

**Report of an Investigation into Claims of  
Ill-health in Telford & Wrekin Related to a  
Power Station in Ironbridge Gorge**

**December 2008 Update**

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**(Previously amended to include additional background information requested  
by Professor Harrison, Expert Assessor)**

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# 1 Purpose of Report: December 2008 Update

This report updates the study into claims of a causative link between emissions from a power station and levels of ill-health in Telford & Wrekin.

In summary, the Director of Public Health had conducted a study of routinely available local health data in response to these claims. The objectives of the study were as follows:

- To determine the factual accuracy of the claims being made about patterns of ill health in Telford & Wrekin, using routinely available health data
- To determine whether any such patterns amounted to evidence that emissions from Ironbridge power station are having an adverse impact on health

The report of the original study was presented, in public, to the Board of Telford & Wrekin PCT in May 2006, along with the report of the expert peer review into the study. This expert peer review had been requested by the Director of Public Health, given the nature of the allegations being made. Conclusions of the expert peer review included that the study conducted by the Director of Public Health had been “entirely appropriate”, “very thorough”, “admirably sensible” and “very reassuring”. The report of the Director of Public Health and the peer review were made available to the public in 2006.

The original study had been based on mortality data for the period 1994 to 2003 and on hospital admissions data for the period 1995/6 to 2004/5. This updated report now includes mortality data for the period 2004 to 2006 and hospital admissions data for 2005/6 and 2006/7. The methodological approaches used in analysing this data to provide the update were the same as for the original investigation.

In comparison to the original report, readers may find the following summary of changes useful:

- Sections 2 and 3  
Unchanged
- Section 4
  - Section 4.3.2: Table and commentary updated to include age standardised all cause mortality for 2006
  - Section 4.3.3: Table and commentary updated to include hospital admissions for acute pulmonary disease for 2005/6 and 2006/7. Commentary updated to reflect case numbers in Ironbridge Gorge
  - Section 4.3.4: Tables and commentary updated to include mortality data for the period 2004 to 2006. Commentary updated to reflect further analysis of all age all cause mortality in Ironbridge Gorge
  - Section 4.3.5: Table and commentary updated to include infant mortality data for the period 2004 to 2006
  - Section 4.4: Commentary updated to reflect the updated analyses
  - Section 4.5: Commentary (minimally) updated to reflect updated conclusions; previous recommendations removed

## **2 Introduction**

### **2.1 Background**

Two individuals have expressed concern that emissions from a local power station are responsible for substantial ill health and mortality within the population of Telford & Wrekin.

Work was undertaken by officers from Telford & Wrekin Primary Care Trust, Telford & Wrekin Borough Council and the Health Protection Agency and by other partners in response to these concerns. Approaches included liaison with the Environment Agency in relation to the compliance of the power station with National Air Quality Strategy standards and a review of the impact of air pollution on health, focusing on sulphur dioxide, nitrogen oxides and particulates.

The Director of Public Health also conducted a review of routinely available local health data and it is the findings of that investigation which form the body of this report. The Director of Public Health has sought an external assurance of this work because of the aggressive and personal approach being adopted by the two individuals in some of their correspondence, including with the local media. The Chief Executive of Telford & Wrekin PCT has had extensive personal involvement in the situation as it has evolved and the Chair of the organisation has also been briefed.

### **2.2 The Nature of the Claims**

Although the claims are very wide ranging and no clear hypothesis has been put forward, the general position being adopted is as follows:

- That there are certain current geographical patterns of ill-health and mortality within Telford & Wrekin
- That these patterns are evidence that emissions from a local power station are currently having a significant adverse effect on the health of people living near to the power station and in Telford & Wrekin

In this context, claims have been made for increased rates of the following conditions:

- All cause mortality
- Premature mortality
- Respiratory disease
- Mortality from myocardial infarction
- Cancer mortality
- Suicide
- Infant mortality

Although the claims are condition specific, it is almost always unclear whether the concerns relate to incidence or prevalence and no age specific effect has featured in the correspondence. Electoral wards are rarely, if ever, mentioned by name. Moreover, no temporal effect has featured in the claims, either acute versus chronic effects at population level or epidemiological trends over time. PM 2.5s have sometimes been mentioned as the agent responsible for the adverse health effects.

There have, however, been two specific allegations as follows:

- That, comparing the periods 1991 to 1996 and 1998 to 2003, there was a large increase in the number of deaths in Telford & Wrekin compared to Shrewsbury & Atcham
- That there has been an increase in the number of deaths in the area surrounding the power station since 1999

Telford & Wrekin PCT has supplied data in response to all the requests which have been made by the individuals concerned under the provisions of the Freedom of Information Act. In addition to this, the individuals have also cited evidence from local undertakers and a local obituary column as the basis for some of their claims.

## **3 Context**

### **3.1 Telford & Wrekin**

Telford & Wrekin has a population of approximately 163,000 people and encompasses the main conurbation of Telford and its surrounding towns and villages in east Shropshire. Telford & Wrekin falls within the "Manufacturing Towns" subgroup of the Office for National Statistics Area Classification System for local authorities. The most notable feature of this subgroup is that a relatively high proportion of residents are employed in a manufacturing occupation. Telford & Wrekin has one of the most rapidly growing local populations in the West Midlands and between 1991 and 2001 saw its resident population increase by 11.9%. Telford itself is situated on the M54 corridor and is an area of relatively low unemployment and low wages. The local economy encompasses the service and public sectors, along with some industry, including manufacturing, engineering and new technology. The area is served by a relatively uncongested road network, with a mainline railway connection to Wolverhampton and Birmingham to the south east and Shrewsbury to the west.

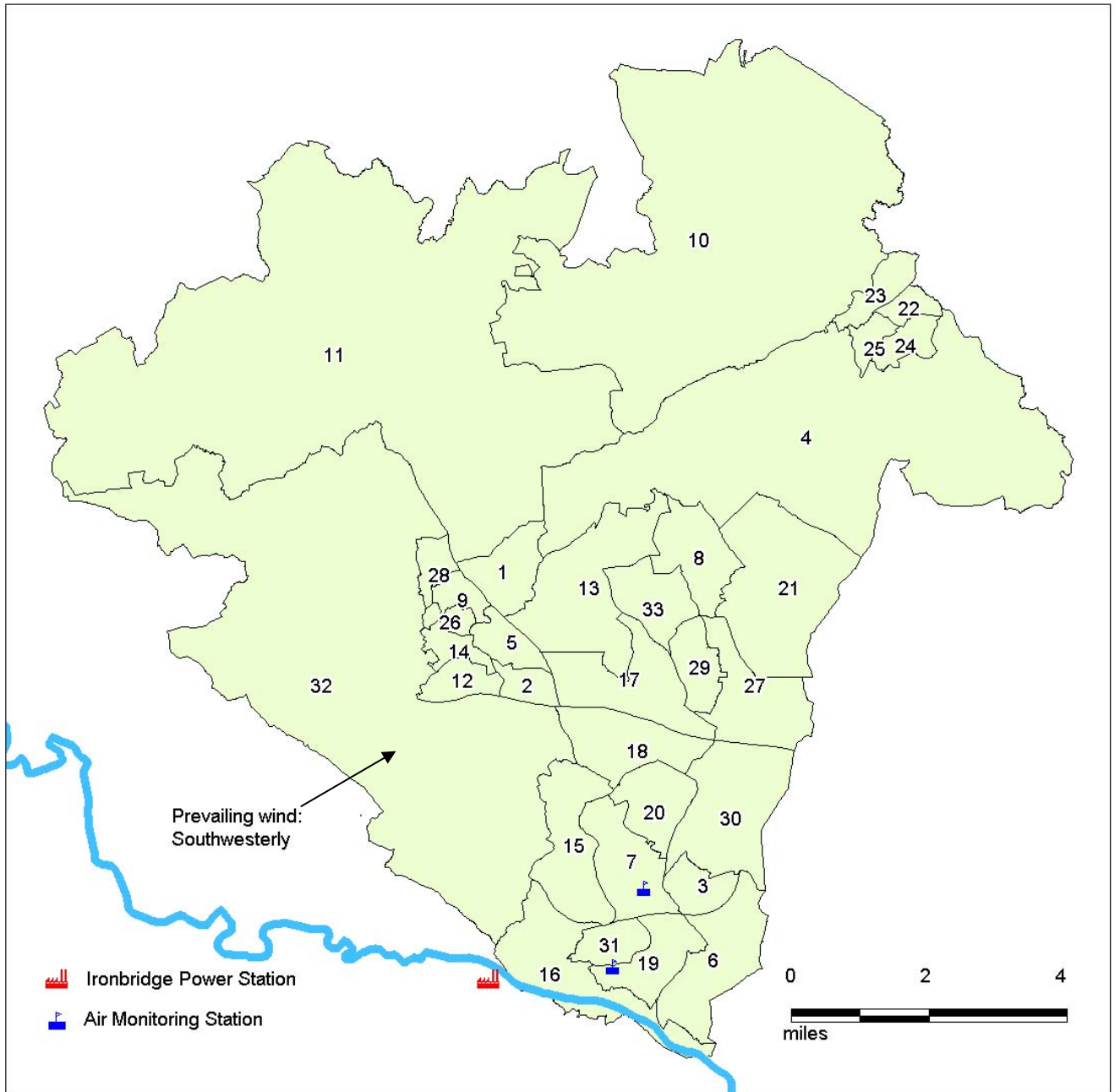
Telford & Wrekin has areas of significant socioeconomic deprivation, with around 24% of children living in households receiving a means tested benefit. Housing stock is generally mixed, including some large new estates but with poorer quality housing concentrated in 1960s developments in the south Telford area. There are also significant health inequalities within Telford & Wrekin. For example, male and female life expectancy is greater in the more affluent areas and there are similar inequalities in premature mortality from circulatory disease and cancer. Deprivation levels are correlated with a wide range of health indicators in Telford & Wrekin, including the incidence of low birth weight, breastfeeding, the consumption of fruit and vegetables, the incidence of sexually transmitted infection, smoking prevalence and outcomes from the local smoking cessation service.

### **3.2 The Power Station**

Ironbridge power station is situated in Broseley, Shropshire in the Ironbridge Gorge on the south bank of the River Severn (latitude 52°37'27" N, longitude 2°30'35" W). It produces electricity for the national grid from the combustion of coal (including low sulphur) and biomass material. Commissioned in 1970, the power station occupies an 85 hectare site and is capable of generating 1,000 megawatts of electricity. The plant includes four cooling towers (each 114 metres high) and one chimney stack (204 metres high). An earlier, smaller station, commissioned in the early 1930s, was demolished in the 1980s.

Figure 1 maps the boundary and constituent wards of the Borough of Telford & Wrekin and the position of the power station. The figure also shows the position of the two air quality monitoring stations, which are specifically sited at the points of maximum ground level pollution from the power station, as determined by the Environment Agency using an air dispersion model.

The main atmospheric pollutants released from the power station are controlled under its "Authorisation", granted by the Environment Agency under the Integrated Pollution Control arrangements. The Authorisation sets limits on the emissions permitted from the power station and specifies the controlling techniques to be used. Emissions are monitored against standards set in the National Air Quality Strategy and the power station has had an Air Quality Management Plan in place since 2001 to minimise the risk of any breaches in these standards. Ironbridge Gorge power station complies with all the National Air Quality standards. Air dispersion modeling of particulates emitted from the power station has predicted the ground level PM10 concentrations to be less than 2% of the National Air Quality Strategy objectives.



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**Ward Key**

1 Apley Castle	8 Donnington	15 Horsehay & Lightmoor	22 Newport East	29 St. Georges
2 Arleston	9 Dothill	16 Ironbridge Gorge	23 Newport North	30 The Nedge
3 Brookside	10 Edgmond	17 Ketley & Oakengates	24 Newport South	31 Woodside
4 Church Aston & Lilleshall	11 Ercall Magna	18 Lawley & Overdale	25 Newport West	32 Wrockwardine
5 College	12 Ercall	19 Madeley	26 Park	33 Wrockwardine Wood & Trench
6 Cuckoo Oak	13 Hadley & Leegomery	20 Malinslee	27 Priorslee	
7 Dawley Magna	14 Haygate	21 Muxton	28 Shawbirch	

### 3.3 South Telford

For the purposes of this report and with reference to Figure 1, South Telford is defined as the wards of Ironbridge Gorge (16), Madeley (19), Woodside (31) and Dawley Magna (7) (for explanation, see Section 4.2). Although the total resident population of South Telford increased by 6.2% between 1991 and 2001 (from 22,933 to 24,355), this growth was significantly less than the Borough-wide rate described above.

The population growth in South Telford was predominantly driven by an increase in housing stock due to the building of new dwellings. This was primarily focused in the Dawley Magna ward, whose population increased by 14.6% between 1991 and 2001. During the same period, despite the increase in total population, the average household size in South Telford fell by 7.7% (from 2.6 to 2.4), due to a 16.2% increase in the number of households. The age profile of South Telford remained relatively stable during this period.

Table 1 shows the Area Classification subgroup for each of the four wards, including the notable characteristics for each ward.

**Table 1 : Characteristics of the South Telford Wards**

<b>Ward</b>	<b>ONS Sub-group</b>	<b>Notable Characteristics (i.e. higher than national average position)</b>
Madeley	Out of town manufacturing	<ul style="list-style-type: none"><li>• Employment in manufacturing occupations</li></ul>
Dawley Magna	Out of town manufacturing	<ul style="list-style-type: none"><li>• Employment in manufacturing occupations</li></ul>
Ironbridge Gorge	Suburbs A	<ul style="list-style-type: none"><li>• Detached housing</li><li>• Households with two or more cars</li></ul>
Woodside	Built-up manufacturing	<ul style="list-style-type: none"><li>• Single parents</li><li>• Unemployment</li><li>• Terraced housing</li><li>• Rented accommodation</li></ul>



## **4 The Investigation**

### **4.1 Objectives**

The objectives of the investigation were as follows:

- To determine the factual accuracy of the claims being made about patterns of ill health in Telford & Wrekin, using routinely available health data
- To determine whether any such patterns amount to evidence that emissions from Ironbridge power station are having an adverse impact on health

### **4.2 Approach and Methods**

For the purposes of the study, four "at risk" wards were defined by their relative physical proximity to the power station and prevailing wind direction (Ironbridge Gorge and Woodside) or because they have an air quality monitoring station within their boundary (Madeley and Dawley Magna). Ward-level measures were compared to the Telford & Wrekin average position. The approach also included comparison of the Telford & Wrekin average position with England & Wales.

The study was based on a series of routine health and health service data. Data sources were as follows:

- Population: Office for National Statistics Revised Mid Year Population Estimates and 2001 Census Standard Tables for Wards
- Hospital Episode Statistics: Telford & Wrekin PCT Contract Minimum Datasets
- Mortality: Office for National Statistics Annual Death Extracts and Vital Statistics Tables
- Deprivation ranking: Office of the Deputy Prime Minister Indices of Multiple Deprivation 2004

Despite the absence of clear references to any trend effects in the claims being made, data was examined for the most recent ten year period for which data was available at the time of the analysis. Where indicated, analyses were based on five year rolling average positions, age-standardised rates and calculation of the 95% confidence interval. In summarising data for the purposes of the report, rates are described as "similar" when the difference between them is not statistically significant or "higher" or "lower" when a difference achieves statistical significance at the 95% confidence level.

The classification of mortality information in England and Wales has been governed by the Tenth Revision of the International Classification of Disease (ICD 10) since January 2001. To allow the development and interpretation of mortality trends spanning this transition, Telford & Wrekin mortality data based on ICD 9 is adjusted to take into account the comparability ratios similarly used by the National Centre for Health Outcomes Development. However, as adjusted national mortality data for chronic obstructive pulmonary disease is not available, local comparisons with the England & Wales position prior to 2001 have not been provided in the report.

Respiratory morbidity was examined through an analysis of hospital admission rates for acute pulmonary disease, based on the following codes from the tenth edition of the International Classification of Disease (ICD 10):

- J20: acute bronchitis
- J45: asthma (excluding J45.0: allergic asthma)
- J46: status asthmaticus
- J68: respiratory conditions due to the inhalation of chemicals, gases, fumes and vapours

Other ICD 9 and 10 codes are provided in the Appendices to the report. Ward level data on suicide has not been provided in the report due to the current advice on disclosure from the Office for National Statistics.

## 4.3 Findings

### 4.3.1 *In response to the claim that, comparing the periods 1991 to 1996 and 1998 to 2003, there was a large increase in the number of deaths in Telford & Wrekin compared to Shrewsbury & Atcham*

Table 2 shows all cause mortality information for the two Boroughs in question.

**Table 2 : All Cause Mortality, Telford & Wrekin and Shrewsbury & Atcham**

Period	Telford & Wrekin					Shrewsbury & Atcham				
	Total Number of Deaths	Population	Age Standardised Mortality Rate (/100,000)	95% Confidence Interval		Total Number of Deaths	Population	Age Standardised Mortality Rate (/100,000)	95% Confidence Interval	
				Lower Limit	Upper Limit				Lower Limit	Upper Limit
1991-96	7,547	864,100	799	781	818	6,019	560,100	717	698	736
1998-03	7,944	941,500	718	702	735	6,053	573,800	635	618	652
Difference (number)	+397	+77,400				+34	13,700			
Difference (%)	+5%	+9%	-10%			+1%	+2%	-11%		

Source: Office for National Statistics Vital Statistics 3 Tables and Mid Year Population Estimates © Crown Copyright

The total number of deaths in Telford & Wrekin increased by 5% over the period in question, while there was a 9% increase in the size of the local population. Similar but smaller effects were observed in Shrewsbury & Atcham. The greater increase in the number of deaths in Telford & Wrekin was to be expected, given the relative increase in the local population. However, the age standardised mortality rates fell significantly in the two Boroughs, with a 10% decrease in absolute terms being observed in Telford & Wrekin and an 11% decrease in Shrewsbury & Atcham.

#### ***4.3.2 In response to the claim that there has been an increase in the number of deaths in the area surrounding the power station since 1999***

“Area” was not defined in the claim. However, Table 3 shows all cause mortality information for the Telford & Wrekin study wards for 1999, 2003 and 2006.

Considering the period 1999 to 2003, there was a 2.3% increase in the total number of deaths in the study wards, with five more deaths recorded in 2003 than in 1999. Although ward level census estimates are not available for the period in question, this increase in deaths is not surprising given the population growth trend in South Telford (for example, the 6.2% increase in the population from 1991 to 2001 which was described in Section 3.3). None of the changes observed in the age-standardised mortality rates, either at ward level or across South Telford as a whole, were statistically significant.

Considering the period 1999 to 2006, there was a 21% decrease in the total number of deaths in the study wards. Deaths fell in all four study wards. The age standardised mortality rate (for all study wards combined) fell from 821 to 618 per 100,000 population, although this was not statistically significant.

**Table 3 : All Cause Mortality, South Telford Wards**

Ward	1999				2003				2006			
	Total Number of Deaths	Age Standardised Mortality Rate (/100,000)	95% Confidence Interval		Total Number of Deaths	Age Standardised Mortality Rate (/100,000)	95% Confidence Interval		Total Number of Deaths	Age Standardised Mortality Rate (/100,000)	95% Confidence Interval	
			Lower Limit	Upper Limit			Lower Limit	Upper Limit			Lower Limit	Upper Limit
Madeley	77	934	714	1,155	80	866	662	1,071	51	582	417	748
Dawley Magna	58	576	426	726	64	604	454	755	67	578	437	718
Ironbridge Gorge	45	1,827	1,276	2,378	37	1,439	951	1,926	27	782	486	1078
Woodside	37	760	512	1,009	41	796	550	1,043	26	531	323	739
<b>Total</b>	<b>217</b>	<b>821</b>	<b>710</b>	<b>932</b>	<b>222</b>	<b>792</b>	<b>686</b>	<b>898</b>	<b>171</b>	<b>618</b>	<b>416</b>	<b>821</b>

Source: Office for National Statistics Annual Death Extracts, 2001 Census Standard Tables for Wards © Crown Copyright, Telford & Wrekin PCT General Practice Population Register

### 4.3.3 Respiratory Morbidity

Table 4 compares hospital admission rates for acute pulmonary disease in the study wards to the Telford & Wrekin average position for children and adults, for the twelve year period 1995/6 to 2006/7.

**Table 4 : Ward-level Hospital Admission Rates for Acute Pulmonary Disease: Comparison with Telford & Wrekin Position**

	Period	Age group	
		Under 15	15+ years
<b>Madeley</b>	1995/96-1999/00	Similar	<b>Lower</b>
	1996/97-2000/01	<b>Lower</b>	<b>Lower</b>
	1997/98-2001/02	<b>Lower</b>	<b>Lower</b>
	1998/99-2002/03	Similar	<b>Lower</b>
	1999/00-2003/04	Similar	<b>Lower</b>
	2000/01-2004/05	Similar	Similar
	2001/02-2005/06	Similar	Similar
	2002/03-2006/07	Similar	Similar
<b>Dawley Magna</b>	1995/96-1999/00	<b>Lower</b>	Similar
	1996/97-2000/01	<b>Lower</b>	Similar
	1997/98-2001/02	Similar	Similar
	1998/99-2002/03	Similar	Similar
	1999/00-2003/04	Similar	Similar
	2000/01-2004/05	Similar	Similar
	2001/02-2005/06	Similar	Similar
	2002/03-2006/07	<b>Lower</b>	Similar
<b>Ironbridge Gorge</b>	1995/96-1999/00	<b>Lower</b>	Similar
	1996/97-2000/01	<b>Lower</b>	Similar
	1997/98-2001/02	<b>Lower</b>	Similar
	1998/99-2002/03	<b>Lower</b>	Similar
	1999/00-2003/04	Similar	Similar
	2000/01-2004/05	<b>Higher</b>	<b>Lower</b>
	2001/02-2005/06	<b>Higher</b>	Lower
	2002/03-2006/07	Similar	Lower
<b>Woodside</b>	1995/96-1999/00	Similar	Similar
	1996/97-2000/01	Similar	Similar
	1997/98-2001/02	Similar	Similar
	1998/99-2002/03	<b>Higher</b>	<b>Higher</b>
	1999/00-2003/04	<b>Higher</b>	<b>Higher</b>
	2000/01-2004/05	<b>Higher</b>	<b>Higher</b>
	2001/02-2005/06	<b>Higher</b>	<b>Higher</b>
	2002/03-2006/07	<b>Higher</b>	<b>Higher</b>

Source: Telford & Wrekin Contract Minimum Datasets and General Practice Population Register, Office for National Statistics 2001 Census © Crown Copyright

The most marked features of these analyses are:

- Overall, the similarity in admission rates in the study wards to the Telford & Wrekin average and the stability of this relationship over time
- Admission rates in the two wards with air quality monitoring stations within their boundaries (Madeley and Dawley Magna) have remained similar to, or lower than, the Telford & Wrekin average
- Paediatric admission rates in Ironbridge Gorge: under 15 year old rates were higher than the Telford & Wrekin average position in 2000/2001 and 2001/2002 (five year rolling average basis) but were similar during 2002/3. However, the actual numbers of children who were admitted on an annual basis were so small as to be non-discloseable (range: 0 to <5 cases). There were no such admissions in 2005/6 or 2006/7
- Paediatric and adult admission rates in Woodside remain higher than the Telford & Wrekin average

#### 4.3.4 Mortality from Myocardial Infarction, Cancer, Chronic Obstructive Pulmonary Disease and Suicide

Table 5 compares age standardised premature and all age, all cause and condition specific mortality in Telford & Wrekin and England and Wales. The table also indicates any significant trend in the Telford & Wrekin measures for the conditions under review when comparing the periods 1994 to 2006.

**Table 5: Telford & Wrekin Age Standardised Mortality Rates: Comparison with England & Wales**

Year	All Cause		Myocardial Infarction		Cancer		Suicide & Undetermined Injury (All Age)	Chronic Obstructive Pulmonary Disease	
	Under<75	All Age	Under<75	All Age	Under <75	All Age		Under <75	All Age
1994	Similar	Similar	Similar	Similar	Similar	Similar	Similar	–	–
1995	<b>Higher</b>	<b>Higher</b>	Similar	Similar	Similar	Similar	Similar	–	–
1996	Similar	Similar	Similar	<b>Lower</b>	<b>Higher</b>	Similar	<b>Lower</b>	–	–
1997	Similar	Similar	Similar	Similar	Similar	Similar	Similar	–	–
1998	<b>Higher</b>	Similar	Similar	Similar	Similar	Similar	Similar	–	–
1999	<b>Higher</b>	<b>Higher</b>	Similar	Similar	<b>Higher</b>	Similar	Similar	–	–
2000	Similar	Similar	Similar	Similar	<b>Higher</b>	Similar	Similar	–	–
2001	<b>Higher</b>	<b>Higher</b>	Similar	Similar	Similar	Similar	Similar	–	–
2002	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
2003	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
2004	Similar	Similar	Similar	Similar	Similar	Similar	<b>Lower</b>	Similar	Similar
2005	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
2006	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
Significant Trend, 1994-2006	↓	↓	↓	↓	-	-	-	-	-

Source: Office for National Statistics Annual Vital Statistics 1 & 3 Tables, Mid Year Population Estimates © Crown Copyright

Comparing Telford & Wrekin to the national position, all cause all age mortality in Telford & Wrekin was significantly higher than the England and Wales average during 1995, 1999 and 2001. Local rates were not significantly different from the national average for the remaining years. All cause premature mortality showed a similar pattern. Rates in Telford & Wrekin were significantly higher than in England and Wales as a whole during 1995, 1998, 1999 and 2001 but not significantly different for the remaining years.

Considering the period 1994 to 2006, all age mortality from myocardial infarction in Telford & Wrekin was significantly lower than the England & Wales average in 1996. Local rates

were not significantly different from the national average for the remaining years. Premature mortality from myocardial infarction was not significantly different from the England and Wales average during any of the years in question. During the same period, all age cancer mortality in Telford & Wrekin was not significantly different to the England and Wales average for any year. Premature cancer mortality rates in Telford & Wrekin were significantly higher than the England and Wales average during 1996, 1999 and 2000 but were not significantly different for all other years. All age mortality from suicide and undetermined death in Telford & Wrekin were not significantly different from the England and Wales average for any year, apart from 1996 and 2004, when rates were significantly lower in Telford & Wrekin. During the period 2001 to 2006, all age and premature mortality from chronic obstructive pulmonary disease in Telford & Wrekin was not significantly different from the England and Wales average.

Table 6 compares age standardised premature and all age, all cause and condition specific mortality in the study wards to the Telford & Wrekin average position. The table also indicates any significant trend in the ward-based measures for the conditions in question.

The most notable features of these analyses are:

- The broad similarity between the Telford & Wrekin measures and the national position. For all these indices, there are no adverse trends and the position in Telford & Wrekin has been similar to the national position since at least 2002
- The broad similarity in the ward based measures to the Telford & Wrekin average and the stability of both this relationship and the ward based measures. There are no adverse trends
- Considering the two wards with the monitoring stations, all cause premature mortality in Madeley was higher than the Telford & Wrekin average during the period 1996 to 1999 (on a five year rolling average basis). Rates have been similar to Telford & Wrekin since 2000. The rates for the other conditions almost exactly mirror the Telford & Wrekin average positions, as do rates in Dawley Magna
- Despite substantial decreases in both the number of deaths and the rate, all age all cause mortality in Ironbridge Gorge remains higher than the Telford & Wrekin average. Further analysis has confirmed that all age all cause mortality rates in Ironbridge are not significantly different from Telford & Wrekin, once deaths occurring in care homes are removed. All age cancer mortality was higher between 1997 and 1999 (on a five year rolling average basis) but rates have been similar to Telford & Wrekin since 2000
- Comparing the five year rolling average positions 1999 to 2003 and 2002 to 2006, each of the four study wards experienced:
  - A decrease in all cause all age and premature mortality
  - A decrease in all age and premature mortality rates from myocardial infarction
  - A decrease in all age and premature mortality from cancer
  - Either a decrease or a stable position for all age and premature mortality from chronic obstructive pulmonary disease

Equivalent ward-level analyses were conducted for all age mortality from suicide and undetermined death. The annual number of suicides and undetermined deaths at ward level each numbered under five for each ward for each year examined. Ward level rates were not significantly different from the Telford & Wrekin average position for each period examined.

**Table 6: Ward-level Age Standardised Mortality Rates: Comparison with Telford & Wrekin**

Ward	Five Year Period	All Cause		Myocardial Infarction		Cancer		Chronic Obstructive Pulmonary Disease	
		<75 years	All ages	<75 years	All ages	<75 years	All ages	<75 years	All ages
Madeley	1994-1998	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	1995-1999	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	1996-2000	<b>Higher</b>	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	1997-2001	<b>Higher</b>	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	1998-2002	<b>Higher</b>	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	1999-2003	<b>Higher</b>	<b>Higher</b>	Similar	Similar	Similar	Similar	Similar	Similar
	2000-2004	Similar	<b>Higher</b>	Similar	Similar	Similar	Similar	Similar	Similar
	2001-2005	Similar	Similar	Similar	<b>Higher</b>	Similar	Similar	Similar	Similar
	2002-2006	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
Significant trend, 1994-1998 and 2002-2006		-	-	-	-	-	-	-	-
Dawley Magna	1994-1998	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	1995-1999	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	1996-2000	Similar	<b>Lower</b>	Similar	Similar	Similar	Similar	Similar	Similar
	1997-2001	Similar	<b>Lower</b>	Similar	Similar	Similar	Similar	Similar	Similar
	1998-2002	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	1999-2003	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	2000-2004	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	2001-2005	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	2002-2006	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
Significant trend, 1994-1998 and 2002-2006		-	-	-	-	-	-	-	-
Ironbridge Gorge	1994-1998	Similar	<b>Higher</b>	Similar	Similar	Similar	Similar	Similar	Similar
	1995-1999	<b>Higher</b>	<b>Higher</b>	Similar	Similar	Similar	Similar	Similar	Similar
	1996-2000	Similar	<b>Higher</b>	Similar	Similar	Similar	Similar	Similar	Similar
	1997-2001	Similar	<b>Higher</b>	Similar	Similar	Similar	<b>Higher</b>	Similar	Similar
	1998-2002	Similar	<b>Higher</b>	Similar	Similar	Similar	<b>Higher</b>	Similar	Similar
	1999-2003	Similar	<b>Higher</b>	Similar	Similar	Similar	<b>Higher</b>	Similar	Similar
	2000-2004	Similar	<b>Higher</b>	Similar	Similar	Similar	Similar	Similar	Similar
	2001-2005	Similar	<b>Higher</b>	Similar	Similar	Similar	Similar	Similar	Similar
	2002-2006	Similar	<b>Higher</b>	Similar	Similar	Similar	Similar	Similar	Similar
Significant trend, 1994-1998 and 2002-2006		-	-	-	-	-	-	-	-
Woodside	1994-1998	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	1995-1999	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	1996-2000	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	1997-2001	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	1998-2002	<b>Higher</b>	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	1999-2003	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	2000-2004	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	2001-2005	Similar	Similar	Similar	Similar	Similar	Similar	Similar	Similar
	2002-2006	Similar	Similar	Similar	Similar	Similar	<b>Lower</b>	Similar	Similar
Significant trend, 1994-1998 and 2002-2006		-	-	-	-	-	-	-	-

Source: Office for National Statistics Annual Death Extracts, 2001 Census Standard Tables for Wards and Telford & Wrekin PCT General Practice Population Register © Crown Copyright



### 4.3.5 Infant Mortality

Table 7 compares infant mortality rates in the study wards to the Telford & Wrekin average position. During the period 1994 to 2006, infant mortality in Telford & Wrekin was not significantly different from the England and Wales average and the trend was stable. At ward level, either no deaths were recorded or rates were similar to the Telford & Wrekin average position.

**Table 7: Ward-level Infant Mortality Rates: Comparison with Telford & Wrekin**

Ward	Five Year Rolling Average	Comparison of Infant Mortality Rates
Madeley	1994-1998	No infant deaths
	1995-1999	No infant deaths
	1996-2000	No infant deaths
	1997-2001	Similar
	1998-2002	Similar
	1999-2003	Similar
	2000-2004	Similar
	2001-2005	Similar
	2002-2006	No infant deaths
Dawley	1994-1998	Similar
	1995-1999	Similar
	1996-2000	Similar
	1997-2001	Similar
	1998-2002	Similar
	1999-2003	Similar
	2000-2004	Similar
	2001-2005	Similar
	2002-2006	Similar
Ironbridge Gorge	1994-1998	No infant deaths
	1995-1999	No infant deaths
	1996-2000	No infant deaths
	1997-2001	No infant deaths
	1998-2002	No infant deaths
	1999-2003	Similar
	2000-2004	Similar
	2001-2005	Similar
	2002-2006	Similar
Woodside	1994-1998	Similar
	1995-1999	Similar
	1996-2000	Similar
	1997-2001	Similar
	1998-2002	Similar
	1999-2003	Similar
	2000-2004	Similar
	2001-2005	Similar
	2002-2006	Similar

Source: Office for National Statistics Annual Vital Statistics Tables 1 & 4 and Annual Births and Death Extracts © Crown Copyright

#### 4.4 Conclusions and Discussion

Comparing the periods 1991 to 1996 and 1998 to 2003, while it is correct that there was a larger increase in the absolute number of deaths in Telford & Wrekin than in Shrewsbury & Atcham, this trend was to be expected given the patterns of population growth in the two Boroughs. Infact, the age standardised mortality rate fell significantly in both areas and to a similar extent. The analysis does not support the claim that the power station is having a detrimental and differential effect on mortality in Telford & Wrekin.

Turning to the claim that there has been an increase in the number of deaths in the area surrounding the power station between 1999 and 2003, the actual increase in the total number of deaths recorded in the study wards was five. This finding is not surprising given the growth in the local population. None of the changes observed in age-standardised mortality rates were statistically significant. Updating the data to 2006 shows a 21% decrease in the number of deaths recorded in the study wards and a (non-statistically significant) decrease in the combined age-standardised mortality rate. The analysis does not support the claim that the power station is having a detrimental effect on mortality in the area around the power station.

There is scientific evidence that industrial atmospheric pollutants can have short-term adverse impacts on respiratory function. Of the analyses conducted in this investigation, the analysis of hospital admission rates for acute pulmonary morbidity is likely to be the one most sensitive to any immediate local effects of emissions from the power station. However, Madeley and Dawley Magna, the two wards with monitoring stations, continued to experience admission rates which tended to be similar to or even lower than the Telford & Wrekin average position. Although Woodside has experienced relatively high admission rates since 1998, this observation is more likely to be due to causative factors associated with high levels of socioeconomic deprivation, Woodside being the most deprived ward in Telford & Wrekin. For example, the 2005 West Midlands Regional Lifestyle Survey confirmed that, within Telford & Wrekin, smoking prevalence rates are significantly higher in the most deprived wards in the Borough. Given that this is ward level data, it is also the case that differences in rates, while statistically significant, may be accounted for by differences in numbers which are actually small in real terms.

Overall, the analysis of paediatric and adult admission rates for acute pulmonary morbidity did not demonstrate a geographic or temporal pattern which could reasonably be interpreted as evidence of a current local effect of the power station on respiratory health. Looking at this another way, other evidence that people living near the power station do not experience excess respiratory morbidity comes from a previous analysis of practice-based referral behaviour. In this study, of the 21 general practices in Telford & Wrekin, six were found to have admission rates for acute pulmonary conditions which were higher than the Telford & Wrekin average. Only one of these practices-Woodside-serves a population living within the four study wards.

Considering the analyses of mortality and comparisons between Telford & Wrekin and England and Wales, there had been some fluctuations in all cause all age and premature mortality and premature cancer mortality in comparison with the national position, but the situation has stabilised in a positive direction in recent years. There were no adverse trends in any of the indicators considered. While recognising the clear limitations of Telford & Wrekin-wide mortality data in investigating effects from the power station, the analyses do not support a claim for a Telford & Wrekin-wide effect on mortality.

Considering the ward-level analyses of mortality, these demonstrated an overall similarity to the Telford & Wrekin average position and both the measures and the relationship with the Telford & Wrekin position were stable. There were no adverse trends.

Within this overall picture, all cause premature mortality in Madeley was higher than the Telford & Wrekin average position during 1996 to 1999 (on a five year rolling average basis). Importantly, premature mortality rates for the individual main causes of death remained similar to the Telford & Wrekin position during this period. However, five year rolling average rates for all cause premature mortality have been similar to the Telford & Wrekin average position since 2000, despite Madeley being a relatively deprived ward (the tenth most deprived of the 33 wards in Telford & Wrekin). Mortality rates in Dawley Magna, the other ward with a monitoring station, continue to mirror, almost exactly, the overall position in Telford & Wrekin.

Despite substantial decreases in both the number of deaths and the rate since 1999, all cause all age mortality in Ironbridge Gorge remains higher than the Telford & Wrekin average. All age cancer mortality was higher between 1997 and 1999 (on a five year rolling average basis), but rates have been similar to Telford & Wrekin since 2000. Ironbridge Gorge remains exceptional within Telford & Wrekin for having a relatively high proportion of its deaths occurring in local care homes for the elderly – 43% versus 17% respectively, during the period 1994 to 2006. The presence of this type of care home may be a powerful determinant of local mortality rates, an effect which would not be entirely controlled for by age standardisation. This type of effect has been noted previously in Telford & Wrekin, albeit as a result of an investigation within a different setting.<sup>(1)</sup> In the investigation, excessively high mortality apparently associated with two local general practitioners was credibly explained by a nursing home effect and the need for local knowledge when interpreting data was emphasised. On a statistical basis, all age all cause mortality rates in Ironbridge are not significantly different from Telford & Wrekin, once the deaths occurring in care homes are removed. Overall, the analyses of ward level mortality did not demonstrate a geographic or temporal pattern which could reasonably be interpreted as evidence of a current local effect of the power station on health.

Infant mortality rates in Telford & Wrekin do not differ significantly from the England and Wales position. Ward level rates are stable and while based on small numbers, do not differ significantly from the Telford & Wrekin position. The analysis of infant mortality did not demonstrate a geographic or temporal pattern which could reasonably be interpreted as evidence of a current local effect of the power station on infant health.

(1) Mohammed AM, Rathbone A, Myers P, Patel D, Onions H, Stevens A. An investigation into general practitioners associated with high patient mortality flagged up through the Shipman inquiry: retrospective analysis of routine data. *British Medical Journal*, June 2004; **328**: 1474-1477

## 4.5 Final Comment

It is very likely that Ironbridge Gorge power station will be exerting a number of direct and indirect effects on health. The plant produces atmospheric pollutants which can be harmful to health, although it has continued to comply with existing National Air Quality standards (as advised by the Health Protection Agency). However, as a generator of electricity for the national grid, the power station also supplies power for communities and individuals in their daily lives, providing, for example, heat and light for the home and workplace. The power station also provides employment, income and leisure opportunities for local people.

It is recognised that this investigation relied on a limited set of routinely available health data and that its design did not amount to a comprehensive scientific study of the local health impact of the power station. In particular, the study has not considered any cohort effects within the population living around the power station. However, with reference to its objectives, the investigation continues to fail to substantiate the existence of patterns of ill-health and mortality which could reasonably be interpreted as evidence that emissions from the power station are having an adverse impact on the health of local people.

This report will provide the basis for recommendations for future action to the Board of the PCT.

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Telford & Wrekin Primary Care Trust  
December 2008