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Control of Air Pollution in Manchester prior to the Public Health Act, 1875

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ABSTRACT

Industrialising cities of the 19th century are seen as lax in environmental matters. However, Manchester took a strong stand against air pollution. It modified complex medieval administrative practices to address industrial pollution, and created new bodies (e.g. Police Commissioners) that considered environmental matters. Its committees and inspectors worked diligently, but pro-industrial sympathies prevented systematic prosecution of industrial offenders. Nevertheless, the smoke menace was certainly systematically addressed. Effective response was limited by inadequate abatement technology, despite a rapid evolution of the administrative policy prior to the Public Health Act 1875.

KEYWORDS

Smoke abatement, nuisance, sanitary reform, local government

INTRODUCTION

Environmental concern in earlier centuries operated under administrative mechanisms that were very different from those of today. As a result, it sometimes appears that there was little regulatory action on issues we would currently term 'environmental'. The earliest regulation of pollution within Europe tended to focus on local issues (Mieck, 1990). It is suggested that English local authorities commonly required the impetus of national sanitary legislation before they would or could act to counter atmospheric pollution and efficiently control local public health issues. It is further argued that 19th century nuisance laws were

ignored in favour of industrial growth and that there was no systematic prosecution of public nuisances (Brenner, 1974). The argument has been extended to suggest that the transition from judicial to legislative regulation of public health which occurred in England from the 1840s was hampered in controlling urban air pollution because: (i) adoption locally was usually optional, (ii) local regulations were vague and non-specific, (iii) such regulations did not require specific devices to be installed or (iv) that smoke emission be reduced to specific levels. Legislative regulation of public health was further impeded by the levy of small fines only, lack of provision for inspection and unsystematic statutory regulation of air pollution. During the period when modern statutory regulation of nuisances was instituted there was no experience of regulating environmental problems of such unprecedented scope and complexity. When air and water pollution were addressed they were frequently allocated lower priority than concern over infectious diseases, inadequate sewerage and housing which were perceived to present more serious threats to health and amenity (Brenner, 1974).

It is also feasible that within rapidly industrialising 19th century towns like Manchester, the dependence upon manufacture for economic growth could have resulted in local adherence to the view that smoke and grime were an inherent and positive sign of local prosperity and that control of local industrial emissions would be counter-productive. Conversely, within non-industrial cities such as York and Norwich, which are commonly assumed to have been cleaner and smoke free, point sources of pollution would have been more visible than within grimy industrial towns. This could, theoretically, have prompted stronger action over local environmental problems.

These suppositions can be questioned through an analysis of local government records for selected English towns. Such an approach, undertaken for the town of Manchester in the decades leading up to the Public Health Act of 1875, allows us to gauge how its local administration dealt with air borne emissions prior to broad national legislation. Special attention is focused on local individuals and institutions that sought to control smoke in the industrialising town. This approach differs from that taken by earlier writers concerned with the *Clean Air Act* 1956. For example, Ashby and Anderson (1981) assessed events in the City of London using an analysis of central government documents and national newspaper items and Malcolm (1976) relied predominantly upon secondary sources about Manchester. It also differs from Brenner (1974) who approached the subject from a specifically legal standpoint.

EARLY MANCHESTER

Throughout the medieval period Manchester was a wealthy manufacturing and merchant town, a provincial capital and focus for commerce. In the early 16th century it was described as the 'fairest, quickest and most populous town' of

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Lancashire (Toulmin Smith, 1964). Its staple industry was the manufacture of small wares and woollen and linen textiles (Kidd, 1996). The population of Elizabethan Manchester was about 3,000 inhabitants. This rose to almost 5,000 individuals by the mid 17th century. The Hearth Tax (1666) recorded 1,368 hearths and about 222 houses in Manchester (Farrer and Brownbill, 1911).

From the medieval period, the government of English towns was undertaken through a number of separate bodies which acted independently of each other but frequently infringed on each others' duties (Frangupolo, 1962; Fraser, 1982; Messinger, 1985). Common membership of these administrative bodies by Manchester's elite was widespread. By the late 18th century, in Manchester, the Court Leet operated alongside the local administrative bodies of Churchwardens, Overseers of the Poor, Surveyors of the Highway and the Lancashire Quarter Sessions. Throughout England essentially medieval administrative entities, such as the Court Leet and the Assize of Nuisance, continued to operate until the early decades of the 19th century (Hudson, 1891; Leach, 1900; Hudson and Tingey, 1906, 1910; Brenner, 1974). Their overlapping functions could result in administrative disarray and confusion (Messinger, 1985) such that the government of pre-Victorian Manchester was characterised by bitter controversy and virtual administrative anarchy (Pickering, 1995).

These diverse authorities had to confront sanitary problems within increasingly industrialised environments. Under a system of common law which remained essentially unchanged from the early 13th century, *private nuisance* could be dealt with as 'an actionable annoyance which interferes with the ability of another to use or enjoy his land'. This type of nuisance law was traditionally employed via civil courts to counter, for example, stinking privies, fouled streams or polluting chimneys. Here the emphasis lay on the damage caused to neighbours by the action. The category of noxious vapour emission was introduced into common nuisance law by the mid-13th century but cases of this type of nuisance remained rare until the late 1700s (Brenner, 1974).

Nuisance complaints were 'presented' to the local court and the defendant was usually fined and requested to abate the nuisance. The Manchester Court Leet jury employed nuisance law in 1592 when it ordered an inhabitant to construct his chimney so that it 'be not noysome to his neighbour' (Thomson, 1967). Throughout the early 1700s Manchester Court Leet also dealt with several public complaints of illicit firing of sooty chimneys as a public nuisance and ordered the imposition of fines for subsequent chimney fires (Earwaker, 1884-1890). In 1785 the Court perceived that the tobacco pipe maker's works in Todd Lane was a nuisance and this was ordered to be removed (Farrer and Brownbill, 1911). In such cases the damage caused by these nuisances was the unacceptable fouling of a neighbour's air. Here too the nuisance law insisted that certain trades, even though they were lawful and necessary, could be closed and forced to move if they were nuisances. This resulted in the zoning of offensive trades to certain areas.

Until the late 18th century, in Manchester, emissions were controlled through pre-existing regulation. This situation altered with the rapid onset of industrialisation which stimulated unprecedented public health issues. The unsystematic mosaic of local government institutions and their reliance on common law nuisance control proved increasingly unable to cope with the problems of a developing urban society and the scope of their influence diminished rapidly (Fraser, 1982).

Manchester began its inexorable urban expansion around 1708 (Frangupolo, 1963; Thompson, 1967). Early 18th century engravings (e.g. Buck [1728] and Whitworth [c1734]) depicted the town at the edge of the River Irwell, surrounded by fields where animals grazed (Shercliff, 1983) and Defoe (1724-6) described Manchester as 'the greatest mere village in England'. However, the urban population rose from 10,000 inhabitants in 1717 to 17,000 inhabitants by 1745. In 1752 Manchester was described as a 'sprightly, gay, still feudal little country town, given intently to trade... a radiant little garden city'. At this stage 'a strong gust [of wind] sufficed to blow the town clear of the mingling wreath of smoke that curled up from its modest chimneys' (Roeder, 1752).



FIGURE 1. View of Manchester (Aikin, 1795)

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ARRIVAL OF STEAM

Roeder's Manchester was poised for rapid, all-embracing change. The town subsequently developed into a vast industrial metropolis (Shercliff, 1983; Kidd, 1996). By 1816 the preceding fifty years building activity had laid out twelve hundred streets and produced a 'congregated mass of building... upwards of sixty miles' in Salford and Manchester (Aston, 1816). The town's growth was stimulated by technical innovations and mechanisation in the cotton industry (Shercliff, 1983). Improvements in transport and communication from 1721 facilitated the movement of coal and other goods (Messinger, 1985).

From the mid-18th century, water-powered cotton mills were established by streams and there were three hundred mills on the River Irk by 1762. In 1781 Matthew Boulton wrote to James Watt that the people of Manchester were 'steam-mill mad'. The first steam powered cotton mill was constructed in Manchester by Richard Arkwright in 1782. The mill was five storeys high, two hundred feet long and included an impressively high chimney which attracted crowds (Thompson, 1967). In 1794 there were three steam-powered cotton mills in Manchester and in 1795 a substantial number of small size stationary steam engines operating within the town (Messinger, 1985). A less industrialised town such as York, by comparison, witnessed the installation of its first steam engine in 1799 (Brimblecombe and Bowler, 1992).



FIGURE 2. River Irwell and Blackfriars Bridge, c. 1860
(Manchester Central Library, Local Studies Unit)

As steam generated power replaced water power, the cotton mills lost their dependence on riverside sites and could be located close to the town of Manchester (Shercliff, 1983). By 1816 there were 82 cotton spinning factories in Salford and Manchester and this number rose to 185 by 1841. Cotton mills continued to favour close proximity to central city amenities although the most recently constructed textile mills spread outwards from the central area and generated working class terraced housing developments around them.

The comprehensive employment of steam-driven technology in Manchester stimulated a wide range of industries and the cotton industry produced demand for textile machinery and engineering industries. By 1800 there were five iron foundries in operation and numerous metal working industries including tinplate workers and braziers (Aikin, 1795; Kidd, 1996). Other local industries also expanded. The first sugar refinery in Manchester was established in 1757 and described as a 'very nasty place'. Chemical works, foundries, breweries and other industries which required water for their manufacturing processes and for the discharge of waste products continued to locate near rivers (Thomson, 1967).

Central Manchester also contained substantial numbers of warehouses and other businesses, an indication of a highly varied economy. However, it was the novel and enormous cotton factory buildings with smoking stacks which provided a focus for contemporary comment and enthralled visitors to the town (Lloyd-Jones and Lewis, 1988). The uninhibited expansion of steam-powered factories resulted in a prolific growth in the numbers of chimneys and the amount of smoke emitted. This was already evident in 1789 when Anna Walker described how:

The smoke and dirt on approach to Manchester was abominable, Manchester is a dull, smoky dirty town ... from whence black soot arises in clouds to overspread the surrounding country. (Thomson, 1967)



FIGURE 3. River Irwell and Cathedral, 19th century (Manchester Central Library, Local Studies Unit)

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The situation had deteriorated further by 1808 when a visitor from Rotherham commented that: 'The town is abominably filthy... the Steam Engine is pestiferous, the Dyehouses noisome and offensive, and the water of the river as black as ink' (Briggs, 1963). In 1816 it was estimated that 47,270 tons of coal were consumed annually in Manchester (Aston, 1816). The local government bodies of early 19th century Manchester, despite their frequently contradictory and competitive nature, attempted to mitigate the smoke nuisance through their own administrative measures.

THE COURT LEET

Nuisance offences had traditionally been addressed through the Court Leet. This medieval institution continued to attempt to control the air pollution in Manchester. The Court heard presentments for nuisance and imposed fines ranging from 1s to £100. Five men were then appointed as *affearers* to consider whether these fines were just. Following a two day adjournment the Court re-convened to hear the *affearers* affirm or denounce the fines (Simon, 1938). Presentments continued until the extinction of the Court Leet in 1846 and for certain offences this procedure remained the only remedy, even after the formation of other, theoretically, more 'advanced' administrative bodies.

Some contemporaries perceived the Manchester Court Leet to be an ineffective and outmoded form of government that had lost its grip on administration (Redford and Russell, 1939). By the 1790s the Leet had ceased to exercise effective control over many sanitary problems. This resulted partly from the spread of Manchester beyond its mediaeval boundaries and outside the Court's administrative control. Even where the Court could act, enforcement was limited to fines and it could not imprison or inflict corporal punishment (Redford and Russell, 1939). Furthermore, nuisance law depended on convincing the courts that particular conduct was unreasonable. This became complicated after industrialisation because, whilst during the 13th century the worst nuisance of a town might be a brick kiln or chandler, by the 19th century a whole town could be based on industrialisation. In such a situation the law had to balance the comfort and health of individuals against an increased breadth of economic interest (Brenner, 1974).

Despite such difficulties, Manchester Court Leet confronted the new problem of industrial smoke from steam engines. In 1801 it prosecuted eleven cotton spinning factory owners for burning large quantities of coal which 'unlawfully' and 'injuriously' made 'great quantities of smoke and soot' to issue onto adjacent houses and into the streets and common highways 'to the great damage and common nuisance of the inhabitants of the Manor' (Earwaker, 1884-1890). Each industry was amerced £100, although the fine was waived to allow time for improvements. This was the maximum fine which the Court Leet could issue and

hints at the seriousness with which this offence was viewed (Simon, 1938). In the same year the Court Leet also dealt with a further seven cases of air pollution. These included several bakers, a tallow chandler for 'bad smell and stinks', a dyehouse, a callenderman and a pipemaker (Earwaker, 1884-1890). Between 1801 and 1844 this antiquated Court dealt with 84 smoke offences by diverse trades. They were fined between £10 and £100, although the fines continued to be waived temporarily to allow for improvements. In many instances those not complying were subsequently recalled before the Court and the fine levied (Earwaker, 1884-1890). In 1828 the neighbouring Salford Court Leet took comparable action against 'noisome and noxious fumes and vapours' emitted by a sal ammoniac factory at Ardwick (Redford and Russell, 1939).

The threat of prosecution was acknowledged by contemporary industrialists and caused some interruption to their business endeavours. In 1790 the cotton mill owned by the Manchester textile entrepreneur Peter Drinkwater became operational (Chaloner, 1954; 1959; Kidd, 1996). Correspondence from Drinkwater to the steam-engine makers Boulton and Watt in April 1789 reveals that local opposition to the introduction of steam engines was voiced even before they were installed (see also Brimblecombe 1987). Drinkwater reported:

I should have wrote you on this subject much sooner had I not been incommoded on all sides by threats of prosecution for erecting a nuisance and indeed, the prejudice is not yet much, if at all, abated. The fact is that we have already a great number of the common old smoaking engines [i.e. Newcomens' pumping engines], in and about the town which I confess are far from being agreeable and the public yet are not all inclined to believe otherwise than that a steam engine of any sort must be highly offensive. (Chaloner, 1954)

A year later James Watt noted that 'Mr. Drinkwater at Manchester was threatened per advance with a prosecution if he made any smoke; he has, however, taken care not to do so, and has escaped hitherto' (Chaloner, 1954).

THE INTELLECTUALS

Manchester's intellectuals also responded to air pollution. In 1789 Thomas Percival drew attention to the effects of urbanisation on human health (Percival, 1789). This work was typical of the interest in urban demography which began with John Graunt's (1662) study of London and which later aided the sanitary reform of the early 19th century. Percival was a member of several local learned societies and instrumental in establishing a Manchester Board of Health in 1796 during an outbreak of fever. The primary aim of this Board of Health, an 'unofficial' body of physicians and other elite individuals, remained the control of contagious diseases and management of the local isolation hospital (Hennock, 1957). However, during its initial years it undertook pioneering investigations into the physical, moral and spiritual conditions of Manchester's working class.

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On the 11th July 1798 the Board printed the following statement in the Manchester press and circulated copies to local manufacturers:

having taken into consideration the great injury arising to the *health* of the inhabitants of this Town and neighbourhood from the immense quantities of smoke arising from the chimnies of velvet-dressers, bakers, smiths, founders, pipe-makers, cotton spinners and other artificers beg leave to request their immediate concurrence and assistance in adopting the best means of consuming or diminishing the quantity of smoke arising... The Board is *authorised* to inform them that the excellent method of consuming smoke, invented by Bolton and Watt. (PMBH, 1805)

This statement highlights a number of contemporary issues: (i) that only seventeen years after the first steam powered mill had opened in Manchester the smoke problem of the town was perceived to be severe, (ii) that a wide range industries were polluting the air, (iii) that industrial smoke was considered by some elite citizens of Manchester as both unacceptable and controllable. Despite the genuine interest in sanitary reform expressed by the Board its impact was limited to the control of infectious diseases (Briggs, 1963).

THE POLICE COMMISSIONERS

The industrial revolution weakened the traditional dominance of the landed gentry and aristocracy within local government. The rise of a new entrepreneurial industrial middle class challenged older ideologies within urban administration (Walton, 1987). In the early 1790s the local government of Manchester was reformed by a small group of Tory merchants. The 1792 *Act* (32 Geo. III) *for cleaning, lighting, watching and regulating the streets, lanes, passages and places within the towns of Manchester and Salford... for widening and rendering more commodious several streets etc... and for other purposes herein mentioned*, was essentially an Improvement Act on a par with similar contemporary Acts being passed nationally. However, it set up a new body of independent Police Commissioners consisting of the Boroughreeve, the Constables of the manorial Court Leet, the Warden and fellows of the Collegiate Church, and every other person who owned or occupied a building valued or rented at £30 or more. This body, despite its limited franchise, was slightly more representative than the Court Lee. It was dominated by the middle classes of Tory allegiance until the 1830s and possessed stronger statutory powers for the regulation, improvement and maintenance of order in the town (PC, 1797-1833, Walton, 1987). Until the 1840s, the term 'police' was applied in its broadest context to infer the general administration of an area, and maintenance of social order and peace formed a limited part of a much wider brief (Winstanley, 1990).

Other Lancashire towns including Oldham also appointed a Police Commission (1826) via local privately promoted legislation. As in Manchester, its officers took over administrative and regulatory duties including maintenance of

public health (Winstanley, 1990). Manchester Court Leet continued to provide thirty day-police while the Police Commissioners appointed officers for the night watch. Manchester's municipal borough police was formed in 1838 following from the Municipal Corporations Reform Act (1835) which allowed incorporated towns to form a Watch Committee and police force. Following several years in which the town maintained three separate police forces, the Borough police regained control in 1842 (Midwinter, 1968).

The Commissioners worked in close co-operation with the Court Leet rather than superseding it. Many officers worked for both authorities. All jurors of the Court Leet in 1799 were also Police Commissioners and in 1810 the Steward of the Court Leet helped draft a new Police Bill (Earwaker, 1884-90). The Commissioners also responded to concerns expressed by the Manchester Board of Health. In 1807, five Commissioners were requested to 'use their best endeavours for the removal of the nuisances of which the Board of Health have complained to this meeting' (PC, 1797-1833).

The Police Commissioners of towns including Oldham and Manchester perceived regulation of public health a central concern (Winstanley, 1990). Following an initial period of inactivity exacerbated by political and economic unrest throughout Europe, and characterised locally by a competitive pursuit of power between Manchester Tories and Whigs (Gatrell, 1982; Walton, 1987), the Manchester Police Commissioners began to respond to the new urban problems from late 1799 through the appointment of several investigative committees. On the 25th July 1800, a Nuisance Committee was appointed 'to attend to, and report to the General Commissioners under this Act all Nusances in Manchester cognizable by such Act' (Graham, 1954; Chaloner, 1959). Within one month of its appointment the Nuisance Committee had presented a very vigorous report in which it outlined a comprehensive programme of reforms. The report focused on the traditional nuisance offences of encroachment and obstruction of the highways, accumulation of refuse, poor drainage and sewerage and wandering animals. However, it concluded with concern about the new issue of smoke from steam engines:

That the Increase of Fire of Steam Engines as well as the Smoak issuing from Chimnies used for Stoves Foundaries Dressers Dyehouses and Bakehouses are become a great Nuisance to the Town unless so constructed as to burn the Smoak arising from them which might be done at a moderate expence. (PC, 1797-1833)

Five hundred copies of the report, along with a letter stressing the need for compliance, were circulated to relevant individuals (Redford and Russell, 1939). This action reiterated contemporary sentiments expressed by both the Manchester Board of Health and the Manchester Court Leet. The Nuisance Committee believed that chimneys should be constructed to consume their own smoke but did not set out specific measures through which to achieve this aim.

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By 1807 the Police Commissioners had become the most important governing body of Manchester. They continued to operate as a surrogate municipal authority until legislative changes of 1842-3 finally gave power to the Municipal Council (Redford and Russell, 1939, 1940; Frangupolo, 1962; Gattrell, 1982). The 1792 Police Act had provided that, in respect of smoke emission, the Commissioners could request alterations in the height of chimneys in order to prevent further smoke nuisance and:

take any steps which may be necessary for compelling owners and occupiers of steam engines and fire engines to construct the fireplaces and chimneys thereof respectively in such a manner as most effectually to destroy and consume the smoke arising therefrom. (Graham, 1954)

From 1808 smoky chimneys were being dealt with by the Nuisance Committee and standardised administrative procedures for their control were developed. Typically, a small sub-committee comprising two or three men was appointed to investigate the alleged nuisance. Their reports were submitted to the Nuisance Committee and subsequently referred to general meetings of the Police Commissioners for action. This action took the form of standardised recommendations. Most commonly chimneys were considered too low and were requested to be raised 8-15 yards above the ridge of the roof. Other solutions included division of the fireplace into two 'so as more effectually to destroy and consume the smoke...' (PC, 1797-1833).

As with the Manchester Court Leet, smoke polluters were often chastised on several separate occasions for their smoke nuisance. Similarly, mitigation of smoke on an individual basis by the Police Commissioners' Nuisance Committee sometimes remained unresolved for many years. Generally the number of smoke pollution cases remained a low proportion of the annual total of nuisance cases dealt with by the Police Commissioners. For example, in 1832 only seven out of 1,758 reported nuisances related to smoky chimneys (PC, 1797-1833). Encroachments and obstructions on the highways remained most common.

The Police Commissioners' smoke abatement activity took place in advance of national regulation. As industrialisation progressed, the need for central legislative rather than local judicial regulation of industrial and human waste disposal became acute. The statutory regulation of air and water pollution became part of a general movement to improve the sanitary conditions of the urban poor during the mid-1800s, by which time it was accepted that private actions against these problems were inadequate to the task (Brenner, 1974). The necessity for explicit standards of allowable emissions was increasingly recognised alongside the acknowledgement that national legislative measures rather than reliance on common law was required to guarantee enforcement.

This movement began with the Select Committee investigation of coal smoke prevention (1819) and the 1821 Act (1+2 Geo. IV c. 41) *for giving greater*

Facility in the Prosecution and Abatement Nuisances arising from Furnaces used and in the working of Steam Engines which aimed to make common law prosecutions for nuisance more effective. The Manchester Police Commissioners responded immediately to this piece of legislation and on the 3rd October 1821 ordered that their Inspector of Nuisances give notice to all the owners of steam engines under the Commissioners' authority:

their Determination to put in force the Provisions of Mr M. A. Taylor's Act for the Removal of Nuisances occasioned by the Smoke of Steam Engine Chimneys unless the Proprietors proceed to remedy the Evil in the most effectual Manner within two Months. (PC, 1797-1833)

This notice was printed in the local newspapers and circulated on hand bills. The Commissioners also undertook an investigation and reported *On the State of the Nuisances occasioned by Smoke*. This report was referred to a small Steam Engine Smoke Committee, newly appointed by the Commissioners in February 1822. The committee requested that the Nuisance Inspector, Mr Ogden, take further inspection of chimneys observing the quantities of smoke emitted at not less than two firing of the engines. The committee employed a measurement scale and definite expectations on the degree of smoke reduction to be expected. They discovered that seventy four out of eighty five chimneys failed to meet their established criterion. Only twenty had carried out appropriate alterations. As a result the committee requested a general meeting to determine what measures it should take 'in order to carry into full Effect the Intentions of the Legislation and of the Resolutions which a Regard to the Comfort and Health of the Town has induced the Commissioners to pass'. Mr Ogden was ordered to call personally on the proprietors of steam engines and note down their answers 'with respect to the steps they have already taken or intend to take with a View to consuming their own Smoke'. The Police Commissioners subsequently requested that the sub-committee should choose the worst five cases for action (PC, 1797-1833).

However, behind the scenes it appears that the Police Commissioners deferred prosecutions of such smoke offenders. The Steam Engine Smoke Committee recorded that they had abstained from prosecutions at the Salford Quarter Sessions out of a 'wish to act with all possible consideration' and instead directed Mr Ogden to continue his observations and reports. The Committee bemoaned the lack of any general improvement regarding smoke consumption and asked the Police Commissioners whether further indulgence ought to be allowed. The Police Commissioners remained unwilling to act too severely and were prepared only to issue notices threatening imminent prosecution. The disillusioned Steam Engine Smoke Committee disbanded itself on the 13th September 1822:

in consequence of the check they met with at the general Meeting [of the Police Commissioners] in not being allowed to proceed against the worst cases then existing

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the Committee in general feel indisposed to interfere any further in the business. (PC,1797-1833)

Thus, despite the proclaimed intention of the Police Commissioners to actively enforce Mr Taylor's Act, resolve was weak. The Commissioners continued to confront local smoke producers throughout the early decades of the 19th century through publication of notices to abate, threats of action (WNHCC, 1828-1834) and the appointment of small investigative sub-committees. These methods remained ineffectual in achieving successful smoke abatement. For example, following one investigation of smoke nuisance in 1829 the small sub-committee recommended that the complainants and the offender 'arrange the matter between themselves' (WNHCC, 1828-1834),

The interconnection between the local government and the business elite of Manchester resulted in vested interests which weakened local commitment to smoke abatement measures. Individuals would be reluctant to introduce legislative measures which ran counter to the success of their business endeavours (Gatrell, 1982; Lloyd-Jones and Lewis, 1988). Some activities of the Police Commissioners did not conflict with business aspirations. They established a municipal gas supply and employed the profits from this to light, cleanse and pave the streets. Despite the Police Commissioners sympathy to local mercantile interests The Steam Engine Smoke Committee, appointed from amongst the ranks of the Police Commissioners, were sufficiently distressed at the Commissioners' unwillingness to prosecute smoke offenders, that they resigned en masse.

THE INSPECTOR OF NUISANCE

Wohl (1983) intimates that the role of Inspector of Nuisances was primarily to aid the Medical Officer of Health in the successful implementation of public health inspection and control at local level through the inspection of premises and identification of 'nuisances injurious to health'. Inspectors could, however, have some degree of autonomy and were occasionally appointed in advance of the Medical Officer of Health (Brimblecombe and Bowler, 1989). Nuisance Inspectors began to be employed by English municipal town authorities during the mid 19th century, especially following the 1848 Public Health Act which encouraged towns to establish Local Boards of Health and appoint relevant sanitary officials.

However, in Manchester, the appointment of an Inspector of Nuisances occurred prior to the national legislative impetus (PC, 1797-1833). Here, constables appointed by the local Police Commissioners took on the role as public health officers. They were required to act as Inspectors of Nuisance and deal routinely with a plethora of public nuisances defined by local bye-law as an

integral and significant part of police work (Winstanley, 1990). The Police Commissioners appointed a full-time, paid constable in 1799 to maintain the watch boxes, inspect street paving, report public nuisances and supervise the lighting and scavenging provision of Manchester. This individual, a precursor to the later 19th century municipal post of Nuisance Inspector, died in 1803. On the 10th June 1803 the Police Commissioners ordered that a 'fit person be appointed to attend to and provide information of all nuisances and offences contrary to Act of Parliament' (PC, 1797-1833). However, the post subsequently proved almost impossible to fill (Redford and Russell, 1939).

By 1823 both Thomas Ogden and John Jackson were employed by the Manchester Police Commissioners as salaried Nuisance Inspectors (and working independently of the small sub-committees appointed to investigate individual smoke nuisances) to inspect a range of nuisances including those caused by smoke and noxious vapours. They visited sites, suggested improvements to the owners and reported back to the Nuisance Committee. During the period September 1830 to September 1831 the Inspectors dealt with 39 fines for chimneys on fire, nine incidents of which were abated or excused, two fines for smoky chimneys and seventeen smoky chimneys abated or excused (PC, 1797-1833).

The recruitment of suitable staff remained problematic. In 1832 the number of Nuisance Inspectors increased to three. At one point the turn-over of appointed Inspectors by the Commissioners was so rapid that five different individuals were mentioned as having been either appointed or recently considered for the post (PC, 1797-1833; WNHCC, 1828-1834). After several unsuccessful appointments the Commissioners advertised in the local press for an Inspector who must be:

extremely attentive to sobriety and temperance, active and diligent in the discharge of his duty and maintain on all occasions a Calm, civil and obliging but firm and steady conduct, not suffering himself to be biased in the execution of his duty and he is never to use violence except in the most urgent case of self defence... he shall take care not to bring himself or the Committee [Nuisance Committee] into unnecessary trouble, he shall in all Cases give the Inhabitants the most civil answers and behave with all possible humanity to every person... even to such as are accused of offences. (WNHCC, 1828-1834)

Such a description finds strong echoes within the records of many 19th century English local government public health bodies (Brimblecombe and Bowler, 1989, Winstanley, 1990). There were no qualifications set for this office within national public health legislation. The Sanitary Institute, founded in 1867, spread information about sanitary engineering and acted as a certifying body for surveyors and inspectors, although its certificate remained optional. The Institute also ran courses which attempted to develop the Inspector's competence in

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detecting and removing nuisances and by the 1880s most inspectors of larger urban districts were of a higher professional standard (Wohl, 1983).

Local authorities sometimes recognised the importance of attracting the correct calibre of official and that in order for the post to be effective a delicate balance of sensibilities was required. The post of Inspector of Nuisances was frequently arduous and in Norwich, for example, sanitary officials were physically and verbally assaulted by citizens while investigating domestic nuisance. The turnover of Manchester Inspectors remained high. They were often requested to account for their time and many were discharged for neglect of duties, for 'receiving compromise', for losing money and for assault (PC, 1797-1833; WNHCC, 1828-1834). The appointment of sanitary officials remained difficult for English towns even after the 1848 Public Health Act. The City of York, for example, attempted to re-appoint its Chief Constable as the Inspector of Nuisances but this move was blocked by the Local Government Board. York Council subsequently appointed an enthusiastic and diligent officer to the post (Bowler and Brimblecombe, 1990).

MUNICIPAL CORPORATIONS

The 1835 *Municipal Corporations Reform Act* standardised the local government of those English towns which adopted its provisions. This facilitates the comparative analysis of local administrative responses to air pollution during the Victorian era. The increasing number of Public Health Acts passed during the second half of the 19th century also provided improved powers to local authorities to control smoke. Local authority responses to these statutes provides insight into the relative enthusiasm of individual towns for environmental regulation.

In Manchester, the 1835 Reform Act generated intense political dispute between the local Whig-Liberals and the Tories over the issue of incorporating the town. This unrest was exploited by both the radicals and the Chartists (Pickering, 1995). The town was finally incorporated in 1838 and provided with a Borough Council. The new corporation was elected on a wider franchise and placed Liberal reformers in control in place of Tory dominated local government bodies (Gatrell, 1982; Walton, 1987). Political opposition to the Council from older administrative bodies continued until the early 1840s. The Police Commissioners eventually relinquished their position in favour of this Council in 1843 and the Court Leet held its final meeting in 1846 (Messinger, 1985).

Local inhabitants of a recently incorporated town often perceived that sanitary improvement could be achieved through applying pressure to the new administrative authority. In the town of Leeds, for example, agitation by a newly formed citizens' smoke control association ensured the insertion of a smoke

clause into the Leeds Improvement Act of 1842. Similarly, the vicar of Rochdale, J.E.N. Molesworth, helped establish the Manchester Association for the Prevention of Smoke in 1842 and campaigned to persuade manufacturers to sign a resolution pledging themselves to abate smoke voluntarily (Wohl, 1983). Only 35 individuals signed this resolution and only three manufacturers adopted abatement devices. Despite such a weak response, two years later Molesworth was able to ensure that a smoke control clause was inserted into the Manchester Improvement Act of 1844 (Flick, 1980). In 1844 a newly appointed Manchester Improvement Committee suggested that the town was drafting a local sanitary legislation which 'was thereby giving a lead to most of the other large towns of the country' (Briggs, 1963).

From 1843 Manchester's new Council began to organise its response to the social and sanitary problems of the town and appointed a Nuisance Committee of twenty one men who were required to meet at least fortnightly. This body was consciously modelled on the previous Police Commissioners' Nuisance Committee and was requested to use powers contained in the 1792 and 1828 Manchester Police Acts 'for carrying into effect and compelling the due observance and performance... relating to the height of chimneys, for the preventing nuisances arising from smoke'. It was empowered to take the necessary steps to compel owners of steam engines to destroy and consume smoke, to give notices where necessary and to inflict penalties for offences (MCP, 1842-1899; Redford and Russell, 1940).

The General Purposes Committee of Manchester Council requested that the Council decide which clauses in extant legislation relating to smoke nuisance should be enforced since: 'it is only necessary to draw public attention to this subject, and to compel the attention of parties to their furnaces, in order to lessen the evil of which the inhabitants of this borough so justly complain' (MCP, 1842-1899). With hindsight this statement appears naive and optimistic but it suggests recognition of the role of public opinion in health reform.

Within a few years of its appointment the Council had passed a number of local acts granting it extensive powers to ameliorate sanitary problems. These included the 1844 *Manchester Police Act* (7+8 Vict. c.40) *for the good government and police regulation of the borough of Manchester for the suppression of nuisances and other offences within the borough* and the 1845 *Sanitary Improvement Act* (8+9 Vict. c.141). The Manchester press acknowledged the pioneering nature of such actions and saw Manchester as an 'inspiring example to every city...' (Briggs, 1963) although a number of contemporary regional acts, including the 1842 *Leeds Improvement Act* and the 1846 *Liverpool Sanitary Act*, contained similar objectives.

Manchester's 1844 *Police Act* represented a comprehensive measure of social reconstruction. It affected nearly all branches of local administration and committee structure and provided Manchester Council with more adequate powers over the entire Borough than the Police Commissioners had held

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previously (Redford and Russell, 1940; Graham, 1954). It included provision for the control of smoke nuisances. Under the terms of the Act:

every furnace employed ... in the working of engines by steam, and every furnace ... employed in any mill, factory, dye-house, iron foundry, glass-house, distillery, brewery, bakehouse, gas-works, or other building used for the purposes of trade or manufacture, shall in all cases where the same shall be practicable be so constructed so as to consume or burn the smoke arising from such furnace. (Simon, 1938)

Manchester Council appointed a new Nuisance Committee for the whole Borough rather than the township as previously. In December 1844 the new committee advertised in Manchester newspapers and distributed notices stating that proceedings would be instituted against all parties 'who offend and neglect to consume smoke arising from their respective furnaces'. Several offenders were detected by May 1845 but escaped immediate prosecution because the Town Clerk was absent (NCM, 1849-1854; Simon, 1938).

The Nuisance Committee inherited numerous sanitary problems. Between 1801 and 1841 the town's population increased from 70,000 to 243,000 as a result of the massive immigration of workers. The urban conditions were appalling. In 1843 a petition published in the *Manchester Guardian* estimated that there were five hundred industrial chimneys in the town (Mosley, 1996) and



FIGURE 4. Manchester from Kersall (*The Illustrated London News*, 1857)

a report of 1859 singled out thirty-one of these as being particularly offensive. These included oil cloth works, artificial manure works, alum works, tanneries, potteries and turpentine works (MCP, 1842-1899).

The effect on Manchester's atmosphere was dramatic. Alexis de Tocqueville described in 1835 how 'a dense smoke covers the city. The sun appears through it like a disc without rays' (Lawrence and Mayer, 1958). In 1844 a further foreign visitor to Manchester wrote that:

Nothing is to be seen but houses blackened by smoke... smoking factories of different kinds... a pallid population. I could not help being forcibly struck by the peculiar dense atmosphere which hangs over these towns in which hundreds of chimneys are continually vomiting forth clouds of smoke. The light even is quite different... What a curious red colour was presented by the evening light... It is not like a mist nor like dust nor like smoke but is a sort of mixture of these three ingredients condensed moreover by the particular chemical exhalations of such towns. (Thomson, 1967)

Despite such descriptions, in 1845 the Council was congratulated 'for their proceedings against powerful manufacturers to abate the smoke nuisance' (Redford and Russell, 1940) and in 1846 the Chief Constable of Manchester declared it to be common knowledge that 'the town is much freer from smoke than formerly' (MP, 1846).

This period of public health activity in Manchester paralleled national interest in sanitary reform (Keith-Lucas, 1954) which culminated in the 1847 *Health of Towns Act*. Two centrally appointed Select Committees of 1843 investigated the feasibility of abating smoke and visited Manchester, Birmingham and Liverpool. They concluded that smoke could be abated and recommended that legislation be passed. A Royal Commission on the Health of Large Towns (1843) published its second report in 1845 in which it was stated that the smoke nuisance was only second in importance to defective drainage (Playfair, 1845). One of the Commissioners, Lyon Playfair, described the situation in Manchester. He suggested that in this town many public nuisances could be safely dealt with through better legislation. However, he perceived that some nuisances affecting the public health, such as smoke, involved private interests to such an extent that 'hasty interference or summary power might be objectionable'. He estimated that in Manchester an estimated £60,000 per annum was lost through costs involved in countering its smoke. This was double the town's Poor Rates. He believed that, contrary to public opinion, smoke abatement was economically viable, would reduce the burden on health and cleaning and required, above all, sustained effort on the part of stokers (Playfair, 1845).

The significance of the 1847 *Health of Towns Act* was widely recognised by contemporary social commentators including the novelist Elizabeth Gaskell. Her novels, *Mary Burton* (1848) and *North and South* (1855), described urban life in Manchester and referred to the 'unparliamentary smoke' (Brimblecombe, 1987). She had moved to Manchester from a rural location and found that the air

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was so full of soot that her muslin curtains would not stay clean for more than a week (Shelston, 1989).

The 1848 *Public Health Act* represented a culmination of recent activity in this field, brought together clauses from local Acts of preceding years and established central authority control over sanitary reform. The Act allowed the establishment of Local Boards of Health and the appointment of sanitary officials including the Inspector of Nuisances and Medical Officer of Health. It dealt with a huge array of contemporary problems, but did not contain any mention of smoke emissions. The smoke abatement clause in the initial Bill was rejected by the House of Commons due primarily to the pressure of industrialists including John Bright, the Member of Parliament for Manchester. He registered his opposition to all attempts throughout the 1840s to insert smoke clauses into national legislation. He described the smoke clause of the 1848 Bill as 'peddling legislation' and queried how it would be possible to define 'opaque' smoke and who would decide what constituted a 'well approved plan' for the consumption of smoke. He said that in Lancashire 'no three men were ever found to agree upon any effectual plan for preventing smoke' (Ashby and Anderson, 1981). He also doubted that smoke was really a hazard to health (Malcolm, 1976).

In many respects, Manchester Council had enacted relevant smoke abatement regulations in advance of national legislation. It had a small smoke nuisance sub-committee from 1845 and a smoke nuisance inspector appointed from 1847 (MCP, 1842-1899; NCM, 1849-1854). In this context it is perhaps understandable that the Council felt able to criticise elements of national draft legislation, because they gave 'very imperfect and inefficient powers for lessening the smoke nuisance' (MCP, 1842-1899). The Council also resented central government interference into an issue which they were already addressing.

Wohl (1983) suggests that it, in many towns, the appointment of the Medical Officer of Health acted as a catalyst for sanitary reform and that without this post public health reform could not be truly effective. However, it is important not to underplay the role played by lesser officials. In Manchester, from 1850, the Council's smoke sub-committee initiated regular smoke observations which were undertaken by their smoke inspectors. The inspectors and members of the sub-committee were also responsible for visiting firms to investigate cases of smoke emission and to offer advice, serving notices and cautions and summoning firms. The inspectors' timed observations, which form a remarkably detailed record of their work, were tabulated within Council annual reports (MCP, 1842-1899). Smoke observations subsequently became common procedure within English local government (Redford and Russell, 1940). The sub-committee attempted to solicit favourable responses from manufacturers through a tactful and courteous approach, expressing their belief that smoke consumption was entirely practicable and made economic good sense. They argued that much smoke was produced through lack of knowledge on the part of local industrial-

ists. The sub-committee expected that improvements would be affected by manufacturers after their inspections. A small number of offenders who persistently refused to affect alterations were summoned before the Nuisance Committee to account for their delay (NCM, 1849-1854).

All smoke producers, regardless of size, were dealt with equally. Most were, ultimately, willing to co-operate, though some remained unavailable during visits of the sub-committee and a small number felt unfairly treated. In 1852 the proprietor of the Oxford Road Twist Mill wrote to the smoke nuisance sub-committee that:

we are quite weary of the exertions we have so long made to avoid Smoke, for we see no disposition on the part of the Corporation and its servants to exact from several of our neighbours and other persons in the Town who habitually make Smoke, that strict observance of the law which is required from us. (NCM, 1849-1854)

The Council's Nuisance Committee dealt with atmospheric pollution from a wide range of manufacturing concerns and also requested regional railway companies to abate the nuisance from their locomotives (NC, 1859-1861). Where they lacked relevant knowledge of a particular industrial process they obtained professional help from Dr John Leigh, who subsequently became Manchester's first Medical Officer of Health (MCP, 1842-1899). A small number of smoke nuisance cases were brought before the Borough Court. Two cases were heard in 1853. Each was adjourned for one month to allow for more official investigation and for the proprietors to effect alterations. In one of these cases the previously recalcitrant offender finally complied with requests to abate the smoke (NCM, 1849-1854).

Wohl (1983) suggests that 'corruption, lethargy, innate conservatism, and ... parsimony' of the majority of local government officials resulted in opposition to public health reform, and local officials were complacent or simply found the subject of public health boring. This could be compounded by inadequate technical knowledge. However, most opposition to sanitary reform occurred on economic grounds. The desire to maintain low taxation invalidated large scale expenditure on sanitary projects. Thus, unless an epidemic or some other emergency stimulated desire for reform, public health measures were generally viewed with suspicion by ratepayers and town officials. Wohl found the presence of local manufacturers (whose operations were increasingly penalised by public health legislation), on local council public health committees puzzling.

Manchester's Council began in 1838 with substantial merchants, large manufacturers and several leading citizens at its head as Wohl (1983) suggests. Its composition altered only slowly (Walton, 1987). Yet, despite this, Manchester councillors were not adverse to confronting local smoke pollution. Council proceedings against smoke offenders followed a format derived predominantly from the town's previous administrative bodies. This included observing and investigating chimneys, serving notices, summonses and fines and allowing time

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for alterations by furnace owners (MCP, 1842-1899). The Nuisance Committee staff appear to have been dedicated. They perceived that their efforts produced a marked improvement in lessening the smoke nuisance of Manchester. However, this would ultimately prove insufficient to prevent the increase of the smoke nuisance.

THE 1866 SANITARY ACT

A distinct 'sanitary idea' emerged among local authorities from the late 1860s. This has been attributed partly to the impetus provided by well publicised Government reports and to the fear caused by epidemics, but more importantly to low-interest government loans and a higher local tax base. A heightened municipal spirit, sense of civic pride and competitive desire for municipal improvement between neighbouring towns brought further change (Wohl, 1983).

The appointment of professional sanitary officials was also important at a local level. The effective implementation of broad public health initiatives frequently depended on the appointment of a Medical Officer of Health (Wohl, 1983). The first Medical Officers of Health were appointed in Leicester (1846) and Liverpool (1847). Manchester Council is considered 'negligent' in not appointing a Medical Officer of Health until 1868 (MCP, 1842-1899; Wohl, 1983), only four years before it was made compulsory by the 1872 Public Health Act, 1872.

In Manchester the impetus for appointment of an Officer of Health came from the 1866 Sanitary Act (29+30 Vict. c 90) *to amend the Law relating to the Public Health* which was one of a number of important public health acts of the late 19th century and which granted local administrators enhanced powers to abate smoke nuisances. The 1866 Act required local authorities to inspect and abate nuisances within their district and it also included a smoke clause which allowed proceedings to be instituted against: 'Any Fireplace or Furnace which does not as far as practicable consume the Smoke... ' and which emitted black smoke.

Manchester Council requested that their new Medical Officer of Health, Dr. John Leigh, ascertain the rates of mortality in Manchester and study the effects of public health hazards including 'an atmosphere vitiated by smoke, and other particular emanations' (Redford and Russell, 1940). His annual reports frequently railed against poor air quality and he requested that the problem 'be grappled with, and its abolition be demanded' (MCP, 1842-1899). He was equally aware of the range of material damage and illness caused by air pollution. He claimed that a silver spoon would tarnish almost immediately in the streets of central Manchester and that smoke obscuration of sunshine was 'positively injurious to health', caused rickets, intemperance, depression and respiratory diseases and also injured metal, stonework, plants and trees (MCP, 1842-1899).

Despite the Council's attempts to ameliorate the smoke nuisance, the air over Manchester remained polluted. In 1875 Dr. Robert Martin described the sanitary state of a south-central district of the City:

Although the atmosphere was less befouled by smoke than it is in many parts of the city, nevertheless tall chimneys were not absent from the locality, and indeed great complaints were made respecting the soot which fell at almost all times in abundance, sadly interfering with the drying of clothes and the opening of bedroom windows. (Martin, 1875)

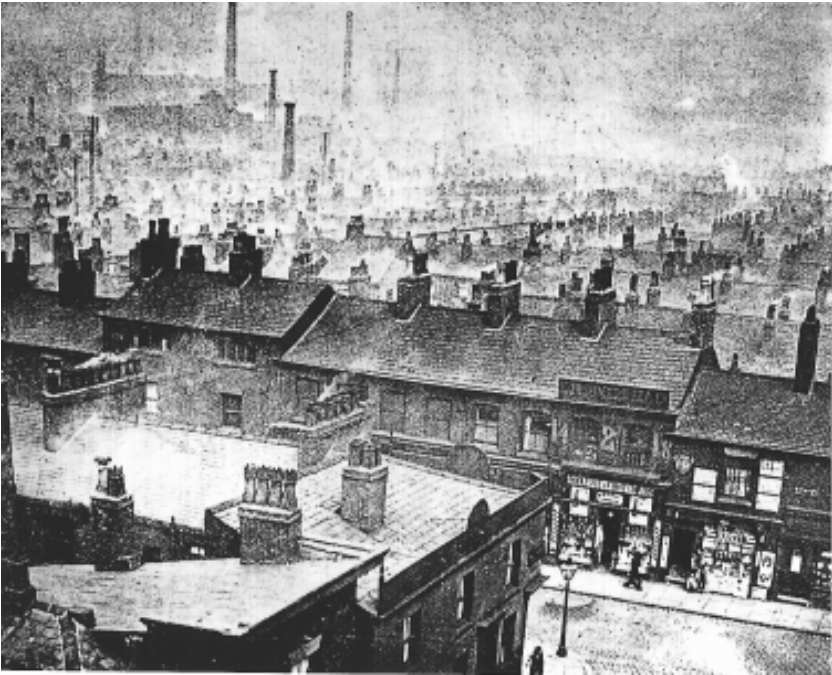


FIGURE 5. Ancoats, from Victoria Hall roof, 1901
(Manchester Central Library, Local Studies Unit)

THE 1875 PUBLIC HEALTH ACT

The 1875 Public Health Act (38+39 Vict. c 55) *for consolidating and amending the Acts relating to Public Health in England* applied to all areas except London. It defined nuisances and required local authorities to appoint sanitary officials who were empowered to enter and inspect premises and to enforce the statute.

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Where the local authority defaulted the Local Government Board could authorise any police officer in the district to take proceedings (as happened in York, see Brimblecombe and Bowler, 1989). It also allowed individuals to complain about a nuisance to a Justice of the Peace, who was also empowered to ensure polluters complied with the Act. Clauses within the legislation were concerned with the abatement of industrial smoke apart from certain exempt processes. However, it contained an escape clause, similar to the 1866 Sanitary Act, that where the furnace was constructed so as to consume as far as practicable its smoke and was carefully attended there was no nuisance within the meaning of the Act.

In towns where procedures were not as well developed as in Manchester, the Act clarified the administrative and legal process. Sanitary officials gained clearly defined powers and a separation of their role from the police force (Brimblecombe and Bowler, 1989). Manchester Council may not have benefited from the added powers of the 1875 Act since comparable regulation was already in place (Simon, 1938; Malcolm, 1976). Certainly, the Council viewed itself to be in advance of national legislation. In 1876 its Nuisance Committee pushed for even more stringent smoke control measures and was determined to see the law enforced (MCP, 1842-1899). By 1878 it was reported to the Local Government Board that Manchester responded very strictly to air pollution (Mosley, 1996; MCP, 1842-1899). From 1880 the Nuisance Committee agitated for raised smoke nuisance penalties which were later adopted within the 1882 *Manchester Corporation Act* (NC, 1880-1881; MCP, 1842-1899).

ANALYSIS AND DISCUSSION

Analysis of smoke abatement activities in Manchester reveals a complex picture. The Court Leet dealt with the new industrial smoke in conjunction with other types of common nuisance. Local professional concern about smoke abatement began in the late 18th century. Urban government was hampered by a complex administrative framework with overlapping functions. The Police Commissioners were created to combat the pressing problems of the era, but remained equally unable to abate industrial air pollution. The formation of the Municipal Council intensified abatement activities.

It is evident from our studies that smoke abatement activity relied not so much on whether the town was heavily industrialised or not, but on the calibre of individuals or organisations dealing with sanitary reform. Early advocates of smoke abatement were typically educated residents concerned with urban health, but were later superseded by statutory bodies. The success of these bodies depended on whether their members were willing to exert pressure on industry. Yet Manchester, despite intense industrial activity, became acknowledged as a leader in smoke abatement. Its local government frequently acted in advance of national legislation and felt their own regulations sufficient. Nevertheless,

national acts invariably provided a stimulus for further action and Manchester usually adopted, or responded to national legislation soon after it was in place.

Throughout the 19th century Manchester's officials generally believed that they were reducing the smoke nuisance. For example, the Medical Officer of Health stated in 1883 that there had been a visible diminution of smoke density as a result of the use of more inspectors and more stringent regulations (MCP, 1842-1899). However, it is difficult to know how objective such beliefs were. Concentrations of air pollutants were monitored in only the most isolated instances (Smith, 1880; Bell, 1892; Bailey, 1893). The only regular quantitative data on smoke was provided by smoke observations and Council prosecutions. The frequency of smoke observations does not necessarily reflect the concentration of smoke in the atmosphere. It is possible that they correlate with the enactment of public health statutes and reveal how legislation created a new sense of enthusiasm for abatement (see also Brimblecombe and Bowler, 1992). A high frequency of observation might also result from an increased public concern about air pollution. The period 1870-1888 in Manchester represented one of intense agitation for smoke abatement from both public and professional bodies including the *Noxious Vapours Abatement Association* and the *Manchester Town Gardening and Field Naturalists Society* and the City was also the venue for a number of smoke abatement conferences (MCP, 1842-1899).

In Manchester, as elsewhere, only a small fraction of industries emitting black smoke were successfully prosecuted. The lack of frequent prosecution and reliance on the goodwill of local industrialists to achieve smoke abatement, is sometimes seen as neglect in addressing environmental pollution (Wohl, 1983). Such a simple analysis fails to address the Council's approach to smoke abatement. The Council did not necessarily view prosecution as a successful outcome, they recognised that fines were too low, but also wished to achieve reduction by encouraging good practice. This may have been naive, but it remains uncertain that a more antagonistic approach would have worked in the absence of widely applicable abatement technology and objective emission limits. There are parallels in the implementation of the Alkali Acts, which were successful where both the abatement technology and the regulations were clearly defined. However where Alkali Inspectors went beyond the narrow remit of the Act they ran into problems (Hawes, 1995; Brimblecombe 1986). Thus in Manchester, the diversity of manufacturing processes precluded a simple standardised response to smoke abatement.

It is suggested that Victorians were slow to address air pollution and that was because smoke was (i) associated with progress and profit, (ii) acceptable as a necessary by-product and (iii) fines were too low, (iv) regulation hindered by weakening clauses and (v) demanded industrial co-operation (Wohl, 1983). These factors are all evident in Manchester but serve to obstruct rather than override the desire to abate smoke. As Wohl argues, Victorian legislation laid the

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groundwork for twentieth century activity but managed only 'to turn the urban skies of Britain from a gritty black to a dull grey'.

Thus some improvements in air quality emerged in the final decades of the 19th century (Brimblecombe, 1986; Brimblecombe and Bowler, 1992). In Manchester, the improvement was perceived to be so marked that emissions from neighbouring authorities became problematic (MCP, 1842-1899). Generalised improvements in England were not the result of any sharp change caused by the adoption of legislation, but possibly the result of: (i) gradual modernisation of furnaces and boilers, (ii) careful choice of fuel, (iii) improved training of stokers, (iv) an expansion of towns (e.g. moving industry and housing away from the centre, thus lowering the source strength) and (v) shifts from coal to gas and electricity.

CONCLUSION

Eighteenth century Manchester inherited a complex framework of medieval administrative practices that were unable to handle the growing industrial pollution. New bodies were created, which were active in the field of smoke abatement, but remained sympathetic to the needs of industry. These new administrative structures have often been attributed to the social upheaval that accompanied the rise of an industrial middle class. However, our work emphasises the added influence of the urban environment in bringing administrative change.

Despite a dependence on industrial growth Manchester saw the need to abate smoke at an early date and confronted it with a barrage of regulations. Observations of emissions were made by inspectors with an intensity which is surprising given that such actions were not required by law before the 1860s. English towns such as Manchester did not necessarily adhere to a policy of *laissez-faire* concerning noxious emissions, despite an arguably 'voluntary' basis to the regulation in the early 19th century. There may not have been a systematic prosecution of the industrial smoke nuisance, but the issue was certainly systematically addressed.

Effective response to air pollution requires both regulations and abatement techniques. Smoke abatement apparatus was inadequate in the 19th century, but the administrative machinery evolved considerably. Manchester developed coherent local government policy, a strong sanitary inspectorate and adopted national and local regulations prior to the Public Health Act 1875. This innovative administrative framework often spread to other towns. Thus, those provisions of the 1875 Act which required local authorities to develop smoke abatement policy, were already embodied in the control of air pollution in this pioneering metropolis.

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