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AN INTRODUCTION TO THE MINERAL STATISTICS OF THE UNITED KINGDOM 1845-1913

by R. Burt with P. Waite

The resurgence of British mining from the post Napoleonic Wars depression, and the real beginnings of modern large scale, highly capitalised techniques, produced an increasing awareness among the leaders of the mining interest of the need for a central depository of mining records and contemporary mining intelligence. This depository would need to perform two broad functions; to receive, store and make available plans and other documentation of earlier mining operations to act as a guide for new ventures in the search for mineral deposits and the avoidance of accidents; and regularly to collect and publish comprehensive production statistics, price and trade data, and other relevant information necessary to provide those involved in the industry with a guide to its performance over time, either at an aggregate level or mine-by-mine. The most ardent and influential of the early campaigners for such an archive was John Taylor, a metal mine adventurer and manager with major interests in mining districts throughout England and Wales and abroad. Throughout the 1820s and 1830s he wrote and published a series of articles arguing the need for the systematic collection of mining records,[1] including his own occasional estimates of British metal production compared with other world producers and the abortive go-it-alone *Records of Mining* publication which failed to survive beyond the first volume.[2] By the later 1830s however, many other men of influence had taken up the cause. In 1838, Sir Charles Lemon, M.P., the leading Parliamentary spokesman for the Cornish mining interest, published the most detailed statistical account of Cornish copper mining yet to appear while the following year, Joseph Carne, a fellow member of the Royal Society, published a complementary study of Cornish tin mining. Both articles were published in the recently established *Journal of the Royal Statistical Society of London* which acted as a general sounding board for this expanding area of interest.[3]

The turning point in the campaign for a mining record office arrived in 1838, when Taylor, Lemon and others, as founder members of the British Association, used their influence to commit that august society to their cause. On the 25th August, the Council of the British Association passed a resolution to the effect that, “It is the opinion of this meeting that with a view to prevent the loss of life, and of property, which will inevitably ensue from the want of accurate *Mining Records*, it is a matter of national importance that a depository should be established for the collection and preservation of such mining records of subterranean operations in collieries and other mining districts”. A committee was formed under the chairmanship of the Marquis of Northampton consisting of John Taylor, Sir Charles Lemon, Davies Gilbert, John Vivian, J.S. Enys, John Buddle and Thomas Sopwith, representing the practical mining interest in most of the major mining districts, together with Sir Philip Egerton, W.L. Dylwyn, Henry T. de la Beche, Charles Lyell, the President of the Geological Society of London, and the Professors of Geology in the universities of Oxford, Cambridge, London and Durham.

The committee known as the *Mining Records Committee* drew up a memorandum "respectfully and earnestly" calling the attention of the Lords of Her Majesty's Treasury, "to the expediency of establishing as soon as possible a National Depository for the preservation of documents recording the mining operations of the United Kingdom". Action followed rapidly. The Treasury accepted the recommendation of the British Association and on the 29th September 1840 established the Mining Record Office under the Department of Woods, then presided over by Lord Duncannon. The Office was placed under the immediate direction of Henry de la Beche, the Director-General of the Geological Survey, and Thomas Jordan was appointed as the first Keeper of Mining Records. Jordan held this post for five years and through his influence the Office rapidly established a large collection of abandonment plans and other records of defunct mining operations. He also added a series of models, displayed in the Museum of Practical Geology, to demonstrate the latest advances in mine engineering in the hope of improving the general level of efficiency in the industry. However, these years saw little progress towards the other main purpose of the Office: i.e. the regular collection and publication of contemporary production data and related material. These activities began with the resignation of Jordan and his replacement by Robert Hunt, on the 19th April 1845. Hunt continued as Keeper for the next thirty seven years and under his control the collection and publication of the annual *Mineral Statistics* gradually grew to dominate the Office's work. He was without doubt the leading architect of the *Statistics*, and lavished great care and energy on their collection and improving their reliability until his retirement, in 1882, at the age of 75.

The first steps in this new direction, however, were hesitant and narrowly circumscribed by the administrative difficulties of collecting full data. In 1846 Hunt published "A Notice of the Copper and Tin raised in Cornwall" in *Memoirs of the Geological Survey of Great Britain and of the Museum of Practical Geology in London*, Vol. I [40] (H.M.S.O. 1846) and in 1847 he prepared three separate pieces for Vol.II Pt.II of the Memoirs (H.M.S.O. 1848) entitled, 'Produce of Lead Ore and Lead in the United Kingdom for the years 1845 and 1846; from Returns made to the Mining Record Office, Museum of Practical Geology'; 'Produce of Lead Ore and Lead for 1847'; 'Table of the Copper produced from the Mines of Cornwall and Devon for the years 1845, 1847 and 1848'; 'Table Showing the Sales of Copper Ore at Swansea, from 1804 to 1847 inclusive, separating those of the Ores of British and Foreign Mines'. Hunt also contributed several descriptive articles to these early *Memoirs* on particular mining districts and geological observations. There was then a delay of five years before further material appeared with a 'Note on Coal raised and Iron made (December 1852) in South Staffordshire' published in 1853. More importantly that year also saw the first attempt to publish details of non-ferrous metal production on a systematic and national and annual basis. Produced under Hunt's name as *Records of the School of Mines and of Science Applied to the Arts* Vol. I, Part IV by the Museum of Practical Geology and the Geological Survey (H.M.S.O. 1853) it contained 'statistics of the Produce of Copper, Tin, Lead and Silver from the mines of the United Kingdom, with the Exports and Imports of these metals, from 1848 to 1852 inclusive'. The statistics were drawn from a variety of secondary sources checked and added to by the Mine Record Office to ensure the widest possible coverage and accuracy. This inaugurated a policy which continued to be followed in

the preparation of the *Mineral Statistics* throughout Hunt's years at the office. Thus in his introduction to the *Records of the School of Mines* Hunt explained that for the Copper production figures, "The ticketing papers,[4] which are regularly published, of the sales in Cornwall and at Swansea have been used, but as a considerable quantity of copper ore is not sold at public sales, the returns of the sales by private contract have been obtained from the Agents of the respective mines themselves and from the copper smelters, especially for this office, these have been added to the quantities sold by public sales." Similarly for tin, "with the exception of last year, when some of the mines published their sales of black tin or tin ore, the returns have been obtained principally from the tin smelters, who have accorded satisfactory replies to every inquiry. Several of the Agents of the tin mines have also furnished information of their produce, and it is hoped that a regular system of return from all the districts producing tin will shortly be arranged." Hunt expressed his particular thanks to Michael Williams and Thomas Bolitho, two of the leading mining and smelting adventurers in Cornwall, for rendering "much assistance in this division of the returns".

Returns of lead production were more difficult to obtain. Unlike copper and tin mining, which was largely concentrated in Cornwall and Devon, lead was produced in many parts of England, Wales, Scotland and the Isle of Man and there was no centralised market or small group of smelters from whom the Mining Record Office could solicit "ready-made" returns. In his introduction to the lead returns for 1845 and 1846 published in *Memoirs* Vol.II Part II, Hunt had noticed that, "as there is no regular publication of the Lead sales, and as the ores are sold in large and small parcels, sometimes publicly, but often by private contract, there has been much difficulty in obtaining accurate information of the entire produce of the United kingdom". For the 1848 to 1852 returns the Office had received some help in monitoring Welsh lead production from the ticketing papers of the ore sales in Flintshire, which "although not published are regularly obtained (by favour) for this office", but were otherwise obliged to undertake the much more formidable task of communicating with "every lead producing district throughout the United Kingdom" and with "each individual mine of any consequence" for returns of its production of lead ore and lead. Nevertheless, Hunt was happy and confident to report that, "The readiness with which the returns are furnished from the lead mines and from the lead smelters in all parts of the country now renders it no very difficult task to arrive at correct results". This generally cooperative attitude of the lead mining interest goes far in explaining the long, complete, and generally reliable run of lead production statistics. Together with Hunt's earlier figures[5] they produced an unbroken series running from 1845 to the final demise of the industry in the twentieth century; a longer and more complete series than for any other metal.

Similar problems to those involved in the formulation of lead production series, were also encountered for silver. Both metals were frequently produced in combination in this country; the silver being refined from smelted lead. Hunt admitted, "the system of obtaining the produce of silver has not yet been sufficiently organised to secure any very exact returns; a near approximation therefore is all that has been attempted". Again Hunt expressed particular thanks to those who had given considerable practical assistance in preparing the series, notably John Taylor and the smelter/refiners, Messrs.

Walker and Co. who have "enabled me to approach to a tolerable degree of correctness". The *Records of the School of Mines* also included an abstract of imports and exports of copper, tin, lead and silver to show the relative importance of domestic and foreign supplies in home consumption. As yet, imports were relatively small and exports of some metals continued at the significant level. These tables were compiled from the official trade returns to the House of Commons.

In 1853, the same year that *Records* appeared, the Treasury appointed a Committee to inquire into the working of several departments then under Sir Henry de la Beche as Director of the Geological Survey and Museum. [41] On the 25th May, 1853 Sir C.E. Trevelyan and Sir Stafford H. Northcote reported very favourably on the activities of the Mining Record Office and recommended that it should be placed "on a more efficient footing". The Treasury acted upon these recommendations and Hunt was finally put in a position to begin the nationwide collection of the full range of mineral statistics.[6]

The next set of annual returns for 1853 and 1854 were published in 1855. Thereafter, they usually appeared annually, in the summer or autumn following the calendar year concerned. Not only was the frequency and speed of publication improved, but also its title and format was regularised to assist the reader. The returns for 1853 and 1854 were published, as before, under the general title of *Memoirs of the Geological Survey, subtitled for the first time, The Mineral Statistics of the United Kingdom*. R.I. Murchison, the new Director General of the Geological Survey, explained the new format in his introduction. "Inconvenience having been experienced on the part of the authors who have had occasion to consult or refer to the publications issued by the Geological Survey in consequence of the different titles under which they have appeared and the changes which have been made in the style and title of the Museum[7] … I herewith give notice that in future every printed work connected with the Survey will appear under the general title of *Memoirs of the Geological Survey*, such being the earliest general designation employed by Sir H. de la Beche. The subsidiary titles are to be printed in a minor and distinct character, and will at once indicate whether the Memoir which follows illustrates 'Field Surveys', 'Mining Records', 'The Decades of Organic Remains', 'Museum', 'Lectures' or 'Catalogues'." From this year until 1882, when the Mining Record Office and the publication of the Mineral Statistics was transferred from the Museum of Practical Geology to the Home Office, mineral production and related data was accordingly published under the title, *Memoirs of the Geological Survey of Great Britain and of the Museum of Practical Geology: Mining Records: The Mineral Statistics of the United Kingdom of Great Britain and Ireland*. (H.M.S.O.). The returns for 1882 and after appeared as Parliamentary Papers.

For the 1854 return, the existing coverage of copper, tin, lead, and silver production was greatly increased by the inclusion of details of the massive output of coal and iron, together with detailed lists of the collieries and their owners and the iron furnaces in blast during the year. The list of collieries and their owners was derived from the Inspectors of Coal Mines but the returns of coal production posed greater problems. Hunt was not prepared simply to accept the estimates of others, but insisted on producing his own improved computations. In declaring his independence of the

Coal Mine Inspectors in this respect, he created a problem of duplication of effort which gradually increased in magnitude until it became a major issue in the late 1870s and was largely instrumental in the reorganisation of the Mine Record Office and the publication of the *Mineral Statistics* following his retirement in the early 1880s.[8] Hunt explained the problems involved in calculating coal output, and his methods of overcoming them, in his introduction to the return. "The difference which exists between the statements made of the amount of our coal production, and that now published, renders it necessary that some information should be given of the means adopted to arrive at the present computation? Every coal-producing county in England and Wales was visited, and personal inquiries made. In each locality travelled over, the aid given by the owners and the lessees of the collieries was beyond what could have been expected. My personal thanks are due to those gentlemen who have, often at great labour to themselves, furnished me with important information. Although not permitted to publish their names, I must be allowed to state that it would have been impossible, without their assistance, to have arrived so nearly at the true productions of our coal fields as is now accomplished." The production information obtained from the coal fields was checked for accuracy and completeness by reference to returns of the quantities of coal transported from the mining districts by sea and rail. "The quantity of coals shipped from the different ports was readily obtainable from the returns made to the House of Commons, and from 'Browne's Export Lists'. Being desirous of obtaining the inland distribution, especial applications were made to all the great railway companies carrying coals over their lines. In nearly every instance the most detailed information has been placed at the disposal of this Office. The following important railways must be named as having given most valuable assistance: London and North Western; Great Western; Great Northern; North Eastern; Midland; Manchester, Sheffield and Lincolnshire; Caledonian; Newcastle and Carlisle." Several of the managers of these companies were thanked personally for their help, "not only in placing the traffic on their own railways in the clearest view, but in obtaining similar information from collateral railway systems. Through these sources and others, which are respectively named in the Returns, it is believed that a very close approxi- [42] mation to correctness has been obtained." It is notable, however, that these returns were aggregated on a county basis. Hunt was never able to produce the degree of mine-by-mine detail for coal that he achieved for most other minerals.[10]

As well as the introduction of the coal and iron returns, the 1854 return also included "sundry minerals", such as stones and clay. These figures were admittedly partial and incomplete and by Hunt's own admission contained only a "few scraps of information ... inserted with a view of obtaining more exact details of these especial mineral productions at some future period".

The process of enlarging the scope and improving the accuracy of the *Mineral Statistics* continued unabated in 1855. Published in July 1856, this was the first return to appear within a year of its completion. Robert Hunt declared that, "during the year no effort had been spared to secure the most exact statistics on every point of interest connected with our mineral industries" and R.I. Murchison, prefacing the volume, praised Hunt's efforts in producing "great additions to all our previous knowledge",

during the last two years. More specifically, this was the first return to include the output of the 'minor' metals, i.e. zinc, arsenic, nickel and cobalt, as well as the 'earthy minerals', salt sulphur, china clay and some building stones. More Significantly, in terms of the importance of the metal, it also included the first estimates of iron ore production and not simply the returns of blast furnaces and their make of pig iron. While the salt production returns for Cheshire, Worcestershire and Ireland were described as, "strictly reliable", the zinc returns did not as yet include "many small parcels of ore ... which have been sold from copper and lead mines in various parts of the Kingdom". The miscellaneous returns of sulphur, arsenic, nickel, cobalt and clays were as yet incomplete, but Hunt declared confidently that, "with every year our knowledge must become more exact". The figures for coal production were said to have been "rendered still more exact by the valuable returns which have been furnished from each of the coal producing districts" and Hunt declared with satisfaction that, "the more minute details of colliery produce which have this year been given to the Mining Record Office, fully confirm the results arrived at in the last Mineral Statistics". Unfortunately those "minute returns" were not published as such.

The returns of building stones, including paving stones and slate, were more satisfactory than those of the previous year, many of the quarries having been "personally visited". However, they were still not, "so satisfactory as could have been desired". Hunt explained, "The extent of the inquiry, embracing nearly every county in the United Kingdom, and the fact of its being necessary that the tonnage produce of all the quarries within a district should be accurately determined, has required more time that it has been possible to give to this subject during the past year. It is believed, from the extent to which information has been promised to the Mining Record Office, that the returns for 1856 will contain full statistics of the produce of the valuable materials furnished from the rocks of the British Isles."

The 1855 return clearly indicated the very considerable progress that had been made during the early 1850s in the collection and rapid publication of mineral production statistics and related data. When Parliament called for a special return of the total production of British mines in that year, it could be promptly and efficiently provided. As R.I. Murchison observed, "if there had not been a Mining Record Office, such information would have cost the country much expenditure, and would not have approached the accuracy of the present results, which have only been reached through long practice and continuous exertion". The objective of producing a reliable, comprehensive coverage of the full range of annual domestic mineral production was approaching completion. Introducing the returns for the following year, Hunt noticed that since the start of the Mineral Statistics, "with each year efforts have been made to enlarge the circle of inquiry; and it is with much satisfaction that I find myself enabled, in the Mineral Statistics for 1856, to embrace every important branch of our Mineral Industries". He declared confidently that, "the inquiry has now reached a stage of completeness which enables [a general view of the industry] to be done with a degree of correctness not hitherto attainable". The returns for many minerals, such as arsenic, were said to be "far more exact than any which had hitherto been published", while for others, particularly iron ore, the degree of detail given was

greatly increased. According to Hunt, the returns for iron ore were now, "a very close approximation to the real produce of all the iron mining districts of the United Kingdom". As well as improvements in the quality and detail of the data collected and published there was also a continued widening of the coverage of the returns to include the production of more minor minerals, namely uranium, iron pyrites, fuller's earth barytes, fluorspar, glasshouse sand, and ochre.

The *Mineral Statistics* for 1856, like those for all earlier years, were compiled from voluntary returns, made by all sectors of the mining and mineral industry, to the Mining Record Office. The very high degree of cooperation given to the Office in the production of the statistics was often referred to by Hunt as practical evidence of the value attributed to their work by the industry and all those with an interest in it. Every year in his introduction to the returns, he went to the trouble of thanking those who had helped. Thus in 1856, "To Mine Owners, Colliery Proprietors, Iron Masters and Smelters, I have to express my obligations, not merely for information as to their own works, but in many cases for their aid in collecting the returns of the district in which they may reside. There are several gentlemen connected with the Coal and Iron trades, whose names I am not at liberty to publish, to whom most especial thanks are [43] due. The assistance which has been given by all Her Majesty's Inspectors of Collieries his particularly acknowledged, as is also the very valuable information as to the distribution of the mineral produce which has been furnished to the Mining Record Office by the Managers of the great Railway Companies. For the returns of the Stone Quarries of Scotland, I am indebted to Mr. Ravenscroft of Edinburgh, who has been engaged in collecting specimens of those stones for the National Museum of Scotland."

Whilst very grateful for the assistance given, the voluntary system of returns created important problems for Hunt and the Mine Record Office. Since not all parts of the industry were likely to offer the same level of cooperation. there was the constant problem of ensuring that the published returns were complete and reliable. Though many deficiencies could often be overcome by making calculations from other sources, there was the further problem of ensuring that the returns which were made were sent promptly to the office. Hunt was firmly convinced that the value of the Mineral Statistics depended largely on the speed with which they were published and that every effort should be made to produce them before the middle of the following year. Unfortunately it proved extremely difficult to cajole the many independent producers in the industry into such regular, efficient and speedy voluntary activity. Hunt apologised for the late appearance of the 1856 Return (published in September 1857 compared with the 1855 Return, published in July 1856), blaming "pressing engagements in the early part of the year, connected with the preparation of a *Descriptive Guide to the Museum of Practical Geology*": However, when the 1857 return was again delayed (published September 1858) the problem was ascribed by Murchison in his preface not to "any want of labour or zeal on the part of Mr. Robert Hunt, but is simply due to the difficulty he has experienced in gathering all the requisite returns of Clays used in Manufacture; Building stones etc. from various parts of the country". Hunt also mentioned problems in obtaining correct returns promptly from "the more important Mineral Districts". Notwithstanding the difficulties. the final

product was said to be a "closer correctness than has previously been obtained, the returns having been checked in every way that became available for the purpose". Hunt declared confidently. "such is a faithful representation, within very small and unavoidable limits of error, of the important Mineral industries of these islands".

Hunt's immediate explanation of the delayed returns was the distracting effects of the serious commercial problems, "which gave the year 1857 so melancholy a termination". He was later to discover to his cost, however, that this year was no temporary aberration. When trade revived it was not accompanied by a corresponding increase in the interest and promptitude with which many mine owners made their returns. Some sectors of the industry were so laggardly in making their 1858 returns, for example, that publication was made in two separate parts. Part I, including the returns of all metalliferous minerals and coal, appeared rapidly, being published in July 1859, whereas Part II, containing the returns of 'earthy minerals', such as limestone, building stones, clays etc. was delayed until July, 1860. While the returns of the various metals included in Part I were said to be generally full and reliable, particularly iron ore which was claimed as "a more exact and detailed account ... than in any former return", those in Part II were still highly unsatisfactory in spite of the delay. Murchison apologised that, "though a large amount of useful information has been obtained, it must be admitted that this branch of our *Mineral Statistics* is, as yet, far from complete" principally because "many persons ... have withheld information". Hunt, whose difficulties were compounded by his own ill-health during the year, declared that his ambition was to make the *Mineral Statistics*. "as complete a record as possible" and expressed the faint hope that through the publication of these incomplete statistics, those associated with the earthy minerals sector would "comprehend and appreciate the value of such returns". Fearful of future time wasting, however, he warned that only when such cooperation became apparent would the inquiry be resumed, and noted cautiously that, "It is not intended, as in the case of the products of Mines, Collieries, and Iron Works, to collect this section of the returns annually, but wherever a sufficient state of completeness is attained to warrant it, the statistics of the Building stones and Clays will be published". Thanking those who had contributed to the collection of earthy minerals statistics, he concluded that, "This must not be regarded in any other light than as an approximation to the truth, though probably the nearest which has hitherto been arrived at". It is notable that the return includes a few figures for 1859, added where available.

Notwithstanding the elimination of earthy minerals from the 1859 return, its publication was again delayed until the end of 1860. The preparation of the statistics was still very much a one man operation and Hunt's continued ill-health, together with the distraction of the unfinished 1858 return during the early part of the year, was sufficient to badly disrupt the work of the Mine Record Office. These problems also again frustrated the introduction of new data on "our Metallic Manufacturers", i.e. mills, forges, tin plate manufacture. This material had been promised for the 1858 return, but in that year their survey had met with such little success that it would not "warrant any publication of the returns". The new material was again promised for the 1860 return. The only major new material introduced for 1859 was a listing of all metalliferous mines and the names of their owners and "the principal

persons connected with them" to complement the similar list for coal mines which had been a regular appendix to the *Mineral Statistics* since their inception in 1853. Hunt concluded his brief introduction to the annual return with thanks for the [44] "presentation of a handsome testimonial" given to him as "an acknowledgement of the importance of those Mineral Statistics, by those who are especially interested in the Mineral Production of the United Kingdom". He typically and staunchly declared, "I trust I may be enabled to continue and improve these Mining Records until the statistics of the Mineral Wealth of the British Isles shall be equal in completeness to the statistical returns published by any government in Europe".

Hunt's untiring efforts to improve the coverage and reliability of the annual returns and to bring forward their publication, finally paid dividends in the 1860 return: published in July 1861, the fastest for five years. Even this achievement fell short of Hunt's aspirations, however, and he explained apologetically that, "Attempts have been made to collect these Statistics earlier, so as to place them in the hands of the public at the end of the first Quarter. This does not, however, appear to be practicable. Many of the Metalliferous Returns are not made up until sometime after Ladyday, and there are a few which cannot be obtained before Midsummer". The return included a greatly improved list of the owners and agents of metalliferous mines, first introduced the previous year, and the long promised new section on the owners of the iron mills and forges of the United Kingdom and the tin plate works of South Wales. Whilst the latter was said to be "a more complete list than any which has previously been given", Hunt was careful to note that it was "not to be regarded as entirely complete". It was hoped that having publicised the format of the information currently available, "in future years there will be greater facilities afforded for obtaining a full representation of our iron manufacturers". As well as the usual range of output data - now "tolerably complete" for metalliferous minerals and coal but still unsatisfactory for earthy minerals - the 1860 return also included a brief survey of the development of the mineral statistics and the general progress of the industry in the United Kingdom from 1854 to 1859. Production series for earlier years were also included for comparative purposes where available as were estimates of the production of other European countries. This whole section provided valuable information on the methods of compiling the various series and an apparently frank assessment by Hunt of their changing accuracy and reliability. This has been considered in greater detail elsewhere.[12]

The *Mineral Statistics* for 1861, 1862 and 1863 all appeared promptly though there were continuing calls to mine owners for greater rapidity in making returns. They included no major new series, apart from a list of the iron mines of Great Britain which was added to the list of other mines and collieries in the 1863 return. Attention was concentrated instead on testing and improving the quality of the series already collected. In 1861 Hunt took advantage of the opportunity presented by the International Exhibition to meet and converse with the proprietors and managers of numerous mines, collieries and smelting works, "to test his estimates of produce" and in 1862 he visited coal fields throughout the country to examine proprietors, inspectors and viewers, the result of which was to "confirm the correctness of the return". In 1862 he also wrote confidently that, "the returns of the Ores and Metals

extracted will be found to be close approximations to correctness" but found opportunity to "extend and improve" the now well established lists of mines and collieries. In 1863 all the various returns were finally made to agree in date to coincide with the calendar year, "the Stannary Court having furnished their accounts to the end of December, instead of as hitherto, to the end of September".

The 1864 return was again slightly delayed, "owing - and it is curious to note the operation of an apparently remote cause - to the deficiency of rain in 1864". Hunt explained that, "In many of our most important Mines the want of water was so great, that the operations required, for the preparation of the Ores for the market, were entirely suspended; the consequence being that large quantities of the Minerals raised last year were not marketable until within the last few weeks", i.e. mid-summer 1865. However, although the returns published in the Mineral Statistics were usually of sales rather than production, to avoid distortion of the 1864 and 1865 figures, Hunt attempted to calculate the quantities actually raised in 1864 and publish them in that return.

The 1865 return saw two significant developments: the introduction of statistics of domestic petroleum production, and, more immediately important, a great increase in the information on coal production. Hunt drew attention to "the new industry by which our hitherto valueless Bituminous shales are converted into a valuable Mineral oil", (i.e. petroleum) and explained that the new series was an "attempt to collect exact information as to the extent to which the shales are worked and distilled in various parts of the country". Unfortunately, there was "some reluctance to furnish full information" and only a few returns could be published, though Hunt hoped for greater support from the owners of the mineral oil works in the future "when the purpose of the inquiry is more fully understood". By contrast the coal returns for 1865 gave "a more correct view of the progress of our coal and iron industries than any statement which has hitherto been published". This was prompted by the great debate about the future survival of domestic coal supplies in view of the current high levels of extraction, i.e. virtually 100 million tons annually. Rather like contemporary debates about the high rates of consumption of proven mineral deposits, there was widespread concern in mid-Victorian England that coal reserves, essential for the prosperity of domestic industry, [45] would be exhausted in the near future. To place this debate on a more informed footing, a range of new information was presented, including tables of domestic coal production for the previous ten years; coal exports during that period; the quantities used in our iron manufacture; and the proportions left to be consumed for all other purposes by each head of the population of Great Britain. Most controversial, however, was a "series of tables ... compiled to show all the sources from which the Metropolitan District has drawn its supply since 1854, distinguishing the coal brought by rail from that which has been furnished by ships". These tables were drawn up in great detail, showing the quantities of coal sent to the London market by sea, railway-by-railway, canal-by-canal, and even colliery-by-colliery. Since many of the collieries supplying coal to London looked to no other market, this latter information amounted almost to a detailed record of mine-by-mine output, the like of which was expressly prohibited by the Coal Mines Regulation Act and was never before or again to be published. Its appearance

immediately sparked off the major row which became the subject of legal proceedings against the Mining Record Office the following year. However, it was held that the City of London Corporation, who had provided much of the information and sanctioned its publication, had acted within their power and on the further assurance that the exercise would not be repeated, the matter was dropped.

For the remainder of the 1860s, the *Mineral Statistics* saw no major innovations, apart from the introduction of tin plate production series in 1869. They all appeared within a year of the record date, though the 1867 return was again slightly delayed "by the extreme dryness of the season" and the 1869 return by Robert Hunt's protracted illness. Constant efforts were made to improve the accuracy of the production returns and continuing attention was given to the appendix list of mines and collieries to ensure that they included only those mines actually working during the year. In 1866, for example, the unusual business conditions made it "desirable to examine with more than usual care the lists of mines ... and to remove from that list the name of every mine which was not in actual working condition at the end of December. This has considerably reduced ... the number of active mines". This type of periodic major review clearly makes it hazardous for the historian to use the lists as a guide or index to the changing numbers of working mines over a long period. During these years Hunt constantly reminded his readers of the voluntary nature of the returns on which the Mineral Statistics were based, exalting the mine owners to make them quickly and reliably and perhaps helping to lay the foundations for a campaign for stronger compulsory powers for the Record Office. Thus in 1867 he wrote that, "it must not be forgotten that every return whi9h appears in this volume is a perfectly voluntary contribution to it" and in 1868 that, "it cannot be too widely known, that the accuracy of the details given is inferred by the ready and candid manner in which returns are given in answer to the applications readily made to the managers or owners of mines, collieries, and iron works". Although in 1868 he was confident that "There is not a metal mine of any importance from which a statement of its annual production is not now obtained on application" and submitted the annual return "with much confidence", Hunt was still no doubt worried, as in 1867, that the compiler of the Mineral Statistics was "entirely dependent on the convenience and inclination of the Mineral producer". He was clearly envious when he noted in 1868 that the "statistical information of a like character, published by France, Belgium, Prussia, Austria and other countries" was the result of returns, "which are made compulsory by law, and which are carefully collected by the officers of the government".

The publication of the 1869 and 1870 *Mineral Statistics* was again delayed particularly for the latter year, which did not appear until 1872. The delay in the 1869 return was occasioned by Hunt's continued ill health through the early part of 1870, while the preparation of the 1870 return was held up by his and Murchison's appointment to the Royal Commission, *To inquire as to the quantity of coal at present consumed in the various branches of manufacture, for steam navigation, and for domestic purposes, as well as the quantity exported; and how far, and to what extent, such consumption and export may be expected to increase*. That inquiry - an expression of the continuing concern about the exhaustion of Britain's coal reserves - occupied the whole of Hunt's time and was not completed until 27th July, 1871. In his

introduction to the 1870 return Hunt apologised that, "Up to the date of the publication of this Report, which forms a volume of 500 folio pages, my time was therefore, necessarily, entirely occupied in completing this vast inquiry, in reducing the returns to systematic order, in writing the history of the coal trade, not only for this but of every other coal producing country, and in working out the results to which we eventually arrived". So great was the effort involved in this massive project, that it saw R.I. Murchison's retirement as Director General of the Geological Survey and head of the Mining Record Office and his replacement by Andrew C. Ramsay. Robert Hunt suffered a recurrence of his earlier illness and a prolonged absence from work, which meant that the preparation of the 1870 returns was not even started until the end of 1871. Under these conditions, their appearance in January 1872 was almost something of an achievement. The only major innovation of the year was the computation of the ore values of calcined iron, previously returned as such, so that, "The relation between the ore raised, and the Pig Iron made, is thus made to approximate much more nearly to the truth".[13] The tin plate manufacture figures were also declared to be, "not yet so complete as could be desired" but they "approach more nearly to correctness".

With the 1870 returns so delayed, it was inevitable that the 1871 Mineral Statistics should also appear late, though the Office was able to claw back some time and publish in October 1872. The middle of this year, however, [46] had seen one of the most significant developments in the collection of mineral statistics in this country, i.e. the passage of two separate pieces of legislation, *The Coal Mines Regulation Act 1872* and *The Metalliferous Mines Regulation Act 1872* under the terms of which, returns of coal and other mineral production was made compulsory. Thus Clause 38 of the Coal Mines Act read "On or before the first day of February in every year the owner, agent, or manager of every mine to which this Act applies shall send to the inspector of the district, on behalf of the Secretary of State, a correct return, specifying, with respect to the year ending on the preceding thirty-first day of December the quantity of coal or other mineral[14] wrought in such mine" ... "the returns shall be in such form as may be from time-to-time prescribed by a Secretary of State, and the inspector of the district, on behalf of a Secretary of State, shall from time to time on application furnish forms for the purpose of such returns" ... "the Secretary of State may publish the aggregate results of such returns with respect to any particular county or inspector's district, but the individual return[15] shall not be published without the consent of the person making the same, or of the owner of the mine to which they relate". In a broadly similar way, Clause 10 of the *Metalliferous Mines Act* read, "On or before the first day of August in every year, the owner or agent of every mine to which this Act applies[16] shall send to the inspector of the district, on behalf of the Secretary of State, a correct return, specifying with respect to the year ending on the proceeding thirty-first day of December the quantity of mineral sold or produced from such mine". As in the Coal Mines Act, the forms, and the type of information required, were to be provided by the Inspectors, on behalf of the Secretary of State, but no regulation was placed on the form in which the information was to be published. The continuation of the distinction between coal and related metal producers and other types of mines was a fundamental one and the slightly different conditions concerning the closing date for returns and particularly the arrangements for their

publication, was to cause great controversy in the future. However, in his immediate pleasure at the grant of these long requested new powers, Hunt appears to have foreseen few of these difficulties and confidently hoped that, "the increased correctness, which should be insured by these enactments, will render the "Mineral Statistics" – which have already obtained, from all who are interested in them, the marks of high approval - of yet higher value to the miner, metallurgist, the mineral dealer, and the public generally than they have hitherto been". His only reservation was that, "Although the returns from the mines and collieries are in future to be compulsory, there is still a large amount of information connected with the metallurgy of this country, and relating to the distribution of our minerals and metals, for which I must, as before, be indebted to ... liberal friends".

The problems inherent in the new legislation made themselves felt immediately and the publication of the 1872 *Mineral Statistics* was delayed until the very end of 1873. Hunt explained in some detail. "The Metalliferous Mines Regulation Act 1872 fixes, unfortunately, the first day of August as the period when the returns of produce are to be made to the inspector, although all the ores raised in the previous year will have been dressed and sampled, and sold many months earlier. This year many of the returns have not been sent to the inspector from the mines until late in November . . . Again, the Act requires only a return of the *ores* raised. As such a return would not convey any useful information, it became necessary - in nearly every case - to obtain either the value of the ores or their percentage produce of metal. This has occasioned considerable additional labour in visiting the mines, or in corresponding with the managers of mines and others. For the ores raised in Cornwall and Devon, it has been thought advisable to publish the returns made to the *Stannary Court*. These, together with the details of the 'Public Ticketings', for copper ores in Cornwall and at Swansea, also published, will enable anyone to check the estimated quantities of metal produced and the values given."

Hunt confronted similar and even more frustrating problems, with the coal returns. "Hitherto the quantity of coal raised, has been arrived at by sending circular forms to all the coal owners, requesting a return to the Mining Record Office of the quantity of coal produced from each colliery. These returns have been, generally, freely given, *it being always very directly understood that they would be treated as confidential* and used only to compute the produce of districts. Up to 1871 these voluntary returns formed the basis upon which the returns of coal given in the 'Mineral Statistics' were computed. Circumstances beyond control, in 1871 rendered it imperative to adopt, instead, the returns which had been made to Colliery Inspectors, and these gave a rate of increase above that which was the rate in previous years. Again, for the year 1872, under the operation of the Coal Mines Regulation Act, 1872 the Returns made by the Inspectors to the Secretary of State for the Home Department are the sources from which the production of coal given in the following pages are drawn, and the only sources available. The operation of Clause 38 of this Act is to limit the examination of those returns to the Inspectors and the Secretary of State. Consequently, the keeper of Mining Records has not been permitted to examine them, and he has no means of ascertaining whether or not errors have arisen in making those returns, or in the computation of the aggregates, when they are made. This has been done, in former

years, with respect to the returns received by this office, in which errors have been often detected, by visiting the districts, and ascertaining on the spot, from every available source, the correctness or otherwise of the quantities given. The only means by which the Keeper of Mining Records is this year enabled to check the returns as they are now given, is by a cautious examination of the distribution of the coal. This has been attempted on a more extended scale [47] than usual. Returns have been most liberally furnished by the railways and canals; and the quantities of coal exported or sent coastwise have been obtained from the Parliamentary Returns". In an attempt to overcome the confidentiality restrictions on the coal returns, Hunt called upon those making the returns to give express permission for the Keeper of the Mining Records to have access to the return and to publish in aggregate form. However, unless all or a very large majority of the mine owners conformed to this practice it would clearly serve no very useful purpose. Hunt certainly never appears to have had any real success with this approach.

However, the following year the 1873 *Mineral Statistics* were published two months earlier, in October. There had been no change in the official arrangements, and the problems confronting Hunt and his assistants at the Mining Record Office remained considerable, but Hunt had taken independent action to overcome them. He explained, "Notwithstanding that the Returns required for 1873 from the collieries and metalliferous mines - under the two new Acts - had already been applied for by, and in most cases made to, the Inspectors, I received authority to solicit from the colliery and mine owners a continuation of that confidence which has enabled me for twenty-five years to compile annual returns of our mineral wealth, which have been admitted to be of great value". He was clearly hurt and very sensitive about what he considered as the slight cast upon him by the 1872 legislation. However, the result of his application for voluntary returns was pleasingly successful. "Some persons have seriously complained of this second application; a few have failed to reply to it. Many, however, have not only given information sought for in useful detail, but have materially aided the inquiry by their influence in their own districts. To these I am under most especial obligations."

Using a combination of official and "private" returns, Hunt produced a composite body of material to give the most comprehensive and accurate coverage of the year's activity. For the metalliferous mines of Cornwall, Devon and Somerset for example, he produced the Inspectors Returns, which gave only information on the ore raised, supplemented for the produce of metal and total value by returns from the Stannary Court, the Duchy of Cornwall, and the Ticketing Papers of copper ore sales in Cornwall and Swansea. "This office has obtained in addition returns from a large number of the mines of Cornwall and Devonshire, and from tin streams and open workings, which do not come under the operation of "The Metalliferous Mines Regulation Act, 1872"." For other areas, Hunt appears to have given even less regard to the Inspectors Returns, declaring flatly that, "The returns of production from all the Mines in other parts of the United Kingdom have been obtained as they have always hitherto been by my direct application for them".

A similar policy was pursued for the coal returns. The following circular letter was sent "to the largest number of the coal owners of the United Kingdom" asking for what was a second return of the coal raised during the year and other relevant information:

> Sirs,
>
> The third paragraph of Clause 38 of the "Coal Mines Regulation Act, 1872", prevents my seeing the return which you will have made to the Inspector of Collieries. I am, therefore, reluctantly compelled to solicit your obliging attention to the annexed questions, to enable me to produce **THE MINERAL STATISTICS OF THE UNITED KINGDOM FOR 1873** with the desired accuracy.
>
> The replies with which you may favour me will be regarded as strictly confidential, and they will be used only in strict obedience with the Act, to enable me to compute "The aggregate result of such returns with respect to any particular county or Inspector's district".
>
> These aggregates will be published, as they have hitherto been since 1854, in the "Mineral Statistics" and I hope a continuance of that confidence which the coal interests of this country have constantly shown will enable me to give a satisfactory return, at an early date, of the production of coal and other minerals for 1879.
>
> I am, Sirs,
> Most faithfully yours,
> Robert Hunt,
> Keeper of Mining Records.
>
> MINERAL STATISTICS FOR 1873
> 1. Name and situation of Colliery.
> 2. Name of the Owner, or of the Firm, working the same.
> 3. The quantity of Coal raised in 1873, in Statute Tons.
> 4. The quantity of Slack raised in 1873, in Statute Tons.
> 5. Prices at Pit Bank.
> 6. Quantities of other Minerals raised in 1873.
>
> Iron Stone.
> Lime Stone.
> Fire Clay.
> Oil Shale.
>
> [48]
>
> Any information as to the distribution of Coal, etc. will be valuable.

Two thirds of the circulars issued were promptly returned, with questions fully answered. Several Coal Mining Associations furnished information in confidence and the overseers of several parishes gave similar assistance. "In addition", Hunt

noted mysteriously, "the production of large districts, collected with great care, was placed at my disposal." From these sources, he estimated "with accuracy" the production of collieries amounting to more than 120 million tons. However, other material was also at hand to check these figures. "All the great coal carrying railways of the United Kingdom, and several of the canals, have furnished the most detailed returns of the coal carried from each coal field, and its distribution, frequently giving, in confidence, the collieries from which it was obtained. All the shipments of coal, both to foreign parts and coastwise, are furnished by the order of the House of Commons, and all the collieries sending coal to within the London district are given in the city of London returns. Nearly all the iron masters have furnished me with the quantities of coal used in their works from their own collieries, or purchased from others." From this additional information, Hunt calculated that the production of coal may have been seven million tons more than his earlier estimate, i.e. 127 million tons. Although insisting that this was only an estimate, Hunt was satisfied that it was "a fairly exact one". It is notable that among the data used in preparing the coal returns, was a fairly detailed and most useful sectoral breakdown of coal consumption. In addition to the principal concern with coal and metal mining, the office also continued to circularise smelting works and the producers of earthy minerals, and produced a wide range of returns from the "liberal" and "freely" made replies of the owners.

The *Mineral Statistics* for 1874, published at the end of 1875, were prepared in the same laborious way but the delay in publication enabled greater accuracy to be achieved by permitting the returns sent to the Mining Record Office to be compared with those collected by the Inspectors of Mines. Andrew Ramsay, the Director General of the Geological Survey, in an introductory notice, also declared his "satisfaction" that by "the amended Act of the last session of Parliament, all returns from the Metalliferous Mines are, in future, to be made to the Inspector of Mines on the first day of February; and that arrangements have been made by the Secretary of State for the Home Department, by which these returns will be forwarded to the Mining Record Office, as soon as possible after they have been received from the Inspectors, by the Home Office." Although this would greatly facilitate the work of the Mining Record Office it would not, unfortunately, save them the trouble of sending a second circular to the mines. As Ramsay explained "as the returns made to the Inspectors are required to give only the quantities of Ore raised, the Keeper of Mining Records will still have to ascertain the *values* of the Ores sold, and the quantities of *Metal* produced from each mine." Equally, the conditions of the Coal Mines Regulation Act, 1872 remained unchanged. "Consequently, the coal owners will be asked still to extend to the Mining Record Office that obliging consideration which they have hitherto shown, and make the usual voluntary return of the produce of their quarries."

The problem of the coal returns was explained in greater detail by Robert Hunt. "As the individual coal returns cannot, under the 'Coal Mines Regulation Act, 1872', be published, and as the Act states that 'no person, except an Inspector or Secretary of State, shall be entitled ... to see the same', it became necessary that a circular should be sent to every colliery in the United Kingdom, asking for a return in confidence, of the quantity of Coal raised in 1874. These circulars were very largely replied to by the coal owners and the questions asked were fully answered. In addition to this the

Coal Trade Associations generally rendered great assistance, and in some cases issued circulars to the members of those Associations, expressing their desire 'that the information applied for by Mr. Robert Hunt will be promptly and accurately supplied to that gentleman, so that his future publications may prove equally valuable as those which are already before the public'." The returns from the mines were double checked and adjusted, as before, by comparing them with returns from the railway companies, canal, coastal shipping, the overseers, and other sources. It is notable that the final estimates of coal production produced by the Office differed noticeably from those produced by the Mine Inspectors. Hunt naturally had greater confidence in his own figures but suggested that the differences arose "principally from the impossibility of obtaining the returns uniformly in statute tons".

The increasing antagonism between the Mining Record Office and the Inspectors of Mines became even more overt the following year with the publication of the 1875 statistics. Although appearing in September, some months earlier than the previous year, Ramsay complained that although the Home Office had promised to pass on the returns to the Inspectors soon after the first of February submission date, "None of these returns were received by the Mining Record Office until nearly all the necessary information had been collected by Mr. Robert Hunt, and for several important metalliferous districts the returns were withheld, as if they had been made under the Coal Mines Regulation Act". This lack of cooperation again greatly increased Hunt's work load, compelling him to visit "nearly every mining district in the Kingdom" to explain the problems confronting the Mining Record Office and to solicit further voluntary information. Although no doubt confused and often irritated by this petty feuding within the government bureaucracy and the request for a second series of returns, the mining interests again lent their liberal support, and Ramsay could report with satisfaction on the "completeness" of the statistics.

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The 1876 *Mineral Statistics* appeared about the same time of the year as the 1875 volume had been published, but those for 1877 were produced in mid-summer and those for 1878 even earlier, in June 1879. These earlier publication times, made possible by the continued good will and cooperation of the mining industry, were sustained for the 1879, 1880 and 1881 returns. Although this increased efficiency was assisted by improved relations and increased cooperation between the Mining Record Office and the Home Office, the work involved in producing the *Mineral Statistics* appears to have been in no way diminished. The Mining Record Office now received and published the returns made to the Mine Inspectors but continued to conduct a second survey "by a voluminous correspondence, by visiting the mineral districts and personally soliciting attention".[17] In the introduction to the 1878 *Statistics*, Hunt reiterated that, "Under the 'Metalliferous Mines Regulation Act, 1872' the Inspectors are empowered to compel returns, on or before the 1st February in each year, of all the Minerals raised from all mines or underground workings. They cannot require returns of mineral produce obtained from open workings or in quarries, such as Tin Ore obtained by washing alluvial deposits or the like; and they have no power to seek the quantities of Iron Ores, or of any other mineral obtained from shallow

beds. They are officially unable to give the money values of any of the Metallic Ores or Earthy Minerals, or to state (which is more important) the percentage of the metal contained in the ores, upon which their commercial value depends. Each one of these matters will be fully found in the *Mineral Statistics* ."

This explanation, however, did not entirely justify the great extra effort which the Mining Record Office invested in a second survey of coal production. While they collected some data which was not returned to the Mine Inspectors, such as the value of output and methods and direction of distribution, they shared the same restrictions on the publication of detailed mine-by-mine returns and the aggregate figures which they produced agreed closely.[18] Hunt's principal objection to accepting the Mine Inspector's data appears to have been their continued refusal to give him access to the detailed confidential returns from which their regional aggregates were compiled - obliging him to work on an unacceptable basis of trust - and the simple belief that using his methods he could achieve more comprehensive and reliable results. Thus even in the 1875 return, when the Inspector's figures had not been passed to the Mining Record Office in time for publication, Hunt wrote provocatively that, "its production has been but slightly impeded. All the principal Coal Trade Association of the country have given their assistance in the most zealous manner, and the returns from all the large coal owners to the Mining Record Office have been far more complete than those made in obediance to the Act".

Truculent assertions of this character, however, required evidence and explanation if they were to receive general credulence and support. Hunt found opportunity to answer his critics in the Introduction to the 1877 *Statistics.* He drew attention to the fact that his estimates for coal production in that year were nearly a half a million tons greater than the *official returns* to the Mine Inspectors. He openly acknowledged the claim that since the Inspectors could "compel" the coal owners to make "a correct return" and the Keeper of the Mining Record Office could only "solicit" this information, it should be that "the quantities given by the Inspectors should be more reliable than those published in the *Mineral Statistics*". He refuted this, however, with a detailed explanation of the Mining Record Offices' sources and methods of operation in compiling their returns. "To each of the collieries, numbering about 4,000, a circular form is issued early in each year, and returns are very fully made to this office - giving in most cases, the distribution of the coal and quantities used in manufactures from about two thirds of this number."

"To the Coal Trade Associations of the Kingdom - to several of the Parishes in the Coal Mining Districts – to the Office of Woods - to the Mines Drainage Association of South Staffordshire - and to several other public bodies, I am especially indebted for much valuable information. In addition to the railway returns published, I am under especial obligation to the railway officials, as a body, for information of the utmost value to me, in computing the production of districts. With the information in my possession furnished from these sources certain colliery districts are visited, and by personal application the deficiencies are supplied."

From the labour which I have bestowed upon this branch of inquiry, I am confident, in the expression of my feeling, that the highest possible degree of accuracy has been attained in the returns of the coal produced in the United Kingdom."

As further evidence of the reliability of the Mining Record Offices estimates of coal production - but, perhaps, also of the lack of necessity for them - Hunt produced in the Introductions to the 1878, 1879 and 1880 *Statistics* a comparative table of coal output as calculated by the Mining Record Office and by the Mine Inspectors, for the years 1854 to date. He noted that in these tables "it will be seen that, although the returns have been collected under widely differing systems, the results have approximated very closely; the differences upon the large quantities of coal raised, not being in any case larger than might be expected from the irregularities existing in the weights used in separate districts, and the differences in the dates to which the returns have been made up". See Table 1. Hunt clearly preferred his own series as the most accurate of the two.

[50]

In 1882 Robert Hunt, after 37 years as Keeper of Mining Records, finally bowed to the onerous burden of his duties and relinquished his post. In the introduction to the 1881 Statistics, the last to be prepared under his guidance, Hunt made no direct reference to his impending retirement other than his customary thanks to "all the mine proprietors and mine agents - colliery owners and engineers - iron masters and managers - railway companies and officials" for the valuable assistance which they have given and his "most sincere thanks for their ever obliging and prompt attention". With Hunt's disappearance from the scene, the authorities took the opportunity to rationalise the collection and publication of the *Mineral Statistics*, and in his last report he wrote, almost certainly with regret that, "I am bound to state that arrangements are in progress, by which, it is hoped, that the objectionable duplication which has existed will be removed". His long battle to preserve the separate integrity of the Mining Record Office from the Inspectors of Mines had been lost with his own official demise, though many of his methods and techniques continued to be used. The Preface to the 1882 *Mineral Statistics* explained in greater detail, and warrants quoting at length.

"These two publications, namely by the Inspectors of Mines based entirely upon statutory returns, and the other by the Mining Record Office based upon the same returns under the Metalliferous Mines Act, but upon voluntary returns and computations of the very much more important minerals wrought under the Coal Mines Act, were published concurrently until 1882;[19] the latter contained also voluntary returns of certain minerals obtained from open cast workings, and gave the values, quantity of metals, etc., in addition to the mining produce."

"The publication of two sets of official mineral statistics was attended with several disadvantages. It was manifestly undesirable, in the first place, that the owners under the Coal Mines Act should be troubled with an application for a voluntary return of what they had already made under the statue; secondly, that two departments should be doing the same work; and, lastly, that there should be two sets of statistics that did not agree."

"Under these circumstances a Committee representing the Treasury, the Home Office, the Science and Art Department, and the Museum of Practical Geology, was appointed resulting in the recommendation that a more intimate connexion than existed should be established between the Mining Record Office and the Inspectors of Mines, which would be best effected by transferring the Mining Record Office from the Museum of Practical Geology to the Home Office."

"This recommendation has now been carried out. Mr. Robert Hunt, to whom the credit is due, under the direction of the late Sir Henry De La Beche, of having been the first to collect and arrange the Statistics of British Mineral Produce, and who for a long series of years most ably discharged the duties of Keeper of Mining Records has retired. The Plans of abandoned mines formerly acquired by the Mining Record Office are now with those sent under the Mining Acts, at the Home Office and, the Mineral Statistics are prepared under the direction of the Inspectors of Mines."

"The new arrangement not having been completed until May 1883, has delayed the issue of the present Paper until nearly the end of the year. It is hoped, however, that in future years, when the arrangements are in working order, the statistics may be completed in time to form part of the Report of the Inspectors of Mines, and also to be published and sold separately, at a small price, in accordance with the recommendation of the Treasury Committee."

"The Statistics do not at present include minerals such as chalk; limestone, stone, ordinary clay, gravel, peat, or turf, some of which are of great value. To include these would require more assistance than the Inspectors possess. All other minerals are comprised, including those from open-cast works, and the statistics show the average value at the mine and open-cast works, the distribution of certain of the minerals, the production of the blast furnaces, the quantity of coal consumed in making pig iron, the production of mills and forges and of tinplate works. The obtaining of this information has required the kind of cooperation of a large number of persons, to whom thanks are due."

"The values have been obtained from the mine owners by each Inspector for his own district. Those of coal show an important variation from values made in former publications, which is due to the values this year having been obtained in a much more detailed manner, including the reliable averages by which wages of miners in portions of several districts have been regulated."

"The appeals for the information have been fairly successful; but the delays in some instances, and the necessity of resorting in others to computations, show that it is almost impossible to obtain early and thoroughly accurate returns under the voluntary system, and point to the desirability of having the whole of the returns made under statute, in like manner to those under the Mining Acts, with, where it is needed, restrictions as to the publication of details similar to those now existing under the Coal Mines Act."

"The weights are in statute tons of 2,240 pounds."

[51]

TABLE 1[1]

The following STATEMENT showing the production of COAL in the UNITED KINGDOM in each year since 1854, as given in the Mineral Statistics and according to the Reports of H.M. Colliery Inspectors since 1864, has been found to be so useful that it will be continued every year.

Year	H.M. Inspectors of Coal Mines Returns Tons	Mining Record Office Returns Tons
1854		64,661,401
1855		64,453,079
1856		66,645,450
1857		65,394,707
1858		65,008,649
1859		71,979,765
1860		80,042,698
1861		84,013,941
1862		81,638,338
1863		86,292,215
1864	95,122,919	92,787,873
1865	98,911,169	98,150,587
1866	100,728,881	101,630.544
1867	105,077,743	104,500,480
1868	104,566,959	103,141,157
1869	108,003,485	107,427,557
1870	112,875,725	110,431,192
1871	117,439,251	117,352,028
1872	123,393,853	123,497,316
1873	128,680,131	127,016,747
1874	126,590,018	125,043,257
1875	133,306,485	131,867,105
1876	134,125,166	133,344,766
1877	132,179,968	134,610,763
1878	132,612,063	132,607,866
1879	133,720,393	134,008,228
1880	146,969,409	146,818,622

NOTE - The returns by the Inspectors prior to 1873 were computations; from that date they are the result of compulsory returns required under the 'Coal Mines Regulation Act, 1872'. The returns received by the MINING RECORD OFFICE are purely voluntary.

1. From The Mineral Statistics for 1880 (1881).

"The Lists of Mines, which formerly appeared with the *Mineral Statistics* are omitted this year, but they are given as usual in the Annual Reports of the Inspectors of Mines."

The responsibility for preparing and publishing the *Mineral Statistics* for 1882 and later years accordingly passed from the Museum of Practical Geology and the Geological Survey to the Inspectors of Mines and the Home Office. Before pursuing the account of their work in the future development of the *Mineral Statistics*, it is useful to notice their own previous experience in this field. Their early efforts in fact predated the systematic publication of data by the Mining Record Office. After the passing of the rust Act for the Inspection of Coal Mines in 1850, the first Report of the Inspectors, made in June 1851, included statistics of the quantity of coal produced in 1850 in Lancashire, Cheshire, North Wales, Staffordshire, Shropshire and Worcestershire. In the 1852 Report statistics of coal production in Lancashire, Cheshire and North Wales were included, based on voluntary returns provided by the colliery owners. The Inspectors continued to collect similar partial statistics from time to time until 1864, when they started a regular tabular statement of the quantity of coal produced, together with the numbers employed in the various districts with ratios of accidents occurring. During the early years the statistics continued to be based, as far as possible, on quantities returned by the colliery owners, though these sometimes required supplementing with computed figures. The turning point, however, came in 1872 when the Inspectors succeeded in persuading the Secretary of State for the Home Office to introduce clauses into the new Coal and Metalliferous Mines Regulations Acts to compel their owners [52] to make accurate returns of all the minerals produced and the numbers employed.[20] These arrangements, it was hoped, would produce the first comprehensive and reliable statistics for the industry. While the returns made under the *Metalliferous Mines Regulation Act* were to be published in detail in the Inspector's annual reports and sent on to the Home Office for deposit and safekeeping, the returns under the *Coal Regulation Act* were to be retained by the Inspectors in their own offices and published only in aggregate form.[21] As has been shown, this was regarded as a premeditated attack on the well established preserve of the Mining Record Office and the highly confidential treatment of the coal returns became a major feature in the gradual demise of the Office.

The general introductions to the Inspectors annual reports gave little or no information about the ways in which production and employment statistics were collected and their general reliability. However, some of the inspectors prefaced their individual reports with valuable introductory comments. In *Reports of the Inspectors of Mines to Her Majesty's Secretary of State* for 1873,[22] the first to follow the new legislation, little progress was made in the collection of data. As Clement Le Neve Foster, Inspector for Cornwall Devon and Somerset, explained, the *Metalliferous Mines Regulation Act* did not come into force until the 1st January 1873.[23] According to that legislation returns of production and employment for the calendar year did not need to be returned before the 1st August the following year. Since these reports for 1873 were drawn up in the early part of 1874, the Inspectors had not yet received the full returns. Foster's report for the year was accordingly very short, simply listing the mines operating, the types of ore produced, and their owners and managers. For future convenience, he

urged moving forward the final date for submission of returns to the 1st February following. Thomas Fanning-Evans Inspector of Mines in North and Central Wales, the Northern Pennines, Shropshire and the Isle of Man, made very similar comments to Foster, but padded out his report with returns made by the 1st August 1873 for 1872. Since returns for that year were not compulsory, however, many had not replied and the final figures were highly unreliable.[24]

The Inspectors' Reports for 1874[25] contained more complete information but the late date for submitting returns meant that they were running a year behind. Thus Foster could report the accidents and deaths for 1874 but the overall summaries for production and employment were those of 1873. Campaigning strongly for a 1st February rather than the 1st August final submission date, he wrote bitterly that, "the law unfortunately allows mine owners and agents seven months for compiling a return which they ought to be able to extract from their books in an hour or two".[26] The logic of this argument was undeniable and during the course of 1874 legislation was passed to amend the *Metalliferous Mines Regulation Act* on this very principle.[27] The general introduction to the Inspectors Reports for 1875[28] noted that, "the annual returns have now to be sent to the inspectors on or before the first day of February in every year, and, consequently, the following summaries contain not only the statistics for 1874, but also those for 1875".[29] In his report on the mines of the South West, C. Le Neve Foster wrote that the amendment, "has worked exceedingly well. I have not heard any complaints from the owners or agents of mines about their being obliged to furnish me with the returns on or before the 1st February and they made no difficulty about complying with the new Act". The following year, however, in his report for 1876, he was less sanguine, complaining of the same tardiness in making returns that had long infuriated Robert Hunt and the Mining Record Office. "On the whole, the annual returns have been sent to me with a fair amount of punctuality, though a few owners deserve punishment for extreme dilatoriness. I invariably find the greatest amount of difficulty in the case of small mines that have stopped, without my knowledge, during the year for which the return has to be made, for it is often far from easy to discover the person whose duty it is to furnish me with proper statements."[30]

It is clear that, unlike the staff of the Mining Record Office who were based in London and relied on necessarily brief periodic visits to the mining districts, the Mine Inspectors were in regular daily contact with the mines in their respective regions and were in a good position to check the general veracity of the returns made to them. They all appear to have travelled extensively in their districts throughout the year and to have been well acquainted with the mine owners, their agents and managers. C. Le Neve Foster regularly gave detailed accounts of his duties at the end of his annual reports and that for 1879 withstands repeating. During that year he claimed to have visited 249 working mines, of which nearly half involved underground as well as surface inspection. 118 visits were also made to abandoned mines to arrange the fencing of 434 dangerous shafts; an irritating intrusion on his time thought Foster. He also attended 17 petty sessions and 13 inquests; made four journeys to London

on official business, one of them to give evidence before the Accidents in Mines Commission; travelled twice to North Wales on official business; and conducted office work and correspondence which included 295 notices in writing concerning breaches in the legislation. During the year he travelled 11,793 miles of which 10,040 was by rail and 1,753 by road. The following year Foster transferred from Cornwall to the North Wales and Isle of Man district consequent on Thomas Fanning Evans, the previous inspector moving to the Midland district. In the report for 1880, he reported that "since the 17th July when I came into Wales, I have travelled upon official business 5,230 miles, viz. 4,142 by rail, 788 by road and 300 by sea. I have made 142 visits to mines; nearly all of them were made without notice, and a large proportion included underground as well as surface inspection.[31] Such devotion to duty would be difficult to emulate even with modern transportation facilities.

Just as Foster was prepared to invest great time and effort in the efficient performance of his office, he was not slow to point a critical finger at those aspects of his duties that appeared to make an unnecessarily large call on his energies. The public hazards created by the shafts of abandoned mines were a perennial source of complaint. Throughout his time in the South Western district he constantly complained of the inordinant amount of time spent in arranging for the fencing of old shafts and in his first report on the North Wales district he purposely commented that, "Dangerous shafts of abandoned mines have at present given me very little work, whereas in Cornwall they were a continued source of trouble and anxiety. It is true that I was dealing with the accumulated neglect of centuries, in a county where the amount of mining that has gone on from time immemorial is something astounding, and where the evil was far greater than it ever could have been in Wales. At the same time I am glad to bear testimony to the efficiency of the labours of my predecessor, Mr. T.F. Evans, as proved by the almost entire absence of complaints of dangerous unfenced mine shafts since I came into this district".[32] It is a matter of regret that those who have responsibility for this aspect of public safety today have not continued to show the same vigilance as their predecessors; a fact unfortunately demonstrated by repeated fatalities from falls into unprotected underground workings."

Foster was also critical of the sometimes poor support given to the mine inspectors by an often self-interested judiciary when those who infringed the regulation acts were brought to court. In his last report on the South Western district, prepared jointly with his replacement, R.J. Frecheville, he wrote, "On looking down the list of fines one cannot help being struck by the fact that most of them are abnormally small. It almost seems that some magistrates think more of the life of a pheasant than they do of that of a man, for I believe that if a similar number of convictions for poaching cases were taken at random the average fine would be heavier. The fact is, a very large number of the magistrates are interested, directly or indirectly, in mining. Many of them are owners of mining property, and have been troubled by repeated notices to fence dangerous abandoned shafts, and have been thereby put to considerable expense; some, indeed, have been prosecuted for neglecting to attend to these notices. Others are shareholders in mines in the district, and as such are not disposed to look favourably upon Government restrictions which they think may interfere with their profits. As a natural consequence fines have on the whole been light, and the inspectors'

labours have been increased considerably ... I am convinced that this mistaken leniency on the part of the magistrates leads to a delay in carrying out all of the provisions of the Act, and thereby tends to keep up the death rate from accidents. In the case of the Coal Mines Act the difficulty was foreseen, and a clause was inserted prohibiting certain persons from acting as magistrates in hearing cases of offence against this Act. I am at a loss to understand why the partners in a metal mining company should have been considered free from the not unnatural bias, which it was feared would affect the decisions given by the owners of collieries and their immediate relatives."[33]

With the demise of the Mining Record Office's separate series of mineral statistics after 1881, the Mine Inspectors detailed returns ceased to be included in their annual reports and began to appear separately in the Home Office's now official consolidated series. The first volume to appear, that for the year 1882, was published in 1884 under the title *The Mining and Mineral Statistics of the United Kingdom of Great Britain and Ireland*.[34] It did not include details of accidents at the mines or the previous series' customary *List of Mines*, containing the names of owners agents, managers and numbers employed, which was published separately. The return for 1883 also appearing in 1884 was expanded to include these classes of information but appeared under the different title of *Summaries of the Report [54] of the Inspectors of Mines to Her Majesty's Secretary of State, and Mineral Statistics of the United Kingdom of Great Britain and Ireland, including Lists of Mines and Mineral Works*. The publication of this full range of information was continued from 1884 to 1887 inclusive under the title *Mineral and Mining Statistics of the United Kingdom of Great Britain and Ireland, including Lists of Mines and Minerals Worked*. The return for 1887, published in 1888 contained:

a) The quantity and value of all minerals wrought.
b) The numbers of people employed in and about mines and open works.
c) The number of fatal accidents at the mines.
d) A list of the mines and some open works.
e) A list of the record plans of abandoned mines, deposited at the Home Office.
f) An appendix showing production of minerals in the British colonies and possessions.

a), b) and c) were prepared from statutory returns made to the Inspectors of Mines. Under the terms of *Metalliferous Mines Act* the mine owners were required only to send returns of the minerals dressed and of undressed minerals sold, treated or used during the year. The owners also "frequently furnished" the Inspectors with the results of assays, which enabled the "quantity of metal obtainable by smelting to be calculated".[35] The returns from open works were described as "purely voluntary and are asked for only in the case of certain minerals such as ironstone, slate, etc. as it would obviously be impossible with the present staff to obtain statistics of all the stone, chalk, clay and gravel washed from all open pits and quarries. In order, however, to render the total mineral output of the kingdom complete, an estimate has been made from the number of persons employed, according to the latest census returns, based upon the calculation that each one on an average produces minerals worth a certain sum in a year".[36] Details of imports and exports and the principal minerals were also appended, as were returns provided by railway and canal companies; lists

of smelters of the major metallic ores; and returns of the make of pig iron and the coal and ore consumption of the iron smelters in each county. Details of metal manufacturers were now omitted.

From 1888 to 1896 inclusive the title and content of the returns was again changed, this time to *The Mineral Statistics of the United Kingdom of Great Britain and Ireland with the Isle of Man*. The accident returns and List of Mines information, including employment data was dropped for separate publication: the accident returns in the Annual Reports of the Inspectors and the *List of Mines* as a separate publication under that name. The *Quarries Act* of 1893 enabled the Inspectors to require returns from all open workings more than 20 feet deep on the same basis as metalliferous mines. This was a very welcome and useful extension of their powers but still failed to provide for complete coverage of all mineral producers. Very large quantities of a wide range of minerals, from iron ore to clay, brick earth and gravel continued to be extracted from very shallow workings and the Inspectors reported pessimistically in 1895 that "without further statutory powers no accurate account of the quantity and value can be given". Attempts were made to estimate the output of iron ore and some other major minerals to make national total figures as comprehensive as possible but for these returns the Inspectors relied on the courtesy of the owners and their reliability was variable. They were similarly obliged to the owners of brineworks for voluntary returns of the quantity of salt production. It is likely, however, that even had full returns from all these workings been made compulsory, that the inspectors would have published them only in aggregate form, giving little detail of the individual workings. This was certainly their policy with open workings under the *Quarries Act*; it being explained in the 1895 return that, "the individual returns could not be published without enormously increasing the size of the book". However, details of the numbers employed, accidents, and owners of open works were included in the annual 'summaries of Statistics of Mines and Minerals', the *Reports of the Inspectors of Mines*, and the *List of Mines*.

The problem of still incomplete and possibly inaccurate returns was raised in the *Report of the Royal Commission on Mining Royalties* in 1893. The Commissioners declared that, "During the course of our inquiries our attention has been directed to the fact that the Statistics relating to minerals issued in this country are incomplete and at times misleading. One cause of this may be the absence of compulsory powers to obtain necessary information. Beyond all doubt our mining statistics fall far behind those issued by other states (including our Colonies) whose mineral resources may be comparatively small".[37] The main weight of their criticism was directed at the deficiency of information about royalties and way-leaves, the average price of coal and miners wage ratios. They called for the reorganisation and expansion of the Department of Mines in the Home Office and, among other things, the immediate collection and publication of information relating to coal consumption by manufacturing and domestic users; royalties and way-leaves; the average price of coal at the pit mouth and at selected points of consumption; miners wages and hours; imports and exports of all minerals; a comparison of the progress of mining in the United Kingdom with that in foreign countries. They concluded that, "Where necessary, additional statutory powers should be conferred on the Department to

enable it to collect the necessary information, due care being taken to prevent the disclosure of individual returns".[38] Following their criticisms, a Departmental Committee was set up at the end of 1893 "To [55] consider the whole question of Mines and Mineral Statistics in view of the Recommendation No.XI of the Royal Commission on Mining Royalties as to collecting information with regard to mines". Clement Le Neve Foster was the Chairman and they presented their report in 1895.[39] They examined the ways in which the Royal Commissions' suggestions could be implemented and in many sectors, particularly the calculation of coal consumption, foresaw considerable difficulties and the need for new statutory powers. Nevertheless, their conclusions largely reiterated the recommendations of the Commission and called for some rearrangement of the material already published. On the specific subject of production statistics they concluded that, "We are of the opinion that the volume of 'Mineral Statistics' should be continued in its present form, with any minor alterations or additions which may from time to time appear desirable, and that the book should be rendered more complete by publishing the output of all important mines and quarries. Most of the returns for mines under the *Metalliferous Mines Act* have been published in detail for many years; but statutory powers will be requisite before the returns of quantities of mineral raised from mines under the *Coal Mines Act* can be treated in the same manner. The *Quarries Act*, which comes into force on the 1st January next, will enable the Inspectors of Mines to obtain returns of the quantities of minerals obtained from open workings which are more than twenty feet deep; there still remain certain shallow workings for ironstone, fuller's earth, coprolite etc. and brine pits, which will be outside the provisions of this Act. It is therefore desirable that the Secretary of State should have power to call for returns from such workings".[40]

Some of the Committee's simple suggestions, such as the reorganisation of the presentation of existing material, were immediately implemented, but many of the more important issues, particularly those requiring further legislation, such as the publication of details of coal output, wages, and royalties, were ignored and never came to fruition. Perhaps their most important success was the institution of an annual 'General Report'. The Committee had noticed that, "One of the principal defects of the present system, under which the statistical returns and reports of the Inspectors appear, is that there is no general statement with respect to the mining industry as a whole. In other departments, such as those which deal with Factories, Education, and Local Government, a general report is presented annually to Parliament; but no comprehensive idea of the condition of the Mining Industry can be obtained without searching through the thirteen separate Reports of the Inspectors and the different volumes of Statistical Returns".

"The Committee are therefore of opinion that a general Report on the Mining Industry of Great Britain and Ireland, as suggested by the Royal Commission on Mining Royalties, should be prepared annually, and that it should be based upon the separate Reports of the Inspectors of Mines and upon the "Mineral Statistics".

"It should contain tabulated statements which will enable comparisons to be made between the different mining fields, counties or districts, as regards persons employed

output, accidents, death-rates from accidents, royalties, way-leaves, hours of labour, wages, consumption and distribution. These comparisons should be illustrated as far as possible by diagrams. The mode of occurrence of the different minerals should be briefly described, and other matters of general interest relating to mining might be added.

The Report should also institute a comparison between the Mining Industry of the United Kingdom and that of Foreign countries as suggested by the Royal Commission.

The first such 'General Report' was published the following year (1894) using a very similar format to that suggested, and became a useful regular feature thereafter.[41]

From 1897 the format for publishing the *Mineral Statistics* was changed yet again, though this time it was to continue through to the First World War. The 1897 volume appeared under the general title *Mines and Quarries: General Report and Statistics*. It was divided into four separate sections, Part III containing details of output and being subtitled *General Report and Statistics Relating to the Output and Value of the Minerals Raised in the United Kingdom, the Amount and Value of the Metals Produced, and the Exports and Imports of Minerals*. This volume contained information similar to that hitherto published under the title of The Mineral Statistics of the United Kingdom and in Part II of the *Annual General Reports for 1894-5 and 1896*. It gave details of the output of all mines, quarries, brineworks etc. Though those for shallow openworks still had to be calculated from voluntary returns made by the owners. It is notable that until this year, the "Clerks of the Mineral Statistics" who had responsibility for preparing the publications at the Home Office, were the same men that had worked with Hunt at the old Mining Record Office, so providing a strong element of continuity in the various series. Following Hunt's retirement in 1882, the new Home Office department had been run jointly by Richard Meade and James B. Jordan. Meade had been originally appointed as Hunt's assistant as long ago as 1841 and had been joined in the Mining Record Office by Jordan in 1858. Meade retired from the Home Office in 1889 but Jordan continued along until 1897, so consolidating a period of more than fifty years data gathering work under just three close associates. From 1897 C. Le Neve Foster, still a [56] member of the Inspectorate, took over responsibility for editing the new Output series, an office which he held for several years. Foster's interest in this aspect of his work has been noticed before and now he was reinvigorated by vociferous support from the mineral conservation lobby. He explained in his introduction to the 1898 Return, "It may be said that the duties of a statistical officer should be limited to a mere statement of figures, and that he should leave others to make comments upon them; but I consider that the editor of this work, even if his position is only that of a clerk who annually checks the amounts taken from the great national store which is not being replenished would be lacking in his duty if he failed to repeat the plain warning of such an authority as Mr. T. Forster Brown, who, in his paper upon "Our Coal Supplies" states emphatically that in another fifty years, that is to say within the lifetime of any now living, the dearth of cheap coal will begin to be felt. We are already dependent upon foreign countries for much of our iron ore and it will be an evil day when we feel the pinch of poverty in coal. The proper husbanding of the coal resources of the Kingdom is therefore a question of national importance".[42] Foster was by no means alone in

his concern over the future of domestic mineral supplies and was the latest contributor to a debate started several decades earlier by Robert Hunt and others. He would no doubt have expressed strong opinions in the current debate on the future of energy supplies.

After 1902 Foster ceased to sign the Reports and they no longer included any meaningful introduction to the statistics or their collection. With the continued disastrous decline of non-ferrous mining in the face 'of very low international price levels there was less and less to record from this sector of the industry and on the eve of the First World War the returns were dominated by the Coal and Quarrying industries. Iron production continued to expand gradually and the output of some new minerals, such as aluminium was recorded for the first time but the country was now generally heavily dependent on imported ores and metals. The last full and detailed set of returns before the holocaust were those for 1913. The 1914 returns, not published until the middle of the war years, appeared only in a highly abridged and aggregated form, giving no mine-by-mine details, lest this should provide useful intelligence to the enemy or, perhaps more practically, make unnecessarily heavy demands on the limited paper and other resources of H.M.S.O.

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4. i.e. successful bids for parcels of ore at public sales.

5. See above

6. Much of the above discussion of the early history of the development of the Mining Record Office was drawn from Robert Hunt's own account, published in the introduction to the Mineral Statistics of the United Kingdom for 1871 (H.M.S.O. 1872) pp.viii-ix.

7. N.B. This confusion is still reflected in the British Museum cataloguing of the early publications of the mineral statistics.

8. See below.

9. The variations in the estimates made by different authors will be judged of from the following extracts from their published statements:-

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10. See below.

11. N.B. There was no provision for the inspection of metalliferous mines before the Metalliferous Mines Regulation Act, 1873. See below

12. R. Burt, 'The Mineral Statistics of the United Kingdom. An analysis of the accuracy of the copper and tin returns for Cornwall and Devon' The Journal of the Trevithick Society No.8 1981.

13. See below

14. i.e. Some ferrous but not non-ferrous minerals.

15. N.B. Only coal and associated ferrous ores.

16. i.e. Metalliferous mines and the producers of earthy minerals other than coal mines.

17. Hunt *Mineral Statistics* (1877).

18. See Table 1.

19. The Mineral Statistics for 1881.

20. It is important to emphasise that the primary purpose of this legislation was to improve the safety of mines. The first report of the Inspectors of Mines following the passage of the legislation explains. "Prior to these Acts the coal and certain ironstone mines of Great Britain were regulated by the former Coal Mines Act which was based upon broad principles relating to safety to life and a few specialities; but the only Act extending to the other mines in Great Britain or to any mines in Ireland, was the 5 & 6 Vict. c.99 which had scarcely any relation to safety, but prohibited the payment of wages in public houses, and the employment of boys under 10 years of age and of all female persons below ground. By the two new Acts provision for safety is extended to all mines in Great Britain and Ireland and under the Coal Mines Act new clauses are introduced relating to the examination of managers and to matters of contract between the masters and operatives, beyond those for which even special rules could be framed under the former Acts." BPP 1874 xiii 337.

21. See Instructions of the Secretary of State for H.M. Inspectors under the Coal Mines Regulation Act 1872 and H.M. Inspectors under the Metalliferous Mines Regulation Act 1872 and 1875. BPP 1878 LXI 221-230.

22. BPP 1874 XIII 301.

23. Ibid p.619.

24. Ibid p.646.

25. BPP 1875 XVI 427.

26. Ibid 781.

27. In consequence of a decision in the Court of Queen's Bench, the slate mines of North Wales were also deemed to come under the Act during the course of 1874.

28. BPP 1876 XVII 75.

29. Ibid 89.

30. BPP 1877 XXIII 708.

31. 1881 XXV 409.

32. Ibid

33. Ibid 609.

34. BPP 1884 LXXXV 535.

35. BPP 1888 CVII 369.

36. Ibid

37. 18934 XLI 360.

38. Ibid

39. BPP 1895 XLII 1-30

40. Ibid

41. See The First Annual General Report upon the Mineral Industry of the United Kingdom of Great Britain and Ireland, prepared by C. Le Neve Foster BPP XXII 607-614

42. BPP 1899 CVII 487.