling emissions, as it covered all aspects of emissions control and also allowed for recent pollution abatement processes to be implemented. Fletcher maintained that this standard was a flexible one 'which can never grow antiquated, nor

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[81]Of these economic considerations are the most important. In 1970, Frank Ireland, Chief Alkali Inspector argued that virtually all pollution control problems could be solved and 'the only reason we still permit the escape of pollutants is because economics play such an important part in the word 'practicable' in the expression 'best practicable means'; most of our problems are cheque book rather than technical.' Quoted in Bugler, J., *Polluting Britain: A Report* (Harmondsworth: Penguin, 1972), p.23.

[82]Bugler, *Polluting Britain*, p.23. Bugler argues that the term best practical means tends to get interpreted as meaning 'the cheapest practicable means' and does not place any obligation for the polluting company to find the best practical means. Furthermore, Brenner has contended that the term 'best practical means' represented the legal enshrinement of a compromise, which attempted to ensure both national prosperity and environmental health. See Brenner, J.F, 'Nuisance Law and the Industrial Revolution', *Journal of Legal Studies*, 3 (1974), 403-433 (p.428).

[83]C.R.O, Papers of the Lancashire Section of the Alkali Manufacturers' Association, DIC/UA/12/3.

can it be oppressive; neither on the other hand, is it so loose to be ineffective.'[84] In his 24th annual report for 1887, Fletcher argued that this standard would:

> ...prove an elastic band ever tightening as chemical science advanced and placed greater facilities in the hands of the manufacturer. When necessary, it could be shown that this phrase would give greater security to the public than would the adoption of any fixed standards, at the same time pressing with less severity on some of the manufacturers, but more equally on all.[85]

Furthermore, no manufacturer could reasonably object to an obligation which asked him to do his best to protect his neighbours from pollution. In the *Journal of the Society of Arts*, Fletcher argued that not only was the term independent of definite fixed standards, it also constructed them,

> If it can be shown, after prolonged observation, that in conducting some process of manufacture a certain amount of success in controlling noxious emanations is usually achieved, this result becomes a basis for the future, a standard to which all expected to conform; and this standard has the great advantage over one rigidly fixed by Act of Parliament, that it is one which accommodates itself to the various conditions of manufacture and the changing light which knowledge brings to bear on it.[86]

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[84]26th R.A.I for proceedings during 1889 (c.6026), p.115 (1890), xx.1.
[85]24th R.A.I for proceedings during 1887 (c.5417), p.19 (1888), xxvi.1. For further discussion see Fletcher, 'The Present State of the Law Concerning the Pollution of Air and Water', p.573.
[86]Fletcher, 'The Present State of the Law Concerning the Pollution of Air and Water', p.574. Angus Smith also saw a great value in this flexible term for the same reasons. He wrote to the L.G.B, on the 20th March 1884 that 'I am most desirous that no details of means should be given. To discuss the best means is to discuss the inventions of the future and to limit them; a method which would bring the proposal into ridicule. I hope no such detail will enter into the printed papers.' P.R.O., MH16/2, Angus Smith to the L.G.B, 20th March 1884.

However, the phrase 'best practicable means' was not without difficulty for these enforcement agents. In his report for 1889, Alfred Fletcher explained that the inspectors did not possess the power to insist upon the use of any particular method for the abatement of noxious gases. Fletcher wrote,

> It is clearly understood that the inspector should deal only with results, and should, as far as possible, avoid interference with the construction of apparatus or the arrangement of a process. The Act deals only with results, it limits the amount of noxious gas which shall be allowed to escape in a given volume of air, or measuring it in relation to the total amount generated, limits the proportion which may pass away, but leaves the manufacturer free as to the means he should employ.[87]

A further difficulty with this term was that it was the additional responsibility of the inspectors to assess what constituted reasonable expense; a problem which delayed the introduction of the state regulation of salt works. In February 1884, Herbert Boyce, an L.G.B official explained:

> ...it would be extremely difficult to state what expense will be involved in adopting the best practical means in each case, as it is impossible, without careful inspection of each works, to say what alterations will be requisite in any particular instance...Dr. Angus Smith is satisfied that the cost of carrying out his

[87]26th R.A.I for proceedings during 1889 (c.6026), p.6 (1890), xx.1.

requirements would not exceed in any case what the Court would consider reasonable.[88]

The question of 'reasonable expense' was even more difficult to assess in the case of cement works, and delayed legislative control until 1935.[89]

It is also notable that the existence of the formula 'best practicable means' essentially formed a defence to the charge of contravening the Acts. In court, the burden of proof was placed upon the enforcing authority, as it was the responsibilty of the inspectorate to prove that the 'best practicable means' had not been employed by the manufacturer. The inspectors were not simply enforcing a simple right or wrong that could be easily attained.[90] A definite fixed standard for each gas would have made it easier for inspectors to prove infractions in court. As Angus Smith argued in his report for 1866,

> If a similar fixed point could be adopted in the case of every gas, there would be complete protection to the public and manufacturer on both sides up to that point, occasional mistakes and accidents excepted. It seems to me a most important thing to seek such fixed points, and where they cannot be attained to make the nearest approach to them, so that evidence may be taken by competent persons on the spot...[91]

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[88]P.R.O., MH16/2, Herbert Boyce to Hugh Owen, Permanent Secretary at the L.G.B, 29th February 1884. A Provisional Order governing salt works was passed in 1884, see L.G.B Provisional Order Confirmation Act, 1884 (47 & 48 Vict. c.157) PP.1884.iv.381.

[89]In 1935 it was laid down that new cement works had to include electrostatic precipitators and limit emissions to 0.5 grains per cubic foot of gases. See Clapp, B.W., *An Environmental History of Britain* (London: Longman, 1994), p.51.

[90]Rhodes, *Inspectorates in British Government*, pp.128-129.

[91]3rd R.A.I for proceedings during 1866 (c.3792), p.53 (1867), xvi.1. See also 8th R.A.I, 1871 (c.582), pp.4-5 (1872), xvi.1.

For this reason, Smith saw the requirement of 'best practicable means' as no more than a precursor to the setting of definite fixed emissions standards. Even though this was not technically feasible in 1866, Smith believed it would be possible in the future. Moreover, even though Alfred Fletcher had a broader perception of the term 'best practicable means', he still asserted that this clause was problematic in court cases. In 1892, he stated:

> ...no prosecution under the Act could be maintained until the inspector were able to convince a judge and jury that the best practical means had not been adopted for the suppression of the evil under complaint. To do this he would probably have to point out some means that were acknowledged to be practicable and were in common use for attaining the end in view. This, too, he must do in the face of skilled witnesses that might be brought to confront him in open court. It is certain that no inspector would subject himself to such an ordeal unless he had a very strong case to maintain.[92]

Finally, the phrase 'best practicable means' undoubtedly increased the workload of the inspectorate, who were expected to educate manufacturers about the most recent, efficient and cost effective technological developments. Angus Smith had stated in his third annual report that,

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[92]Fletcher, A.E., 'Modern Legislation in Restraint of the Emission of Noxious Gases from Manufacturing Operations', *Journal of the Society of Chemical Industry*, 11 (1892), 120-123 (p.123). Dr. Ferdinand Hurter, the United Alkali Company's chief chemist argued against the application of the term 'best practicable means', on the grounds that it bestowed too much power on Judges and Juries, who had to both define this formula and decide if it had been applied by the defendant in each particular case. See 'Adjourned Discussion on Mr. Fletcher's Paper on Modern Legislation in Restraint of the Emission of Noxious Gases from Manufacturing Operations', *Journal of the Society of Chemical Industry*, II (1892), pp.309-312 (p.311).

> I do not think it well to take from the manufacturer all responsibility and to leave him to wait until the inspector informs him that some change is needful. This plan may be best for a while, but the whole responsibility must gradually be thrown back as the letter of the law directs. This will be a great relief to the inspectors who may have taken upon themselves more than was demanded.[93]

In the final analysis, the responsibility of defining and overseeing the instalment and operation of the 'best practicable means' complicated, rather than eased the inspectorate's task. However, there was no workable alternative, at least in the first instance, as cheap, efficient abatement processes were not known for many noxious gases.[94]

Anomalies

Anomalies in the schedule of chemical works registered under the Alkali Act, 1881 were an additional constraint upon the operation of the Alkali Inspectorate. The major problem was the distinction made in the schedule between the manufacture, and the use of acid. In cases where noxious vapours such as nitric acid, sulphuric acid and hydrochloric acid were manufactured, these processes were included under the Act. However, where a process merely used these acids, the manufacturer was exempt from regulation and inspection. Therefore a situation existed which allowed for the 'legal' and 'illegal' emission of acids, although their detrimental effect on the surrounding environment was

[93]3rd R.A.I for proceedings during 1866 (c.3792), p.48 (1867), xvi.1.

[94]Sir Henry Enfield Roscoe, who served on the R.C.N.V in 1878, commented that 'the escape of noxious vapours cannot in all cases be prevented without seriously interfering with trade. For instance with glassworks an enormous quantity of saltcake is employed, the sulphuric oxide being given off in the process of fitting the materials. No one has yet proposed a method by which these acid fumes could be collected or absorbed without greatly damaging the industry by reason of the costliness of such a process.' Rosoce, H.E., *The Life and Experiences of Sir Henry Enfield Roscoe* (London: Macmillan, 1906), p.162.

obviously identical.[95] Furthermore, it was written into the legislation that a manufacturer who used acid would only be inspected if he made any effort to abate the noxious by-products. Hence, it was not in the interests of these manufacturers to attempt to control pollution. The anomalies were clarified in 1888 by Alfred Fletcher, who commented on nitric acid:

> ...the manufacture of this acid is named in the schedule to the Act, but not the use of it. It is in the use, however, of nitric acid that the greatest difficulty arises; when used as an oxidising agent large volumes of acid fumes are given off, and strangely this operation does not come within the reach of the Act until some means are adopted for condensing the fumes. This is generally accomplished by a process of oxidisation under which nitric acid is reformed. As this, in a sense, is a manufacture of nitric acid, the operation comes under the Act, and the works are inspected, and in an extreme case if the condensation and retention of the acid were negligently and imperfectly performed, the manufacturer might be fined; but should a neighbouring manufacturer make no attempt at condensation and allow the whole of his nitrous fumes to escape unchecked, he would do so with impunity as far as the Alkali Act is concerned.[96]

The same anomaly existed in regard to sulphuric acid, where manufacture was included under the Alkali Act, but use was not. One example of this was the manufacture of the dye venetian red, on which Fletcher commented,

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[95]See Fletcher, 'The Present State of the Law Concerning the Pollution of Air and Water', p.573.
[96]24th R.A.I for proceedings during 1887 (c.5417), p.17 (1888), xxvi.1.

> During the process, sulphate of iron is roasted at a high temperature. Sulphuric and sulphurous acids are given off in large quantity causing great nuisance; where, however, some effect is made to arrest these acid gases, and by the reformation of sulphuric acid to condense them, the work comes under registration and inspection as a place for the manufacture of sulphuric acid.[97]

Even the first gas to be identified and subjected to central government control - hydrochloric acid, was exempt from inspection when it was used rather than manufactured. In 1887 Alfred Fletcher observed that,

> This anomaly became very marked at one of the alkali works under inspection. A test made of the gases passing up the chimney showed the presence of hydrochloric acid. Some of this, however, was known to proceed from a process not within the scope of the Alkali Act, and not liable to inspection...no notice could be taken of the major quantity, the acid not under the control of the Act. It cannot be supposed, however, that on gaining access to the outer air from the chimney top, any difference would be made by the hydrochloric acid of the registered or the unregistered process in their attack on the trees or crops of the neighbouring farmers.[98]

The alkali inspectors believed that the solution for anomalies and omissions from the schedule would be to alter the whole emphasis of the alkali legislation. In 1881, Angus Smith composed a Bill which sought to list and regulate the noxious gases themselves, rather than the processes that produced them. This would have given the Inspectorate the

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[97]ibid.
[98]ibid.

power to deal with specified pollutants from any industrial source, regardless of the process involved.[99] However, John Stephenson M.P, a representative of manufacturing interests, complained personally to J.G Dodson, the then President of the L.G.B, that this blanket provision to cover all gases would mean that no works would be spared inspection. Owing to such pressure, the Alkali Bill submitted to the Lords in February 1881 omitted the provision for a schedule of gases rather than processes.[100] Every Chief Inspector who served after Smith continued the campaign for a schedule which named noxious gases rather than the specific processes which produced pollution. Alfred Fletcher believed that the existing schedule was 'essentially cumbrous, incomplete and indefinitive'.[101] He argued that a schedule which listed harmful emissions rather than the numerous processes which produced them, would have a variety of benefits. In 1887, Fletcher contended that:

> ...if instead of placing alkali works under inspection on account of a possible escape of hydrochloric acid gas, this acid itself were named and its emission controlled, then all processes during the conduct of which its escape were possible would be brought under inspection, whether they were processes in which the acid

[99]Frankel, M., 'The Alkali Inspectorate: The Control of Industrial Air Pollution', *Social Audit Special Report* (London: Social Audit Ltd, 1974), p.6.
[100]MacLeod, 'The Alkali Acts Administration, 1863-1884', p.107. However, it is notable that many manufacturers wholeheartedly supported the introduction of a more wide-ranging schedule which listed gases rather than processes. In 1892, Eustace Carey of the United Alkali Company argued that the present schedule was the cause of 'glaring anomalies', see 'Adjourned Discussion on Mr. Fletcher's Paper on Modern Legislation in Restraint of the Emission of Noxious Gases from Manufacturing Operations', p.309. In May of the same year, the *Chemical Trade Journal* stated that 'there is only one method of dealing with these gases, and that is to specify each one by name, and any manufacturer whatever who happens to evolve any of them in any process whatsoever should be brought at once under inspection. Inspection should have no terrors for a man who wishes to carry on his works with as little nuisance to his neighbours as possible.' See 'A New Alkali Bill', *Chemical Trade Journal*, 10 (1892), 337-340 (p.339).
[101]P.R.O., MH16/3, Alfred Fletcher to the L.G.B, 25th February 1890.

> was manufactured or in which it was used and liable to be volatilised. A list of such noxious gases might, I think, be drawn up with a much closer approach to completeness than can be reached in the attempt to make out a list of the processes of manufacture during which such gases are liable to be emitted.[102]

In his twenty seventh annual report for 1890, Alfred Fletcher explained that a schedule of gases, rather than of processes, would be a simpler solution,

> If, for instance, all processes from which sulphuretted hydrogen were liable to be discharged, came on that account within the scope of the Act, a large group would be brought in. It would not then be necessary to describe each separate process of manufacture and indicate the method by which this gas is generated. The fact that such a gas was present and liable to escape into the air would be sufficient to bring the operation within the scope of the Act.[103]

In 1889, the specific anomalies caused by the process schedule in the 1881 Act were outlined by Fletcher. Firstly, chemical processes altered so rapidly, that the list of processes to be overseen could never be definitive. Also, a manufacturer would escape regulation if he were utilising a new process not named in the schedule, even if they were producing vast amounts of a noxious gas. Fletcher argued:

> ...the chief cause of these anomalies lies in the fact that in the Alkali Act a schedule is given of the manufacturing processes which should come under the inspection provided by the Act. These processes however may vary from day to

[102] 24th R.A.I for proceedings during 1887 (c.5417), p.18 (1888), xxvi.1.
[103] 27th R.A.I for proceedings during 1890 (c.6357), p.141 (1891), xix.119.

day and the Inspector has no power to examine any processes not named in the Act, though it may be as noxious as any in the schedule and emitting the same gas.

Therefore, Fletcher suggested that,

> A simple cure for this ever growing weakness in the Act would I think be found in naming the noxious gases to be controlled instead of the processes of manufacture in which they are produced. The list would contain the same noxious gases whose repression is sought under the present Alkali Act. They are not numerous, a list of eight includes them all, while the various processes of manufacture from which these gases or one of them may emanate are far more numerous and their schedule can indeed never be made complete.[104]

Fletcher named the eight gases to be scheduled as the acid compounds of chlorine, fluorine, sulphur, nitrogen, sulphuretted hydrogen, metallic fumes (containing lead, copper, zinc, antimony, arsenic or their compounds) and the fumes emitted from cement works. However, the attempts of the second Chief Inspector to alter the emphasis of the Alkali Acts were as unsuccessful as that of his predecessor. Alfred Fletcher wrote in December 1889 that the Permanent Secretary of the L.G.B, Sir Hugh Owen, had insisted on a compromise,

> In conversation on this subject Sir Hugh Owen points out that it may be thought undesirable to unsettle the Alkali Act so soon after its amendment in 1881 and that rather than recast the schedule it might be sufficient for the present purpose to

[104]P.R.O., MH16/3, Alfred Fletcher to the L.G.B, 24th January 1889.

> add to it...the addition to the present list of works would be as follows:- "Sulphur recovery works or works in which sulphur is extracted from 'alkali waste'".[105]

The Chief Inspector criticised this compromise, arguing that the alteration to the schedule meant that there would be three clauses to control sulphuretted hydrogen, whilst naming the gas itself in the schedule would cut the need for this and any other inaccuracies. According to Fletcher this 'would also make the Act more truly a noxious vapours Act as was obviously intended by its framers.' Alfred Fletcher disagreed with Hugh Owen's opinion that the 1881 act was too recent to consider amendment, contending:

> ...the alleged fault to be remedied was not made in the original act of 1863 but in the amended act of 1881 where the schedule of inspected processes occurs. The inconvenience arising from the alleged faulty description or designation of the subjects of inspection has been a growing one and will ever increase.[106]

The Victorian Alkali Inspectorate never overcame the anomalies of the schedule of manufacturing processes rather than noxious gases. The piecemeal approach of adding new processes to the schedule by Provisional Order was consolidated by the Alkali Act, 1906.[107] In fact, W.A. Damon, who served as chief inspector from 1929-1955, was also unsuccessful in his attempt to introduce the control of gases without the specific classification of manufacturing processes, and a process based schedule remains in existence today.[108]

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[105]P.R.O., MH16/3, Alfred Fletcher memorandum, 16th December 1889.
[106]ibid.
[107]See section eight on Provisional Orders and the first schedule attached to the 1906 Act, which lists the type of works and processes to be regulated. Alkali, etc., Works Regulation Act, 1906 (6 Edw.7 c.14.) PP.1906.i.131.
[108]See Frankel, 'The Alkali Inspectorate', p.6.

6.4: Prosecution

A number of difficulties faced the Alkali Inspectorate if it decided to initiate legal proceedings against chemical manufacturers. First, there was a time limit of three months within which the inspectorate had to either recover a fine on an unregistered work, or collect evidence and initiate proceedings against a work that was emitting noxious gases.[109] In his twenty fourth annual report, Alfred Fletcher complained,

> That there should be such limit of time where the alleged offence is the excessive emission of a noxious gas is most desirable, but it is otherwise when the offence is that of carrying on works not previously registered as directed under the Act. Then the lapse of so short a time should not bar proceeding.[110]

Second, the inspectorate had to consider the high cost of legal proceedings, in the light of the low annual budget granted for incidental expenses. For example, it was indicated in chapter five that the cases against Messrs Golding and Davis (1879) and Mr. Snape of the Phoenix Alkali Works (1879), were both settled out of court with the offenders payment of the maximum fine of £50 (see appendix one). However, the solicitor's bill of costs for

[109]P.R.O., MH16/2, Hugh Owen to Alfred Fletcher, 14th January 1887. The factory inspectors faced the same predicament. The Factory Act of 1833 dictated that a prosecution had to be brought within fourteen days of the commission of the offence. See Bartrip and Fenn, 'The Conventionalisation of Factory Crime: A Reassessment', p.183.

[110]24th R.A.I for proceedings during 1887 (c.5417), p.20 (1888), xxvi.1. This constraint was partly removed by section 17 (2) of the 1906 Act, which removed the limitation of three months within which it was necessary that proceedings for the recovery of a fine for non-registration should be commenced. See 43rd R.A.I for proceedings during 1906 (c.161), p.14 (1907), ix.219. However, section 18 of the 1906 act enacted that 21 days before any court hearing for failing to abate noxious gases, the inspector must serve a written notice to the defendant stating the facts behind the initiation of legal action, and the details of the technical means that the manufacturer had failed to use. See the Alkali, etc., Works Regulation Act, 1906 (6 Edw.7 c.14.) PP.1906.i.1 (p.11).

dealing with these actions was £220, nearly the entirety of the inspectorate's budget for incidental expenses for 1879 (£250).[111]

Moreover, even the imposition of a fine at the highest level for a first offence (£50) would have acted as an efficient deterrent for few offenders. For example, the Widnes Traders' Association record of the gross and rateable value of various chemical works for 1879 indicates that Golding, Davis and Company was worth £2,500 (gross) with a rateable value of £1,750. Furthermore, the Phoenix Alkali works owned by Mr. Snape had a gross value of £498, and a rateable value of £358.[112] Therefore, it can be assumed that a £50 fine imposed by the Alkali Inspectorate would certainly not have caused any lasting financial hardship to these chemical manufacturers. In general terms the maximum fine may not have deterred a determined offender, who could make a significant profit whilst law-breaking.[113]

A third restriction upon the use of legal sanctions by the Alkali Inspectorate was the power possessed by juries and the negative attitude of jurors towards this type of case.[114] In his report for 1887, Alfred Fletcher complained that,

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[111]P.R.O., MH16/1, Darbishire and Tatham Solicitors to the L.G.B, 2nd January 1880. For details of annual budgets for incidental expenses, see the Civil Service Estimates, 1864-1907. It is notable that by 1898, the annual budget granted to the inspectorate under the heading of incidental expenses had only risen to £350.
[112]C.R.O, Widnes Traders' Association Scrapbook, DIC/UA/17/31.
[113]This echoes the conclusions of Clark Nardinelli, who has contended that the penalties inflicted on offenders under the Factory Acts did not constitute a great burden to factory owners. He states that in 1835 the total fines and costs imposed was £2,722, which represented approximately 0.005% of the net value of textile output in that year. Furthermore, in most years total fines and costs amounted to about 0.001% of the net value of output, and the net annual income of many large mill-owners exceeded the £9,021 in total fines and costs collected during the first ten years of factory legislation (1834-43). See Nardinelli, C., 'The Successful Prosecution of the Factory Acts: A Suggested Explanation', *Economic History Review*, 38 (1985), 428-430 (p.429).
[114]The qualifications required for jury service during this period were to be a male British citizen between the ages of 21 and 60, without any criminal conviction. The property qualification was land ownership or rental income of £10 a year, or £20 p.a in land or tenements held by lease for twenty one years or longer, or to be a householder liable for £20 per annum in poor rates (£30 p.a in Middlesex). Furthermore, it was

> All proceedings for the recovery of penalties are taken in county courts, and the amount of the penalty is sued for as a debt due to the chief inspector. In these courts, however, it is competent for either party to a suit to demand that the case shall be tried by a jury, who are called not only to pronounce as to the justice of the claim, but to determine its amount. In the case of a suit for the recovery of a penalty under the Alkali Act, which is one of a quasi-criminal nature, and not for the simple recovery of a civil debt, the anomaly presents itself of a jury being empowered not only to give a verdict as to the truth of the accusation brought, but to determine the amount of the penalty that should be inflicted. On more than one occasion the inconvenience of this arrangement has been very obvious, and has made the occasion of strong comment by the judge sitting in the case.[115]

The case against the St. Helens Alkali Company in 1880 particularly highlighted these anomalies (see appendix one).[116] Angus Smith commented that,

> The Judge directed the jury that they must find that the offence under the act had been committed and that it was for them to say what the penalty was to be and this should be such a sum as would deter the defendants from committing another offence. The jury found that that the defendant had committed an offence and fixed the penalty at £5 adding a recommendation that a resident inspector or sub-inspector should be appointed by the government.[117]

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stipulated that jurors must not be kin or acquaintance to either party in the law suit. See Stephen, J., *New Commentaries on the Laws of England*, III, 8th edn. (London: Butterworths, 1880), pp.542-545.

[115]24th R.A.I for proceedings during 1883 (c.5417), p.20 (1884), xxvi.1.

[116]Angus Smith reflected that 'in this class of case the jury are put in the awkward position of having to decide whether the offence has been committed and then of awarding the punishment in fixing the penalty.' P.R.O., MH16/1, Angus Smith to the L.G.B, 18th August 1880.

[117]ibid.

Angus Smith had hoped for a penalty of £50. [118] Despite the small penalty, the Judge did all that he could in support of the inspectorate, by awarding costs against the defendant on the higher scale.[119] Reasons for the negative attitude of jurors, and 'the danger of a jury with local sympathies', were discussed by Smith in a letter in August 1880. According to the Chief Inspector, the landlord of a local hotel had told him that the case against the St. Helens Alkali Company victimized this small chemical works. This landlord argued:

> ...the sympathy of the Jury was with the chemical manufacturers of the neighbourhood and the defendants in particular, as they thought the defendants were being persecuted in being prosecuted, while some large concerns and great offenders in the way of emission of noxious vapours got off free. He even said that if they had only seen how to do it they would have let off the defendants altogether.[120]

Furthermore, the landlord admitted an economic argument in favour of the St. Helens Alkali Company. He commented:

> ...that he for one did not wish these Acts to be strictly carried out or the peculiar trade of St. Helens would leave it and 'then how should he live?...He called my

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[118] 17th R.A.I for proceedings during 1880 (c.3081), p.71 (1881), xxiii.1.

[119] P.R.O., MH16/1, Angus Smith to the L.G.B, 18th August 1880. The supportive attitude of the judiciary in this case is revealing as several commentators have argued that the magistracy was unsupportive towards the factory inspectorate. It has been argued that the magistracy were reluctant to convict fellow millowners, and often mitigated penalties to £1 - 'the sovereign remedy.' Bartrip and Fenn have discovered that during the period 1844-1864, the magistracy imposed minimum fines in about 75% of all convictions, and have suggested that the negative attitude of the magistracy discouraged the use of prosecution as an enforcement option. See Bartrip and Fenn, 'The Administration of Safety', pp.96-97 and *idem*, 'Success or Failure? The Prosecution of the Early Factory Acts.' In opposition to this argument, Peacock has contended that the magistracy *were* supportive of the factory inspectors and did impose reasonable fines. This commentator believes that the magistracy did not wish 'to show themselves unworthy of their commission.' See Peacock, A.E, 'The Successful Prosecution of the Factory Acts, 1833-1855', *Economic History Review*, 37 (1984), 197-210 (p.210).

[120] P.R.O., MH16/1, Angus Smith to the L.G.B, 18th August 1880.

> attention to some copper works and said they were about the worst offenders and could not understand that they were not within the scope of the Alkali Act.[121]

The case against the Sutton Lodge Chemical Company in 1884 (see appendix one) also highlighted the problematic nature of prosecuting infractions of the Alkali Act. As previously discussed in chapter five, acid liquor was allowed to flow from their works and come into contact with drainage from alkali waste.[122] Although the manager had claimed that this escape was accidental, legal proceedings were initiated. When the case was heard at St. Helens County Court in October 1884, the defence contended that the foreman, Mr. Johnson, 'alone was liable'. However, the Sutton Lodge Chemical Company was found guilty and ordered to pay a small penalty of five pounds, although costs of over £18 were awarded against the company.[123] Alfred Fletcher noted that this case made two weak points in the Alkali Act apparent,

> The fact that a jury can be called upon to try these cases and to fix the amount of the fine, a course described by the Court as most unusual in British jurisprudence. The clause 25 under which a manufacturer may throw the blame and the penalty

[121]ibid. In his 17th annual report, Angus Smith offered further comment on the case against the St. Helens Alkali Company. He stated that 'there was a strong feeling shown by the jury in favour of the works, and I did not get my own way inasmuch as the fine was made £5 instead of £50. I had a good reason to believe that this was done under mistaken apprehension that inspection was in the direction of driving out the works from the town. More minute inspection will, on the contrary, enable more works to be built. It is the fault of the alkali makers...that they have not arrived at such a complete condensation as to make all fear on their account groundless.' 17th R.A.I for proceedings during 1880 (c.3081), p.71 (1881) xxiii.1.

[122]This was a particularly serious offence, reflected in the fact that it carried the heaviest penalty set by the legislature. Section five of the 1881 Act provided for penalties of fifty pounds for allowing acid liquor to come into contact with 'tank waste', one hundred pounds for any subsequent offence of this type and five pounds for every day that this offence continued. See the Alkali, e.t.c., Works Regulation Act, 1881 (44 & 45 Vict. c.37) PP.1881.I.25, p.28, s.5.

[123]P.R.O., MH16/2, John Swift Solicitors to Alfred Fletcher, 25th November 1884.

> onto a workman, his servant. In this trial this plea was advanced but repressed by a ruling of the judge.[124]

The *St. Helens Newspaper and Advertiser* was also driven to comment on the anomalies illustrated by this case. In the issue for the 1st November 1884, it was reported that the Judge:

> ...did not know of any other case within the scope of English jurisprudence where the jury were called upon not only to answer the question whether the defendants were liable or not but were also empowered and required to assess the amount of the penalty. The Act did not fix one certain sum which could neither be augmented nor reduced, but it said 'a penalty not exceeding £50' so that if a jury found defendants liable it would be in their power to assess the fine at the full amount of £50 or to reduce it to what they thought reasonable and proper...The Judge remarked that he never heard before of a jury being asked to fix a penalty...His Honour remarked that any juryman who had a prejudice against any particular works might render the Act nugatory. He might stand out for a verdict of acquittal or a farthing damages against the opinions of his fellows.[125]

However, an analysis of the penalties imposed on polluters by juries does not indicate a strong movement towards £1 fines. Figure three indicates that £1 penalties were only

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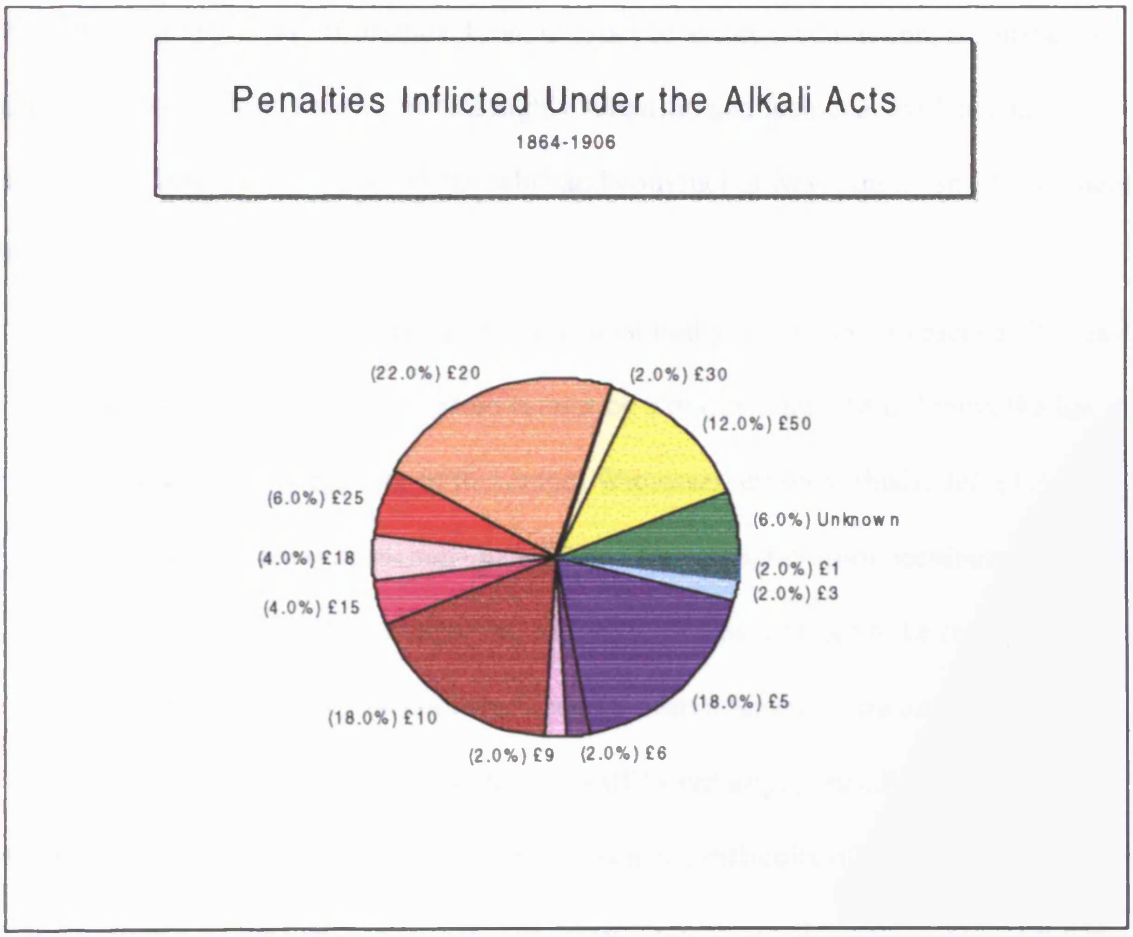
[124]P.R.O., MH16/2, Alfred Fletcher to the L.G.B, 21st November 1884. According to W.G Carson, this loophole also existed in the 1833 Factory Act, whereby 'it was legally permissible to shift responsibility from the mill-owner to the employee, where the magistrates were satisfied that the offence had been committed without the personal consent, concurrence or knowledge of the master.' Carson has indicated that there were cases of active collusion between master and servant, where the workman would take the blame and the owner would reimburse the minimal fine likely to be inflicted upon him. Carson, 'White Collar Crime and the Institutionalisation of Ambiguity', p.143.

[125]P.R.O., MH16/2, *St. Helens Newspaper and Advertiser*, 1st November 1884.

imposed in 2% of cases that reached the courtroom during this period. The most common penalty was £20 (22%).

Figure Twelve



Taken from the Annual Reports of the Chief Inspector 1864-1906.[126]

[126]Interestingly, Bartrip and Fenn have discovered that in the period 1834 to 1876, the average fine set for offences against the factory acts fell from £4 to £1, and that fluctuations may have been affected by the broader economic context. Bartrip and Fenn, 'The Evolution of Regulatory Style in the Nineteenth-Century British Factory Inspectorate', p.210. The low number of prosecutions undertaken by the Alkali Inspectorate renders it impossible to assess whether the penalties imposed on offenders against the Alkali Acts altered significantly over time, or were influenced by economic fluctuations or depressions.

The final constraint upon the use of prosecution as an enforcement tool was that it depended upon the Alkali Inspectorate's ability to prove an offence in court. However, this involved manifold difficulties. First, in order to assure a conviction, the inspectors had to rely upon witnesses to present highly scientific and technical evidence to unqualified juries in a fair, understandable and convincing way. Angus Smith commented that:

> ...the uncertainty of a trial leaves the most guilty some room to escape...The law is not very definite, and therefore cannot be without blame. Still, I think the law enough, if we were sure of its course. Witnesses are proverbially full of defects, from ignorance or from self-interest, or sometimes say from peculiarity of taste or temperament; and the courts are, I suppose by law, obliged to be led by the evidence given, and uniformity of result is not attained. Sometimes the alkali maker and sometimes the landowner suffers unfairly, generally the latter.[127]

A further problem which faced the inspectors was the difficulty of proving without doubt that an offence had actually occurred. The constraints of low finances and insufficient manpower meant that the district inspectors were unable to monitor the operations and emissions levels of individual chemical works constantly. As early as 1872, Angus Smith maintained that,

> The method of measuring by percentage is becoming insufficient, unless supplemented by other methods of detection. For example, excessive escapes may take place in an irregular way that cannot be measured, and the inspector can bring

[127]9th R.A.I for proceedings during 1872 (c.815), p.35 (1873), xix.1. For further discussion of Smith's concern with the clarity of evidence and his abhorrence of legal trials, see 5.3.

> no action. He may be sure that a work has done much harm, but he can only remonstrate, unless he measured the gas.[128]

The alkali inspectors were also hampered by the difficulty of identifying the particular culprit responsible for incidents involving chemical pollution. In fact, it was the failure of the common law to adequately deal with this issue that had motivated the passing of the first Alkali Act in 1863.[129] As Alfred Fletcher wrote to the L.G.B in February 1891,

> To the agriculturist who had suffered loss, the common law gave but partial remedy. It was often impossible among a group of offending chemical works to determine which of them should be made defendants in an action for damages, and even if a payment of money could be exacted that was no compensation for the loss of trees and for the destruction of ancient estates.[130]

However, the difficulty of identification did not diminish over time for the alkali inspectors, and it exerted great pressure upon the chemists who investigated infractions. Angus Smith noted in his third annual report for 1866 that,

> The gases and vapours which produce unpleasant or noxious smells are extremely diluted in most cases when they meet the complainants, but the senses of the dullest are delicate, and betray substances the existence of which is not always easily proved by chemists...The chemist...is put in a very unpleasant position. If there are many manufactures together the blame is thrown about from one to the

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[128]ibid.

[129]H.A. Bruce's statement in support of the Alkali Bill in the Commons on the 19th June 1863, focused upon the inadequacies of the common law in cases of chemical pollution. See Hansard, PP.1863.clxxi.col.1163-1164.

[130]P.R.O., HLG29/40, Alfred Fletcher to the L.G.B, 11th February 1891. For further discussion of the problem of identification, see Fletcher, 'The Present State of the Law Concerning the Pollution of Air and Water', p.570.

> other in such a manner as actually to destroy all certainty, when the evidence is collected from the outside of the works.[131]

The Alkali Inspectorate believed that the only final solution for the problem of identification was to introduce a system which provided for the collective liability of chemical manufacturers in close proximity to one another. Angus Smith explained in his report for 1870 that,

> We are coming to the belief that it be fair to estimate the amount of acid escaping from all works in the neighbourhood of any one which complained of, and to rate the amount payable for damages to each when there is no reason to presume that exceptions are to be made. We must of course remember to examine local circumstances...Such a system, however, if acted on by authority, might be united with the first extension of the Alkali Act.[132]

Many manufacturers were wholeheartedly opposed to this proposal, and in February 1879, a deputation from the Alkali Manufacturers' Association visited the L.G.B, to protest against it. These manufacturers recognised that collective liability would be a more even-handed solution on the grounds that it would affect unregulated businesses such as glass works, galvanizing works, manure works and copper works. However, the petitioners objected to being placed in a 'compulsory partnership' with manufacturers who did nothing to abate pollution, and contended that collective liability would discourage usually compliant manufacturers from investing time and money into

[131] 3rd R.A.I for proceedings during 1866 (c.3792), p.51 (1867), xvi.1.
[132] 7th R.A.I for proceedings during 1870 (c.354), p.506 (1871), xiv.43.

environmental protection.[133] In an article published in the *Journal of the Society of Arts*, the alkali manufacturer, Edmund Muspratt contended that collective liability would drive manufacturers from this country; as it would tempt local residents to sue for higher amounts of collective compensation for chemical pollution. Muspratt repeated the claim that this clause was an unjust one, which would lessen individual responsibility for pollution control. Compliant manufacturers would cease to be so under a system where they would be punished to the same extent as deliberate offenders.[134]

Despite these arguments, in April 1879 a bill entitled the Noxious Gases Bill (no.123) was introduced into the House of Lords. This was broadly based upon the recommendations of the Royal Commission (1878). It provided for the control of all types of works which emitted fumes that were defined as noxious, utilising a graduated scale of requirements. These were fixed emissions limits where possible, the enforcement of the term 'best practicable means' where limits could not be set, and Smith's idea of 'interrogative and tentative' inspection, in cases where there were no known abatement methods. However, the most contentious point in the bill was Clause 29, which provided for the collective liability of manufacturers. Parliamentary representatives of the manufacturing interest took particular exception to this point, and the bill eventually fell by the wayside due to the early dissolution of Parliament in March 1880.[135] The Alkali and Works Regulation Bill (no.29), introduced in February 1881 omitted the provision for

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[133]*The Times*, 6th February 1879, 6e. The manufacturer, Thomas Tyrer also called for the introduction of collective liability in his article 'On Some Points of Legislation Affecting Manufacturers', *Journal of the Society of Chemical Industry*, 1 (1882), 33-35.
[134]Muspratt, E.K., 'The Noxious Gases Bill', *Journal of the Society of Arts*, 28 (1880) 280-286.
[135]See Ashby and Anderson, *The Politics of Clean Air*, p.45.

'interrogative and tentative' inspection, and the concept of the collective liability of manufacturers in cases where the specific offender could not be identified.[136]

6.5: Opposition and Criticism

At several junctures during its early history, the Alkali Inspectorate was subjected to opposition and criticism from various external sources. In particular, criticism emanated from a group of landowners with estates in the North West of England.[137] A particular focus for complaint was the shortage of alkali inspectors, and focused upon the need for resident inspectors, especially in areas where there was a high concentration of chemical works.[138] In June 1875, Robert Holland, land agent for Runcorn landowner Sir Richard Brooke, complained to Wilbraham Egerton, M.P for Cheshire,

> It is a manifest absurdity to think that inspectors who live so far off as Manchester and Liverpool can have much control over what takes place at Widnes, Runcorn or St. Helens. It might, perhaps be possible to report to the inspectors every large escape of gas, if such escapes always took place in the day time; but it is a fact that they generally take place at night and cannot therefore be traced to any

[136]However, section 12 of the 1906 Act did broaden the inspectorate's right of entry into unregistered premises. This section allowed the inspectors to 'enter and inspect any work to which in the opinion of the L.G.B, any provisions of the Act applies.' Section 23 of this statute also provided for the collective liability of manufacturers in apportioning damages for chemical pollution. However, complaint manufacturers would be exempt from the recovery of damages, if they could provide a certificate from the Chief Inspector to state that the requirements of the Act had been complied with when the nuisance arose. See the Alkali, etc., Works Regulation Act, 1906 (6 Edw.7 c.14.) PP.1906.i.1.

[137]The Brooke of Norton Collection, housed at Cheshire Record Office, contains a vast quantity of correspondence relating to damage to various estates by chemical fumes and resulting legal matters in the period 1862-1874.

[138]The idea of government regulation by resident inspectors was advanced by Smith in 1864. The Chief Inspector commented that 'My earliest idea was to have resident chemists in every spot not entirely devoted to the inspection but it was not considered possible to be carried out.' See P.R.O., MH16/1, Angus Smith to the Secretary of the L.G.B, 20th September 1875.

> particular work. The police of this neighbourhood and gamekeepers have informed me that at night...on their beats the gas frequently escapes, that it is purposefully let off...and they can sometimes scarcely breathe.[139]

In July 1875 the same land agent wrote to Wilbraham Egerton, pressing the point that it was an:

> ...absolute necessity...for more inspection - and for one or more inspectors. As it is there is no possibility of controlling the manufacturers and the Act of 1874 seems likely to become a dead letter.[140]

Complaints from landowners did not diminish during the period under consideration. In February 1903, a group of north west landowners, including the Earl of Derby, the Earl of Sefton and Sir Richard Brooke sent a lengthy critique of the administration of the Alkali Acts to their member of parliament, Arthur Stanley. Their complaints were threefold, referring to the increase of damage caused by chemical fumes, the continued exemption of copper works and the unsatisfactory nature of inspection. The landowners focused particularly upon the extent of inspection and the inspectors' 'obvious disinclination to take proceedings to recover penalties for offences under the Acts.'[141] Furthermore,

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[139]P.R.O., MH16/1, Robert Holland to Wilbraham Egerton, M.P, 26th June 1875. Wilbraham Egerton later served as a committee member on the Royal Commission of 1878.

[140]P.R.O., MH16/1, Robert Holland to Wilbraham Egerton, 16th July 1875. Robert Holland's complaints allegedly later took on a more sinister form. In December 1877, Alfred Fletcher wrote to Angus Smith explaining that he was considering legal action against Mr. Holland and a marine stove dealer called Mr. Prior. Apparently the two men had accused Fletcher of neglect of duty and accepting bribes from manufacturers, and had thrown rubbish in the inspector's garden. P.R.O., MH16/1, Alfred Fletcher to Angus Smith, 10th December 1877. Such occurrences were not uncommon. In 1879, George Davis, inspector for the middle district informed Angus Smith that he was considering taking legal action for slander against a Mr. Graham who had accused him of misusing government time. See S.M.L, Angus Smith to George Davis, 23rd and 26th August 1879, 2/2-3.

[141]P.R.O., MH29/87, Petition from north west landowners to Arthur Stanley, M.P, 15th February 1903.

> From the fact that no prosecutions have taken place in respect to the working of the Chance-Claus process [which released sulphuretted hydrogen] it is obvious that the health of the district and the prosperity of the farming community of the neighbourhood are made subservient to 'financial consideration of cost' on the part of a wealthy combination of manufacturers.[142]

Complaints regarding inadequate manpower also emanated from Local Authorities, especially those in the North West. For example, in January 1882, a petition from Much Woolton Local Board argued that 'inspection that does not provide an inspector for each large centre of industry cannot be efficient'.[143] Furthermore, in 1885, a short-lived Manchester based public health periodical entitled the *Health Journal* gave a lengthy critique of the implementation of the Alkali Acts. The journal reported that a local public health association had unsuccessfully petitioned the L.G.B over the issue of inadequate inspection. Apparently, the petitioners had not attacked the inspectors personally because,

> As men of common sense they knew that there was a limit to human effort, and that...when each inspector had but sixty works under his charge, [they] could scarcely inspect, with satisfaction to the suffering public, the immense number of works which the Act of 1881 called upon them to visit...The injustice to the public of [the] loose administration of the law is greatly intensified by the fact, that owing to the large number of works allotted to each inspector, the number of his visits is very few and far between, so that when a bad escape of noxious gases is

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[142]ibid.

[143]P.R.O., MH16/1, Petition from Much Woolton Local Board, 4th January 1882. This Local Board was later to finance the employment of a resident inspector, in conjunction with other local authorities in the North West.

> found, there is no unbiased evidence to prove in many cases, that this escape has not been in existence for many months previously. Indeed, within our knowledge, many very bad escapes have occurred at works and have been entirely unknown to the inspector, for the simple reason that he did not appear on the scene for weeks either before or after they happened.[144]

Criticism from this public health journal was not restricted to the number of alkali inspectors employed to enforce the law. The enforcement approach of 'negotiated compliance' adopted by the Alkali Inspectorate also received criticism from certain quarters. The policy of non-prosecution was most notably criticized by the Report of the Royal Commission on Noxious Vapours (1878). The commissioners stated,

> In the opinion of many of the witnesses, this policy, at first expedient, has been unnecessarily prolonged; and we believe that, although allowance should have been made for the shortcomings of manufacturers honestly striving to render due obedience to the law, more frequent instances of severity exercised towards those known to have been animated by a different spirit, would have been advantageous to the public, and desirable in the interests of the manufacturers themselves.[145]

In 1885, the *Health Journal* complained that:

> ...the infringers have, almost invariably...been able to persuade the inspectors, whenever caught at infringement, that the prevailing high escape has been due to accident, and the inspectors taking this view of the case, sympathise with the manufacturer, and...no more heard of the matter. What we wish to know is: Have

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[144]Manchester Central Library (hereafter M.C.L), *Health Journal*, September (1885), 59-61 (p.60), Q.613.05 H5.
[145]R.C.N.V (1878), PP.1878.xliv.43.Q.32, p.16.

> the inspectors, or the Chief Inspector, legally any right to withhold a prosecution when they have found the Act limit exceeded? [146]

It was argued that the duties of the inspectors were well defined in respect to infractions under the Alkali Acts, and

> ...we hold it to be their duty, whenever the Act limits are found to be exceeded, to prosecute the infringers. It may seem to be a small matter to some of our readers whether *four* or *six* grains of oil of vitriol be found in he exit flue of a works, but the Act distinctly makes it an offence to let more than four issue, and when we consider that even *four* grains is much above the average usually escaping from well regulated works, it will be seen that our contention is a just one, and for the protection of the public, every infringer of the Act should be prosecuted, according to the letter of the law. [147]

Even after the extension of the Alkali Act to include a wider range of harmful chemical processes, its legislative shortcomings were noted by the *Health Journal*, which complained in September 1885 that the Alkali Acts:

> ...are so worded as to entirely exempt the largest offenders. A man may purchase copper pyrites, and, in burning them, pass all his sulphurous fumes free and unchecked into the atmosphere - the Acts do not interfere with him; but so soon as he attempts to condense these injurious fumes, the inspector steps in and says, 'You must do it after such and such a fashion.' This is surely a mistake in the

[146]M.C.L, *Health Journal*, September (1885), 59-61 (p.60), Q.613.05 H5.
[147]ibid.

drafting of the Bill. Similarly with glass works...Does such a state of the law encourage the suppression of noxious gases? We say - most distinctly - No! [148]

The last, and most important, source of opposition to, and criticism of, the Alkali Inspectorate were the chemical manufacturers. Sarah Willmot has asserted that the reaction to State regulation from nineteenth-century chemical manufacturers was mainly favourable.[149] The criticisms which were advanced about the implementation of the Alkali Acts focused upon several issues, many of which were outlined by Newcastle manufacturer, David Hill, in a paper presented to the *Newcastle-Upon-Tyne Chemical Society* in January 1879. Hill complained at some length about the testing procedures adopted by the Inspectorate:

> ...were not of that thorough and accurate character that might be desired. The inspectors, instead of using thorough methods, frittered away their time with such things as flexible aspirators, finger pumps, and exhausted flasks, which were capable at best of giving qualitative rather than quantitative results, in order that experiments might be commenced at once and finished as quickly as possible.[150]

This manufacturer asserted that there was a lack of uniformity in the methods utilised by the district inspectors, which meant that results between districts could not be compared. David Hill contended that the 'whole method of testing should be prescribed by the chief inspector, and published in the reports, together with all precautions to guard against

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[148]ibid.

[149]See Willmot, S.,'Pollution and Public Concern: The Response of the Chemical Industry in Britain to Emerging Environmental Issues, 1860-1901', in Homburg, E., Schröter, H.G., & Travis, A.S. (eds.), *The Chemical Industry in Europe, 1850-1914: Industrial Growth, Pollution and Professionalization* (Boston: Kluwer Academic Publishing, 1998).

[150]Hill, D.,'On Noxious Vapours', *Transactions of the Newcastle-Upon Tyne Chemical Society* (1879), 192-214, (p.196).

error.'[151] Hill was particularly concerned about the preferential treatment of manufacturers in Lancashire, who allegedly did not have to conform to such high standards, especially regarding the use of open roasters rather than closed roasters for the condensation of acid. Furthermore, it was argued that if the manufacturers of Lancashire had been less careless, then there would have been no necessity for the Alkali Act, 1874, to which alkali makers of the North East were also subjected.[152] Hill was also concerned about the infrequency of prosecutions under the Alkali Acts, providing a long list of infractions undertaken by Lancashire manufacturers which were not prosecuted.[153] Hill calculated that 94 infractions had occurred without legal action in one year, and that the public interest would be better served by more prosecutions by a chief inspector who did not act as 'accuser, excuser, and exerciser of clemency'.[154]

A further focus for manufacturers' disapproval was the introduction of a statutory registration fee by the Act of 1881. This issue was especially potent for small-scale Irish salt manufacturers, who utilized rock salt in place of brine in the manufacturing process. Angus Smith had also been keen to overlook those in this category who produced less than one ton a week, arguing that 'a wider discretion should be allowed.'[155] In June 1882, Angus Smith's assistant, Adrian Blaikie, reported that many salt works in the south of Ireland only produced between 2-8 tons a week, often employing two or three workers, who also undertook alternative employment as grocers, bakers or builders. Blaikie

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[151]ibid., pp.204-5.
[152]ibid., p.198.
[153]Hill, D., 'Supplementary Remarks on Noxious Vapours', *Transactions of the Newcastle-Upon-Tyne Chemical Society*, 222-238 (p.223).
[154]Hill, D., 'On Noxious Vapours-Part II', pp.243-245.
[155]P.R.O., MH16/5, Memorandum from Angus Smith, 23rd April 1883. See chapter four for further discussion of this issue.

commented that these works were 'perfectly harmless' and often operated at a loss. Furthermore, their owners:

> ...considered that their pans could scarcely come under the Act as salt works where salt is extracted from brine, because they did not use brine but rock salt, and some were doubtful whether it would be worth their while to continue salt crystallizing if put to an annual tax of £3...Some of the makers spoke of the 'injustice of the tax' and made other remarks about the difficulties of Irish industries.[156]

When he became Chief Inspector in 1884, Alfred Fletcher argued that the use of rock salt in place of brine should be held as sufficient grounds for exemption from registration. Fletcher stated,

> I would remind the Board that although no chemical difference can be shown between the salt works whose natural brine is used and those where rock salt is dissolved in tanks and the brine thus made clarified and evaporated; there is necessarily a great difference commercially. Such works must always be insignificantly small. These small salt works cause no nuisance and need no inspection, while the registration fee is regarded as a heavy tax and causes great irritation.[157]

Manufacturers utilised other arguments in their attempt to avoid the registration fee; particularly the claim that their more prosperous competitors were exempt from payment.

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[156]P.R.O., MH16/5, Adrian Blaikie to the L.G.B, 7th June 1882.

[157]P.R.O., MH16/7, Alfred Fletcher memorandum, 21st April 1887. However, the Lancashire section of the Alkali Manufacturers' Association was strongly opposed to the exemption of Irish manufacturers as 'clearly wrong in principle.' See the Papers of the Lancashire Section of the Alkali Manufacturers' Association, C.R.O, DIC/UA/12/3.

In July 1884, the inspector for Scotland and Ireland, Charles Blatherwick wrote to Alfred Fletcher that,

> The registered Salt Manufacturer has certainly a grievance if other works escape the payment for the license - as he is thus practically undersold by an opponent who resists the law. In many cases I found this fact stated very strongly.[158]

Other manufacturers claimed that another government tax upon chemical works was unjust.[159] J. Ferguson Bell, of the Stafford Corporation Gas Department commented that:

> ...in the case of very small gas works where only say 20 tons of sulphate of ammonia is made per annum this means a tax of 3/- per ton of sulphate. Now the Inland Revenue Commissioners are demanding a tax of 10/- per annum for still license which is simply preposterous...[160]

Some manufacturers complained for exemption on the grounds that that they did not cause pollution. For example, in January 1885 Jeremiah McAuliffe, owner of an Irish salt and lime works replied to the Board's request that he should register, arguing that,

> I don't understand what you mean by the licence. There are no acids or drugs used by me in the manufacture of salt; it is simply made from rock salt and pure spring

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[158]P.R.O., MH16/6, Charles Blatherwick to Alfred Fletcher, 23rd July 1884. Alfred Fryer later made the same point in a letter to Russell Forbes Carpenter, commenting that 'Several of the smaller sulphuric acid manufacturers in South Wales are suffering from the competition of the Britton Ferry Chemical Co., as this firm is sending out large quantities of sulphuric acid at a low rate. These manufacturers feel it is a little hard that they should have to pay the £3 annual fee for registration, whilst their big rival is exempted from complying with the regulations of the Alkali, & c., Works Acts.' P.R.O., MH16/4, Alfred Cooper Fryer, Inspector for the South Western District, to Russell Forbes Carpenter, 7th December 1896. Russell Forbes Carpenter wrote to the Secretary of the Board that the Britton Ferry Chemical Company 'is exempt - even if registered as an Alkali work, the inspectors can take no notice of manufacture of sulphuric acid.' P.R.O., MH16/4, Russell Forbes Carpenter to Secretary of the L.G.B, 28th March 1898.

[159]One manufacturers went as far to call the registration fee 'blackmail.' See P.R.O., MH16/7, John Connick to the L.G.B, 14th April 1887.

[160]P.R.O., MH16/3, J. Ferguson Bell (Stafford Corporation) to Alfred Fletcher, 23rd October 1890.

> water, there are no gases or vapours injurious to health arising from it. What salt I make is very limited as I am principally in the lime trade. I can't see how the paying of a license would do away with noxious gases even if they did exist.[161]

Such complaints diminished when small Irish salt works which utilised rock salt in the manufacturing process became exempt following the Alkali Act, 1892.[162]

Another grievance expressed by the manufacturing interest concerned the Alkali Inspectorate's policy regarding trade secrecy. In February 1879, a deputation from the Alkali Manufacturers' Association petitioned the L.G.B requesting that annual reports should contain only the number of visits made to works and an average for all recorded escapes. Furthermore, it was demanded that individual works be identified by their number rather than their name, and that the reports of the district inspectors should not be published. The petition contended that,

> If the inspectors are required to publish particulars of which use can be made in actions by individuals against manufacturers, it will prevent their being treated with the confidence that is so desirable for the efficient discharge of their duties.[163]

Four years later, in June 1883 Sir James Stevenson, M.P wrote to Charles Dilke, President of the L.G.B on behalf of chemical manufacturers who were concerned about the appointment of John Affleck and other resident inspectors. The manufacturers

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[161]P.R.O., MH16/6, Portland Cement and Lime Works to the L.G.B, 31st January 1885.
[162]See section two of the Alkali, etc., Works Act, 1892 (55 & 56 Vict. c.30) PP.1892.i.67 (p.67).
[163]C.R.O, Papers of the Lancashire Section of the Alkali Manufacturers' Association, Petition to the L.G.B, February 1879, DIC/UA/12/3.

particularly objected to the idea that any inspector should be allowed to report to Local Authorities. This was:

> ...on the ground that they were compelled by the Act of Parliament to admit the Inspector to see all the processes carried on in their works, and that if he had any authority to report what he saw there to anyone but the chief inspector he would be reporting in many cases to Boards of which the rivals in trade of the manufacturers were members and giving them information that might be most injurious to the persons whose works he had inspected.[164]

The manufacturers were assured that any local officer appointed would not be allowed to communicate any knowledge to Local Authorities. Furthermore, the resident inspector for Widnes and Runcorn would only make a general report to the Chief Inspector each quarter, a minimal amount of which would be relayed to the Sanitary authorities.[165]

However, the issue of industrial competition and trade secrecy was forced upon the Alkali Inspectorate yet again in April 1898. Edmund Muspratt, of the United Alkali Company[166] and the Honorary Secretary of the Alkali Manufacturers' Association, complained to the President of the L.G.B that the inspectorates' annual reports:

> ...appear to deal with matters beyond the scope of the Act, and contain many details, the publication of which is adverse to the interest of the Manufacturers affected, inasmuch as they give to the world statistics and information concerning

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[164]P.R.O., MH16/2, Sir James Stephenson, M.P for South Shields to Sir Charles Dilke, 15th June 1883. James Stephenson sat on the Aberdare Commission of 1878, as a representative of the Alkali Manufacturers' Association.
[165]P.R.O., MH16/2, L.G.B to Thomas Brocklebank, Chairman of Associated Sanitary Committees, 17th August 1883.
[166]Hereafter U.A.C.

processes which are of great use to foreign competitors, while no similar information is published by any foreign government which is available to the British Manufacturer...The members of the Association...will be reluctantly compelled to withhold information not directly bearing upon his duties...unless they are assured that such information will not be included in the published Report of the Inspector to the Board.[167]

Russell Forbes Carpenter explained that Edmund Muspratt particularly objected to the publication of statistical information about salt decomposed by the Leblanc and ammonia soda processes. [168] This was due to the fierce competition which had developed between these two manufacturing processes, and the trade depression which had hit the Leblanc manufacturers. Since its formation in February 1891, the U.A.C, the union of Leblanc companies, had been fending off competition from the more economical and efficient Solvay or ammonia soda process. This process was being worked in Germany, Austria-Hungary, Russia and the U.S.A, and very successfully in this country by Brunner, Mond and Co., amongst others. In fact, from 1893, the profits of Brunner, Mond and Co. were alone greater than those of the Leblanc union - the U.A.C.[169] From this period, the U.A.C had been relying upon the production of bleaching powder, previously a side product of Leblanc soda, in order to make a profit. However, even the profitability of bleaching powder was now threatened by the commercial possibility of producing chlorine, as well

[167]P.R.O., MH16/4, Edmund Muspratt, Honorary Secretary of the Alkali Manufacturers' Association, to Henry Chaplin, President of the L.G.B, 4th April 1898.
[168]P.R.O., MH16/4, Russell Forbes Carpenter to Mr. Lithiby, 6th April 1898.
[169]Reader, W.J., *Imperial Chemical Industries: A History*, I (London: Oxford University Press, 1970), p.108. See also Matthews, M.H., 'The Decline of the British Leblanc Industry in the Nineteenth-Century: A Spatial Perspective', *Cambria*, 5 (1978), 46-68.

as caustic soda, by the electrolisis of brine, a process that was not in the Leblanc cycle.[170] Russell Forbes Carpenter responded to Edmund Muspratt's concerns about the publication of details about statistics and processes in his annual reports by ending this practice.[171]

The various attempts to block or dilute new legislation by parliamentary representatives of the manufacturing interest have been well recorded elsewhere.[172] It is interesting to note that the only concerted efforts by manufacturers to hamper the implementation of the Alkali Acts, occurred from April 1898 onwards. Again this appears be the result of the U.A.C's anxieties about competition and profit margins. The U.A.C's first effort to unsettle the admninistration of the Alkali Acts was made possible by an anomaly in a clause of the 1892 Act, which referred to the point at which acid gases could be tested by inspectors. Debate arose in 1898, when the directors of the beleagured U.A.C argued that the prescribed limit for sulphuric acid (4 grains of sulphuric anhydride per cubic foot of chimney gases) should be applied to all gases escaping from the whole of the works, and that tests should be taken at the main flue leading to the chimneys.[173] The inspectors had always taken the sulphuric acid tests at the exit flue that left the sulphuric acid process (the exit flue of the Gay-Lussac Tower), before the sulphuric acid gases mixed with other gases in the chimney flues. Therefore, the U.A.C's proposal would have allowed the mixture of gases prior to testing; meaning that each cubic foot of sulphuric acid gases finally emitted would contain more acid than the permitted statutory limit.

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[170]ibid., p.114.
[171]P.R.O., MH16/4, Russell Forbes Carpenter to Mr. Lithiby, 6th April 1898.
[172]See Ashby and Anderson, *The Politics of Clean Air*.
[173]P.R.O., HLG29/87, Russell Forbes Carpenter memorandum, 25th January 1901.

Furthermore, legal opinion agreed that the clauses on testing were ambiguous and could be legally challenged by manufacturers.

Russell Forbes Carpenter contended that this was a serious challenge to the authority of the Inspectorate, which, if successful, would make the Acts completely unworkable as 'it would become practically impossible to prevent nuisance from the gases that escape'.[174] The district inspectors concurred with this view. John Affleck, resident inspector for Widnes and Runcorn, argued that to control pollution with tests applied to chimney gases:

> ...is a practical impossibility. The attempt to do so would be a sham, and foredoomed to failure. This our opponents must know as well as I do.[175]

On several occasions, inspectors tests had proved infractions against the Acts, but '...no notice has been taken by the manufacturers of the remonstrances lodged by the inspectors.' In fact:

> ...the said objectors would resist any legal proceedings that might be instituted against them under this Act for infractions based upon tests taken as hitherto.[176]

Therefore, in April 1901, a single clause Bill was introduced into the House of Lords that was designed to combat the confusion about testing methods.[177] John Affleck observed that if this amendment failed, and the inspectors were forced to test at chimneys rather than at exit flues:

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[174]ibid.
[175]P.R.O., HLG29/87, John Affleck to the L.G.B, 28th May 1901.
[176]P.R.O., HLG29/87, Russell Forbes Carpenter memoranda, 17th October 1900.
[177]Alkali, etc., Works Regulation Act, 1881, Amendment, Bill, 1901 (207) PP.1901.i.11.

> ...the acid maker might discharge even ten times as much acid gas from his works into the atmosphere as he is now permitted to do, without the chimney gases exceeding the 4 grain limit of acidity prescribed in the Act, and without the inspector having any power to interfere, or even to complain...it is the firm conviction of the whole staff of inspectors that no really effective control can be much longer maintained over the very noxious residual gases discharged into the air from the large number of vitriol, manure and alkali works in which this process is carried on in all parts of the country.[178]

Yet, the Alkali Manufacturers' Association continued to press for tests on chimney gases rather than at exit flues; its chairman, David Gamble even threatened the Chief Inspector, 'if you do not give way on that point you will not get your Bill this year'.[179] Carpenter was forced to negotiate with the Association, conceding that the catalytic (or contact) sulphuric acid processes could be removed from the prescribed limit clause and placed under the less stringent 'best practicable means' clause, if the manufacturers would accept testing at exit flues. The Association accepted the point of applying tests to the exit flue of the main sulphuric acid process, but would not accept this point for the concentrating processes, which they believed was to difficult to keep within prescribed limits. However, Carpenter was not willing to concede this point, and stalemate was reached.[180]

Crisis point was reached when the 1901 Bill designed to resolve the testing anomaly hit problems in the House of Commons, was delayed until August, and then

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[178]P.R.O., HLG29/87, John Affleck to the L.G.B, 28th May 1901.
[179]P.R.O., HLG29/87, Russell Forbes Carpenter to Samuel Provis, Permanent Secretary at the Local Government Board, 21st June 1901.
[180]ibid.

dropped due to lack of parliamentary time. Furthermore, owners of other scheduled works began to claim that, like sulphuric acid manufacturers, they were entitled to tests of chimney gases, rather than at exit flues. Carpenter was led to claim that the whole administration of the Alkali Acts was being undermined by this point.[181]

The second concerted attempt to undermine the operation of the Alkali Acts by the U.A.C occurred at this juncture. During the drafting of a new bill, Russell Forbes Carpenter attempted to negotiate with manufacturers over the introduction of mutually acceptable new statutory levels for sulphuric acid emissions.[182] The Chief Inspector wanted to set the statutory limit at 1.5 grains of sulphuric anhydride per cubic foot of chimney gases. Edmund Muspratt, of the U.A.C, argued on behalf of the Alkali Manufacturers' Association, that manufacturers could not condense under the existing limit of 4 grains of sulphuric anhydride per cubic foot of chimney gases. Carpenter wrote,

> These particular concentrating processes whose conduct is in question were not in 1881 practised in this country on any extended scale. The nuisance has arisen from their extension and massing together on a large scale in limited areas. The greater number of such works can comply with the limit of the Bill. I urged the danger of fixing a legislative limit for the worst cases, admittedly few in number. When they realised I was not in a position to go further in the way of concession, Mr. Muspratt said a compromise might perhaps be reached on the basis of 2

[181]P.R.O., HLG29/87, Russell Forbes Carpenter to Samuel Provis, Permanent Secretary at the L.G.B, 5th November 1902.

[182]Two bills which contained a clause to resolve the testing anomaly were withdrawn from Parliament during this period. See the Alkali, etc., Works Regulation Act, 1881, Amendment, Bill, 1903 (325) PP.1903.i.39, which was partly intended to introduce control over metallurgical works, and the Alkali, etc., Works Regulation Act, 1881, Amendment, Bill, 1904 (202) PP.1904.i.53.

> grains...I could not accept this, but...while we could not agree the clause, the principle was accepted though the specific figure was not.[183]

At a further meeting with the Alkali Manufacturers' Association the manufacturers offered to agree to a limit of 2 grains of sulphuric anhydride per cubic foot of gases. However, Russell Carpenter stated,

> I am unwilling to abandon the limit of the Bill, as the principle of conceding everything to the worst offenders in a legislative enactment of this character must act disastrously in lowering the standard of efficiency, easily attained in 99 cases out of 100 of the works operating very varied processes for accomplishing the end in view.[184]

Carpenter believed that the inspectorate should remain firm regarding the 4 grain limit. However, in February 1904, Eustace Carey of the U.A.C, suggested a compromise. For a period of three to five years the U.A.C should only have to condense their sulphuric acid emissions to a limit of 2 grains per cubic foot of gases, and after this period the limit should fall to 1.5 grains of sulphuric anhydride per cubic foot. Russell Carpenter was positive about this proposition, commenting in a letter to the L.G.B,

> I strongly urge acceptance. We secure, ultimately, what we desire, and, by giving time for improvement, show reasonableness and consideration. The Company's

[183]P.R.O., HLG29/87, Russell Forbes Carpenter to Samuel Provis, Permanent Secretary at the L.G.B, 27th November 1903.
[184]P.R.O., HLG29/87, Russell Forbes Carpenter to Samuel Provis, Permanent Secretary at the L.G.B, 20th January 1904.

> staff will work far more willingly than if driven, by fear of the Court always before their eyes, perhaps into a stubborn non-possumus attitude.[185]

This compromise passed onto the statute book in 1906, and indicates that through the use of 'negotiated compliance', the Alkali Inspectorate was able to overcome a serious challenge to the implementation of the Alkali Acts.[186]

6.6: Summary

This chapter has analysed factors which constrained the enforcement practices of the Alkali Inspectorate, and will conclude with an overview of the lasting effect of these constraints on the implementation of policy. Peter Bartrip and Paul Fenn have explained the actions of the early factory inspectorate as a rational cost-effective approach in the light of the constraints upon it. According to these commentators, the factory inspectors selected an enforcement strategy which assured maximum compliance, given their limited resources and given the existence of various pitfalls inherent in a penal enforcement approach. Hence, inspectors utilised tactics of education and persuasion to enforce the law. Bartrip and Fenn have maintained that,

> Given the costs of bringing a case, and the likelihood of securing nothing more than a low fine at its conclusion, we would therefore expect that the inspectorate, pursuing social cost-minimizing objectives with limited resources at its disposal, would have tended to favour the alternative approach of devoting more of its

[185]P.R.O., HLG29/87, Russell Forbes Carpenter to Samuel Provis, Permanent Secretary at the L.G.B, 5th February 1904.
[186]See section 26 of the Alkali, etc., Works Regulation Act, 1906 (6 Edw.7 c.14.) PP.1906.i.1 (p.13).

> resources to the detection of offences against the Acts with a view to inducing compliance in those particular cases by means of negotiation.[187]

However, W.G Carson has contended that the factory inspectorates' use of the enforcement strategy of negotiated compliance promoted the 'conventionalisation' of factory crime.[188] This process of 'conventionalisation' is one whereby certain criminal behaviour, particularly 'white collar' crime, is not labelled as deviant or stigmatised and punished, but rather assumes a 'conventional' status.[189] Carson has argued with reference to the early factory inspectorate, that,

> After 1836, and despite the directive that they should now enforce the law despite all the difficulties, the inspectors rapidly begin to evolve routine modes of inspection which, without abdicating from the attempt to regulate, acknowledge the power differentials permeating their relationship with the employers, tolerate certain levels of violation as acceptable, and institutionalise alternative methods of control.[190]

These 'alternative methods of control' were explanation, friendly advice and warnings - the approach of 'negotiated compliance'. In this way, violation of the factory acts came to be accepted as a conventional feature of industrial production, rarely prompting the application of more severe sanctions such as prosecution.

These historiographical accounts provide a vital new framework for the consideration of the implementation of the Alkali Acts. The Alkali Inspectorate can also

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[187]Bartrip and Fenn, 'The Evolution of Regulatory Style in the Nineteenth-Century British Factory Inspectorate', p.211.
[188]Carson, 'The Conventionalisation of Early Factory Crime.'
[189]See Carson, 'White-Collar Crime.'
[190]Carson, 'The Conventionalisation of Early Factory Crime', p.51.

be seen to have made the same cost-benefit analysis within the context of various constraints, and was forced towards an approach of negotiated compliance by both internal and external circumstances. As Eric Ashby and Mary Anderson have observed with reference to the first Chief Alkali Inspector,

> It is not difficult to imagine the obstacles Smith had to overcome. An isolated government official based in Manchester, with very little backing or guidance from his employers in Whitehall, 180 miles away; empowered to control emissions from a great and flourishing industry. His only hope was to secure the confidence and cooperation of the factory owners. One tactless letter, one injudicious prosecution for infringement of the Alkali Act-and Smith would have had the whole Alkali industry ganged up against him.[191]

Several specific factors influenced the use of 'negotiated compliance' by the first central government environmental inspectorate. First, a low budget, an unequal manpower/workload ratio and the associated problems of ill health and travel meant that the inspectors were unable to monitor individual chemical works constantly, and were therefore driven to emphasize education and trust in order to achieve the compliance of manufacturers through goodwill. Second, a 'penal' enforcement strategy was unattractive due a number of obstacles. These included the high financial cost of prosecution, the weak deterrent effect of the penalties set both by the legislation and by juries, the negative attitude of juries, the difficulties of presenting scientific evidence to laymen, the burden

[191] Ashby and Anderson, *The Politics of Clean Air*, pp.25-6.

of proving an infraction and identifying a specific offender in court, and the technical anomalies apparent in the legislation.

It cannot be denied that, like factory crime, the pollution of the environment was, and remains a 'conventional' crime. However, it is evident from the above discussion, and in particular from the correspondence of Smith and Fletcher, that it was not a deliberate objective of alkali inspectors to protect only the class interests of manufacturers. The enforcement policy was a compromise between many diverse interests. Unfortunately, the conventionalisation of pollution was a side-effect of an enforcement policy which the inspectors were forced to adopt in the light of the constraints outlined in this chapter.

Chapter Seven: The Impact of Late Victorian Environmental Regulation

7.1: Economics, Environment and Enforcement

The role of economics was as fundamental to environmental regulation during the late nineteenth century as it is today. The enforcement approach adopted by the Alkali Inspectorate illustrates that, at an early point in its history, it recognised that its role was not to minimise pollution at any price. Rather, the inspectors recognised a tension between public and private interests. The Alkali Inspectorate was entrusted with the demanding task of compromising between *laissez-faire* principles, the desire for economic prosperity and environmental well-being. It responded by 'optimising' the pollution levels that were the inevitable concomitant of rapid industrialisation, urbanisation, and improvements in the standard of living.[1] The conflict of interests between ideology, economy and environment was resolved, at least in part, by the enforcement approach of 'negotiated compliance.' This represented the lowest possible level of interference with chemical manufacture and profit, whilst providing for a certain amount of pollution control.

The introduction to this thesis posited the question 'whose interests were served ?' This study has made it clear that the Alkali Acts were not enforced primarily to protect the interests of the general public in terms of environmental protection. They were enforced to protect the interests of the public in environmental *and* economic terms, to ensure the cleanest atmosphere possible with the least harm to the economy and the

[1]Ashby and Anderson, *The Politics of Clean Air*, p.65.

standard of living.[2] As Ashby and Anderson have noted, in general terms this type of legislation does not exist only to protect the general public:

> ...it exists to reconcile the often conflicting interests of the public who want clean air, the manufacturer who wants to make a profit, the employees who want to keep their jobs, and the government who wants national prosperity and contented citizens.[3]

This thesis on the Alkali Acts administration has revealed the complex nature of the relationship between the British State and industry. Crucially, it appears that 'negotiated compliance' was the way that nineteenth-century state agencies could best regulate trade. It served to fulfil the desire for regulation, to ensure the acquiescence of manufacturers, to satisfy landowners and to protect economic prosperity. Therefore, this approach was not only adopted by the Alkali Inspectorate, but also by the inspectorates of factories and mines. This is in line with the findings of modern social scientists, who have asserted that negotiated compliance is characteristic of the state regulation of industrial behaviour in the modern context. The 'softly, softly' approach has been seen as endemic in the regulation of 'white collar' crime, particularly when activities have economically beneficial side effects for the whole community. This enforcement culture means that modern Britain relies upon persuasion, voluntary agreements and partnerships more than any other industrialised democracy. This tradition has its roots in the work of nineteenth-century bodies such as the Alkali Inspectorate.

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[2]Paulus has argued with reference to the enforcement of the 1875 Sale of Food and Drugs Act that 'the state and business interests slowly evolved a *modus operandi* that did not cause harm to either.' See Paulus, I., *The Search for Pure Food: A Sociology of Legislation in Britain* (London: Martin Robertson, 1974), p.38.
[3]Ashby and Anderson, *The Politics of Clean Air*, p.66.

However, the approach of 'negotiated compliance' adopted by the Alkali Inspectorate was not only a convenient way to administer a compromise between the *laissez-faire* ethos, economic considerations and environmental factors. Chapter six has made it clear that this approach was also the only realistic enforcement option in the light of constraints such as insufficient funding, inadequate manpower, legislative loopholes and technological difficulties. Prosecution was eschewed not only in the interests of regulatory efficiency, but also because the Alkali Inspectorate had few alternative options. In fact, this body had even fewer enforcement options than the inspectorates of factories and mines. The Alkali Inspectorate was granted a consistently lower level of funding than these bodies throughout the period 1864-1906. Although these departments also utilised 'negotiated compliance', the greater resources granted to them enabled these bodies to prosecute offenders more frequently than the Alkali Inspectorate could.

It can be assumed from the low level of funding granted to the Alkali Inspectorate, that the British State intended it to possess only modest powers of interference with commercial freedom. In addition to the fiscal context, a variety of other internal and external constraints conspired to constrain the actions of the Alkali Inspectorate. In historiographical terms, these are crucial findings as they imply that the extent of state intervention during the nineteenth-century may have been far more limited than many commentators have asserted. One must concur with Peter Bartrip's view that,

Overall, the resources allocated to inspection in the mid-nineteenth-century were not of a magnitude to warrant the strong emphasis accorded to inspectors either as enforcement officers or agents of government growth.[4]

Lower funding levels do not imply that the inspection of chemical works was cheaper than of factories or mines, as the workloads, responsibilities and technical expertise of all three bodies were broadly comparable. Rather the lower funding of the Alkali Inspectorate illustrates its relatively low status. This is explicable in several ways. First, it should be recalled that the first Alkali Act was passed in response to pressure from influential North Western landowners, such as Lord Derby, whose property had been damaged by chemical fumes. From the outset, then, this was pragmatic, piecemeal legislation which attempted to protect land values and resolve the defects apparent in common law remedies for chemical pollution. Noxious vapours were not an 'intolerable' condition for the general public as a whole, this issue was not at the centre of public debate and neither was it the result of an altruistic 'green' concern. Contemporary sources rarely link chemical pollution to broader criticism of urbanisation or industrialisation - the 'Condition of England' question. The selection of the risk of chemical pollution for government action is actually more informative about nineteenth-century society than the magnitude of this environmental risk. Although they undoubtedly posed a serious, if localised, environmental threat, alkali works were regulated initially because of pressure from landowners, and because a technically and economically feasible solution was available. The absence of such a solution for coal smoke pollution, which was a more

[4]Bartrip, P.W.J., 'British Government Inspection, 1832-1875: Some Observations', *Historical Journal*, 25 (1985), 605-626 (p.626).

pervasive environmental threat, explains the absence of a body of coherent central government policy until the Clean Air Act of 1956. This clarifies the point that pollution law can only advance in line with technical knowledge.

The second factor which contributed to the low status of alkali works inspection was its administrative setting. Until 1873, this body was placed under the jurisdiction of the Board of Trade, and thereafter under the control of the Local Government Board. Neither of these departments possessed the prestige of the Home Office (which oversaw factories and mines), and this is reflected in a lower level of general funding granted to these departments. Furthermore, chapter three has illustrated that the Local Government Board displayed a somewhat miserly attitude towards the Alkali Inspectorate. When this was matched with the Treasury's desire for stringent economy, the result was a depressed funding level throughout the period 1864-1906, in comparison to the inspectorates of factories and mines.

The third reason for the lower status of the Alkali Inspectorate was its novel character. It was a new, scientific department which was created temporarily in the first instance to protect air quality. The technicalities of the legislation and its enforcement were beyond both the administrators in central government and the general public. Furthermore, unlike the inspectorates of factories and mines, the alkali works department was not concerned with the moral or physical well-being of women, children or the working classes, which were far more evocative subjects, and which justified higher remuneration for this class of inspector in the eyes of the Treasury. In contrast, the

pollution of the natural environment by chemical manufacturers was frequently a localised, and often a victimless crime.

7.2: The Impact of the Alkali Inspectorate

This thesis has focused upon the ability of Victorian government to formulate and implement effective environmental reforms. This is an essential ingredient, as it has been asserted elsewhere that the Alkali Acts were an almost immediate success.[5] The measurement of the concept of effectiveness is problematic for two reasons. First, there is an absence of unbiased quantitative data which would allow an estimate of atmospheric pollution levels before and after inspection. Second, it is impossible to assess the efficiency of negotiated compliance as the Alkali Inspectorate did not utilise any other approach which would provide a comparison,[6] and there is no data detailing actual infraction levels. Therefore, effectiveness has had to be assessed by utilising John Harris's model for the efficiency of central government inspectorates.[7]

Accordingly, it is obvious that the adequate implementation of legislation by a central government inspectorate is only possible if there are enough inspectors to fulfil the task. Harris has noted that the number of inspectors required in a particular service is dependent upon a number of variable elements. In the case of the Alkali Inspectorate, the important factors were the novel and technical nature of the Alkali Acts and pollution

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[5]MacLeod, R.M., 'The Alkali Acts Administration, 1864-1884: The Emergence of the Civil Scientist', *Victorian Studies*, 9 (1965-6), 85-113.
[6]In his study of river pollution control in industrial Lancashire, 1848-1939, Terence Richards has compared the enforcement of river pollution law for the Ribble and the Mersey-Irwell basins, and has concluded that persuasion was more effective than coercion. See Richards, T., *River Pollution Control in Industrial Lancashire 1848-1939* (University of Lancaster: Unpublished Doctoral Thesis, 1982).
[7]Harris, J.S., *British Government Inspection: The Local Services and the Central Departments* (London: Stevens & Sons, 1955), p.182.

abatement methods, the extent and importance of the chemical industry, the amount of travelling required, the complicated and time consuming nature of the chemical tests to be carried out at each work and the pollution control procedures to be disseminated amongst manufacturers. In the light of these requirements, it must be concluded that a staff of between 5-12 alkali inspectors during the period 1864-1906 was wholly inadequate to perform the tasks effectively in a rapidly developing industry.

The second factor in Harris's categorisation is the skill and competency of the Alkali Inspectors. It was argued in chapter two, the inspectors were all highly qualified individuals. Many of these men had received scientific education to doctoral level, had engaged in chemical research on the continent, and had gained practical experience in the industrial context, whilst employed as managers of chemical works. In terms of integrity, it is evident that the great majority of inspectors were dedicated and honest individuals. They shared many interests with the manufacturers, particularly through the close knit network of chemical societies, and it is clear that they often sympathised with the constraints felt by the manufacturing interest. On several occasions, manufacturers were granted too much scope, but in general terms the inspectors attempted to administer the law as impartially as possible. There is little evidence to suggest that the alkali inspectors were fanatical devotees to pollution control for its own sake. Although dedicated to their task, they viewed it in an objective way, and were frequently prepared to compromise between environmental well being and economic profit. Terms such as cost/benefit analysis and 'best practicable environmental option' may have evolved recently, but they