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AN IMPERIAL CONNECTION? CONTRASTING ACCOUNTING PRACTICES IN THE COAL MINES OF NORTH-EAST ENGLAND AND NOVA SCOTIA, 1825-1900

Abstract: The archives of the General Mining Association (GMA), a London-based enterprise with substantial holdings in the Nova Scotian coal-mining industry during the 19th century, are investigated in this paper. The historical record was examined with particular reference to the degree to which industrial costing techniques were transplanted via engineers/managers within the British Empire. The findings support the hypothesis that linkages to Newcastle were evident in Canadian coal mining, but that the accounting emphases differed somewhat between the two locales. In Nova Scotia, there was a great attention to day-to-day expense control. A similar concern was apparent also in the North-East of England, but here there appeared the additional sophistications of costing capital improvement projects and estimating the profitability of new workings. With regard to labor, the managers of the GMA's Canadian operations, like their counterparts in the North-East Coalfield, seemed disinterested in tracking the efficiency and productivity of individual miners. We hypothesize that this inattention typified an environment wherein labor was scarce and employment alternatives existed for the work force.

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INTRODUCTION

The types of costing information utilized by the General Mining Association (GMA) in the Nova Scotian coal industry during the 19th century are detailed in this paper. As an absentee owner situated in London, the GMA required a flow of accounting information in order to manage its substantial properties, particularly the Sydney Colliery on Cape Breton Island, Nova Scotia.¹ Comparisons were made to findings, both published and unpublished, which the authors have advanced from earlier archival research into north-east coal mining during the industrial revolution in Britain [Fleischman and Parker, 1997; Fleischman and Macve, 2001; Oldroyd, 1996, 1999]. The GMA archive was examined with reference to the additional question of whether or not costing methods were exported across the Atlantic because of the imperial connection resulting from Canada's position within the British Empire.

A DEVELOPING LITERATURE

Our study of the transfer of accounting techniques within an empire is explored through the example of the coal industry. From the British perspective, there is a rapidly emerging literature on coal-mining accounting during the 19th century. Studies focused on the first half-century during which the industrial revolution in Britain was running its course include Edwards et al. [1995], Edwards and Newell [1994], Fleischman and Macve [2001], Fleischman and Parker [1997], McLean [1997], and Wale [1989a]. Works by Boyns [1993], Boyns and Edwards [1997], Boyns and Wale [1996], Edwards et al. [1995], and Wale [1989a, b] have commenced the process by which the second half-century is now under the scrutiny of accounting historians. These investigations complement earlier work by economic historians, including Bulman and Redmagne [1951], Church [1986], Flinn [1984], Harris [1976], Hirsch and Hausman [1983], Mendlicott [1981], Rowe [1923], and Walters [1975].

The above-mentioned works run the gamut from limited investigations of individual coal-mining enterprises, to regional studies of various U.K. locales, to national surveys. For the pur-

¹All Canadian collieries mentioned are located in Nova Scotia. Sydney, Low Point Barrasois, Bridgeport, Lingan, Cornhill, Point Aconi, Spanish River, and Victoria are all situated on Cape Breton Island. Albion in the Pictou Coalfield and Joggins and Springhill in the Cumberland Coalfield are on the Nova Scotian peninsula.

poses of the comparison to Nova Scotian mining undertaken here, the authors propose to concentrate on Tyneside² operations, in the Great North Coalfield centered on Newcastle. Costing at the collieries of the Great North coal measures stood at the forefront of practice in Britain. Access to London via the sea made Northumberland, Durham, and Newcastle the largest and best-developed coalfield in Britain from the 17th century [Ashton and Sykes, 1964, p. 194; McCord, 1979, p. 36]. According to Flinn and Stoker [1984, p. 18], the north-east's collieries enjoyed a high reputation for technical progress and business organization, techniques that mine owners elsewhere copied. Potentially the greatest contribution of the region to the historical development of costing practice was in the dissemination of knowledge by Tyneside viewers (mining engineers/managers). Among the tasks they performed was the provision of cost data for forecasting the profitability of mine workings and for evaluating the relative advantages of capital improvement projects. A body of costing practice was already well developed on Tyneside by the 1730s [Oldroyd, 1996]. As the 18th and 19th centuries progressed, the notability and expertise of particular viewers caused them to be surrounded by schools of apprentices, who in turn moved out from Tyneside to other regions, countries, and related industries, such as iron and lead [Flinn and Stoker, 1984, pp. 57-59; Hiskey, 1979, pp. 8-9]. Tyneside viewers were, for example, employed on the Duke of Norfolk's estates in South Yorkshire [Medlicott, 1981, pp. 183-188]. They also prepared costings for the Bowes family's lead-smelting operations in County Durham [Oldroyd, 1999, p. 191].

Recent studies of Tyneside accounting techniques include those of McLean [1997], who examined the costing records of the Tanfield Moor Colliery in County Durham, 1800-1850, and Oldroyd [1996, 1999], who looked at the earlier records of the aristocratic coal cartel in the north-east known as the "Grand Allies." Both authors found evidence of sophisticated costing practice, which directly assisted management in a range of activities, including decision making. Fleischman and Parker's [1997, p. 115] subsequent research revealed a level of sophistication in north-east colliery costings during the industrial

²One reviewer has noted that "Tyneside" as used in this paper is not geographically accurate since County Durham does not front the River Tyne. However, we have maintained the term to be consistent with the labeling in Fleischman and Parker [1997] and Fleischman and Macve [2001].

revolution that transcended what they had found in other British industries, such as textiles and iron.

Given the volume of research on British coal mining in the second half of the 19th century, the issue might be raised that these materials would afford a better contrast to Nova Scotian developments because of a greater chronological correspondence, notwithstanding the overlap between the formative period prior to 1850 and previous research on Tyneside. However, there are numerous reasons why somewhat earlier Tyneside methods are more directly pertinent even apart from the obvious perspective that the authors' expertise in this region is derived from primary source material. As Fleischman and Parker [1997, ch. 5] and Fleischman and Macve [2001] have endeavored to demonstrate, mining techniques in North-East England were quite different from other U.K. venues. These differences, not to be restated here in great detail, include the use of the "bord and pillar" method of mining as distinct from the "longwall," the utilization of direct hire rather than the "butty system" (subcontracting) for labor recruitment, and the managerialism of the "viewers" to a much greater extent than elsewhere. These inheritances were reflected in Nova Scotian mining operations as the following pages will attempt to detail. Aside from these aspects of the industry's basic structure, there were a number of other similarities between north-eastern and Nova Scotian coal mining. As Brown [1871, p. 82] pointed out, the coal mined in Nova Scotia was closer to the Tyneside product in terms of combustibility, carbon content, and ash residue. Mining depths were great at both venues, at least post-1854 in the case of Sydney, mandating large capital expenditure. Coal mining in the Newcastle vicinity and Nova Scotia was not linked to a native iron industry as elsewhere in the U.K., giving rise to the expectation that greater attention would be paid to distribution networks, particularly overseas transport.³ In both North-East England and Nova Scotia, the industry was impacted by external control mechanisms — in Canada it was governmental control, while on Tyneside it was the coal-owners' cartel.

Work by Boyns et al. [1997a, b] has not only featured comparative archival research for the U.K. and France, but has also

³Trevor Boyns has pointed out to us that post-1860, the South Wales coal industry's growth depended more upon expanded export than the local iron industry. Hence, subsequent to that date, owners might have been expected to pay greater attention to distribution networks.

urged that accounting and business historians follow the lead. Variously they have suggested that “the need for such work [comparative accounting history] is receiving increased recognition,” that comparative history is a “valid methodological tool,” and that accounting historians should begin to think beyond the box of their own native methodologies [Boyns et al., 1997b, pp. 7, 8, 13]. It is within this framework that the following study is undertaken, but with the additional parameter that the imperial connection aided and abetted the spread of accounting. We are also following the lead of Boyns et al. [1997a, b] in focusing on what they defined as “industrial” accounting. Our emphasis here is more specifically directed toward costing, although we do touch upon the financial reporting necessitated by the GMA’s absentee ownership of its Nova Scotian mining operations.

There has been a wealth of recent literature on the export of British accounting structures to former colonies [Annisette, 1999; Briston and Kedsilie, 1997; Carnegie and Parker, 1999; Chua and Poullaos, 1998; Parker, 1994]. However, the emphasis of this research has been limited to the transfer of accounting professionalization. Within the context of the 20th century, Briston and Kedsilie [1997, p. 194] wondered the degree to which the Chartered Institute of Management Accountants attempted to export “its training, educational and examining processes.” Pre-20th century accounting links between metropolis and periphery are featured in work by Carnegie [1997], Neu [1999], and Spraakman [1999], but this literature does not deal with the export of industrial accounting methods. Even though Canada was identified by Parker [1994, p. 609] as an “active importer” of accounting exports from the U.K., we have not seen any research that focuses on costing issues. Vent and Milne [1997] have done a comparative study of precious metals mining, but since the mines were American and Australian, the impact of an imperial connection would not have been present. This paper proposes to begin an examination of these linkages.

Two main archives were visited. The Public Archives of Nova Scotia (PANS) in Halifax houses mineral and mining records, 1800-1868, as well as the Richard Brown collection. The Beaton Institute (BI) at the University College of Cape Breton in Sydney contains the records of the GMA, 1827-1901. Additionally, comparative data were obtained from the Carlisle Record Office (CRO), housing the estate records of the Lowthers of Whitehaven, and the Northumberland Record

Office (NRO), which contains the records of the North of England Institute of Mining and Mechanical Engineers.

Narrating the story of the Sydney Mines is greatly facilitated by the longevity of key personnel, both in Nova Scotia and the GMA in London. The Richard Browns, father and son, served in an unbroken tenure of some 70-odd years as managers of the mines. Similarly, J.B. Foord and C.E. Swann served for most of the century as Secretaries to the GMA proprietors.

The paper proceeds with a brief historical overview of the history of the GMA's coal-mining operations in Nova Scotia, followed by an extensive analysis of the surviving accounting records. Featured here are sections on expense control, capital estimations, regulation, and accounting for labor. The paper concludes with an assessment of the perceived linkages between Nova Scotian and Tyneside coal-mining practice.

THE GMA IN NOVA SCOTIA: AN OVERVIEW, 1826-1901

The systematic exploitation of coal in Nova Scotia began with the formation of the GMA in 1826. Coal had been mined in the province since at least 1715, but the early proprietors had insufficient capital to engage in large-scale operations [Brown, 1871, pp. 100-101; Martell, 1945]. The GMA was formed by the jewelry firm, Rundell, Bridge & Co., which acquired a 60-year monopoly over all of the province's mineral rights in commutation of the debts of Prince Frederick, Duke of York. The monopoly only lasted 30 years as the GMA agreed to its revocation on December 31, 1857 in return for a new lease of its existing holdings on preferential terms. The company also reserved the right to expand into designated new sites [Brown, 1871, pp. 100-110; McKay, 1983, p. 20; Wylie, 1997, p. 15].

The Earl of Lowther must have had connections with the company as it was at his behest that one of his stewards, Richard Brown, was sent to examine and report on the coal mines in Cape Breton Island. Brown had trained as a viewer in the Earl's coal mines in Westmorland, England, a county heavily influenced by Newcastle practice. In Canada he became manager of the Sydney Mines and chief engineer of the whole operation. As the paper will relate, Newcastle viewers did consultancy work for the Lowther estates and were well known to Brown. It is probably through these connections, plus the fact that the north-east was internationally renowned for its mining expertise, that the London-based company also employed them in Canada. The GMA's lack of previous mining

experience is probably significant; there would be an incentive to hire the best people for this enterprise, taking into account the scale of the investment.

In his later book, Brown [1871, p. 91] noted that the chief objective of the GMA was to establish an extensive trade with the U.S. In 1827, 20% of the coal consumed in Boston and New York came from Great Britain, 34% from Pennsylvania, and 46% from Virginia [Brown, 1871, p. 93]. The GMA was unsuccessful in its attempts to penetrate this market, partly due to the opening of the Schuylkill Canal in 1825, which provided Pennsylvanian coal with an outlet to the sea. The company was also impeded by U.S. trade tariffs that were only temporarily relaxed between 1854-1866 [Forsey, 1926, p. 5; Macnutt, 1965, p. 215]. Most of the GMA's expansion was fed by increased demand from the Canadian provinces. Coal production under the GMA expanded from about 20,000 tons per year in 1825 to about 100,000 tons in the 1850s. The period following the rescission of the GMA's monopoly saw the largest increase, with production in Nova Scotia rising from about 600,000 tons in 1867 to 8 million tons in 1913. New entrepreneurs were attracted into the market, with most of the investment coming from Britain, the U.S., and Montreal, resulting in a decline of the relative position of the GMA [McKay, 1983, p. 13; Wylie, 1997, pp. 15-16]. The GMA sold its interests in Pictou to the Halifax Coal Company in 1872 and the Sydney Mines to the Nova Scotia Steel and Coal Company in 1901. The Sydney Mines in Cape Breton and the Albion Mines in Pictou were the GMA's major holdings, but there were also secondary workings at Bridgeport, Lingan, Joggins, and elsewhere [McKay, 1983, p. 18]. Despite the large number of operations, Sydney was the flagship installation and the focal point of most surviving accounting records. It is to this archival material that we now turn.

THE COMPARATIVE ACCOUNTING RECORD

In this section, the accounting practices of the GMA will be considered across four parameters: expense control, capital estimations, regulation, and accounting for labor. Comparisons will be made to corresponding techniques found in north-eastern coal mines during the industrial revolution.

Expense Control: From the outset, the Directors of the GMA were interested in economy. In a report to the GMA's Directors

in 1834, John Buddle, the foremost Tyneside viewer, emphasized the need for economy [NRO: 3410/BUD/19/270]. When Brown, Jr. was appointed to succeed his father in March 1864, Foord, on behalf of the GMA, emphasized this responsibility:

. . . hence it becomes of the utmost importance that the cost of raising and shipping it [coal] should be reduced as low as possible. Your recent visit to the Collieries of the North of England, and the practical information you have doubtless acquired in those Collieries where economy is studied as closely as possible, will enable you to apply that information with advantage in your future management of the Sydney Mines, so far as it might be susceptible of solid and useful improvement [PANS: MG1/158/37].

In 1880, when Brown's managerial duties were extended to the Low Point Barrasois and Lingan Mining Company, he agreed to the following covenant:

Brown shall and will at all times observe the strictest economy in all expenses he may incur on account of the said company and keep or cause to be kept just and true accounts of all his receipts, payments, transactions, and dealings on account of the said Company [PANS: MG1/158/35-36].

While these contractual statements have the ring of boilerplate verbiage, the Browns apparently believed that expense control was an utmost responsibility. In 1870, Brown, Sr. wrote to his son, congratulating him for reducing costs at Sydney and opining that ". . . the cost of working is the grand test of the competence of the manager and will speak for him in the strongest language" [PANS: MG1/151/109].

The desire to reduce costs was reflected in the costing procedures adopted. Expenses were analyzed monthly and yearly and subjected to *ex post* rationalization. The system went beyond the tracking of expenditure and constituted a genuine system of cost control, the basis of which was the calculation of unit cost. R.H. Bridge, who is described in one of the documents as "accountant," forwarded a retrospective estimate of the cost per ton at the Sydney Mines for March 1870 to Foord. In the letter, he referred to similar reports for January and February, indicating regular monthly returns. Bridge also sent Foord an annual return of the cost per ton at the Sydney Mines for 1869 [BI: MG1419/83-110-1870/D8c]. Another annual return has survived for the Albion Mines in 1841. Here, the annual expenditure was analyzed and grouped under subheadings of

raising charges, shipping charges, new works, and royalties. The various shipping charges were divided by the numbers of chaldrons shipped, whereas the other charges were divided by the number of chaldrons raised, the sum producing a grand total. The chaldron was a traditional output measure based on the volume of a coal wagon. This particular report was designated number 15, indicating that it was part of a sequence [PANS: RG1/463/46].

A complete set of monthly cost returns has survived for the Albion Mines for June 1868 in the papers of Thomas E. Forster, the Newcastle viewer [NRO: 3410/FOR/3/2/131]. As well as including inventories of plant and analyses of employees and rates of pay, these returns provided a detailed analysis of the monthly expenditure converted into unit cost. The average cost per ton for each expense was listed beside the average cost per ton for the year to date and the average cost per ton to the same point in the previous year. The report also included a summary of the cost per ton of the various expenses for each of the five previous years. Correspondence in August 1868 between Brown, Jr. and Foord indicates that by this time the company was using pro-forma cost sheets designed by Forster. Brown complained that Forster's monthly cost-per-ton sheets were more detailed than those which the company had used previously [NRO: 3410/FOR/3/2/140]. The fact that this letter was also found among Forster's papers shows that Foord must have sent it to Forster for his comments.

The 1870s saw an upsurge in costing activity at Sydney. Comparative costings per ton for the Sydney and Lingan Mines for 1872 were carried to tenths of a cent [PANS: MG1/159/52]. Perhaps the surviving record most reflective of sophisticated costing is an 1874 document of Brown, Jr. in which he calculated the price of sales necessitated at various production levels. First, Brown reckoned that the "fixed charges" for a relevant range from 75,000 to 150,000 tons amounted to \$62,972. He then calculated the unit cost per ton at different levels to which he added a variable cost component of \$0.97. To generate the profit required, Brown established a per-ton price ranging from \$2.75 at the 75,000 tons volume level to \$2.00 at 150,000 tons. He then performed a sensitivity analysis on the impact of a \$0.50 price advance per ton [PANS: MG1/159/75].

Correspondingly, the calculation of unit cost in the Tyne-side coal industry had a long ancestry. In a letter to the Duke of Northumberland in 1617, Hugh Bird computed the unit cost of working and leading (overground haulage) Newburn Colliery

[Hatcher, 1993, p. 265]. By 1730, unit cost calculations were common practice in the region [Oldroyd, 1996]. There are strong indications that the types of calculation which had been devised on Tyneside in the 17th and 18th centuries were still being practiced in the British coal industry in the nationalization era following World War Two. They certainly featured in government statistics showing the unit cost, unit selling price, and unit profit for the industry as a whole and in the pro-forma costing forms used by individual collieries in the 1940s and 1950s. They were remarkably similar in design to the ones devised by Forster for the GMA some 80 years previously [Bulman and Redmayne, 1951, pp. xxiii-xxiv, 116, 121; Clement, 1951, pp. 38-41].

The pattern of survival of costing documents in Nova Scotia is sporadic, with high points occurring in the 1840s, 1870s, and 1890s. Whether this pattern reflects the creation of records or is merely a function of the vagaries of record survival is difficult to tell. In some cases the peaks do correspond to initiatives taken by particular officials.

In 1842, one George Wightman was sent to investigate the GMA mining operations and to write a report on why the Albion Mines were suffering losses [PANS: RG21/A/Vol. 3, folder of materials 1841-1856]. Wightman concluded that losses on land speculation (£7000), dead stocks of materials and stores (£1750), unnecessary expenditures on the works (£43,470 — mostly a vastly overpriced railroad and superfluous housing), an annual loss occasioned by the faulty arrangement of the coal yard (£1000), and excessive labor costs (50% more than necessary) were to blame.

The second great wave of costing activity came in the 1870s, occasioned by the appointment of Jonathan Rutherford as General Manager of the GMA holdings in 1872 and the Swann visitations at the end of the decade. At this time there appears in the archive a detailed record of expenditures on a new winning at Sydney with columns for costs incurred through to the end of 1872 and 1873 respectively [PANS: MG1/159/62]. As was the case in the Newcastle region, managers were concerned about the relative efficiency of horses and machinery [Fleischman and Macve, 2001]. In 1869, James Hudson, a resident viewer trained in the U.K., complained to Cunard and Morrow, the GMA's Halifax agents, that at the Joggins Mine the number of horses to tons raised (13 horses for 8,000-8,500 tons annually) was proving too costly [PANS: RG21/A/Vol. 3]. The GMA's proprietors were informed in the report for 1877

that a reduction in the number of horses and associated human handlers in favor of underground hauling machinery saved approximately £35-£40 per horse annually [BI: MG1419/91-68-2690/G/9]. Notwithstanding this concern, Brown, Sr. noted to Jr. in March 1877 that greater attention should be paid to cost on a monthly basis, citing as evidence the gross fluctuation in annual horse upkeep charges (\$74 in 1871, \$106 in 1872) [PANS: MG1/151/282].

Swann's tenure as GMA Secretary had a positive impact on the volume of expense control reports. In 1878, the year of Swann's first visit to Nova Scotia, E.W. Scovell, Chair of the Board of Directors, reported how production costs had declined as a result of working a new winning rather than the Queen Pit and the considerable reductions in other expense categories the Directors had enforced at the mines [BI: MG1419/91-68-2690/H, 1878]. In the same year, it was further reported that Swann had affected many economies and that he should return to Nova Scotia frequently [BI: MG1419/91-68-2690/G/9, 1878]. A report for 1880 chronicled another visit in which Swann reportedly went over every item of expenditure with Brown, Jr. [G/11, 1880].

Although the annual reports to the GMA became extremely sketchy in the 1890s, the last decade of ownership, and rarely transcended barebones financial statements, certain of the expense control documents reflected a growing maturity. In 1896, Swann was provided with an estimate for a new winning with calculations of the expenses associated with 1½ years of proving the coal seam and three years production at 100 tons and upward per day. There were 33 expense categories [PANS: MG1/159/98]. There was also an 1894 cost comparison of filling orders in summer and winter. From July - September, when raising costs alone impacted upon the cost of production, the cost was 70.111¢ per ton. In winter (February-April), when banking was an additional factor, the cost was 72.049¢. The improvement in expense control at Sydney over time is seen rather dramatically in a comparison of an 1860 and an 1897 abstract of production costs presented as Exhibits 1 and 2. The differences in detail and the number of data categories are immediately apparent.⁴

⁴Boyns [1993, pp. 336-337] demonstrated how the cost sheets at the Powell Duffryn Colliery in South Wales reflected a more detailed breakdown of costs in the period 1871-1913. New categories of cost were related to technological innovations.

EXHIBIT 1

Abstract of Production Costs, Sydney Mines, 1860

Cost for Ton, Sydney Mines 1860 -

Total Quantity of Coal raised in 1860 as per Abstracts	3	129,566	0
Left			
Small Coal	17,444	0	
Used for Lighting, by Cottiers & free -	853	0	18,352 0
<i>Cost calculated on Tons -</i>		<i>111,214</i>	<i>0</i>
Pit Charge	21,565	3 10	<i>S. D. $\frac{100}{100}$</i> 3 10 34
Surface do	5,970	5 7	10 94
Materials used	5,783	18 6	1 48
Passm Expenses	163	9 9	35
Salaries	1,402	10 .	3 03
Sums raised	708	18 10	1 53
Raising Charge on 111,214 Tons			<i>D. 6 $\frac{287}{100}$</i>
Filling from Banks	1,103	2 5	2 30
Leasing & Locomotive Charge	585	13 7	1 22
Shipping do	580	8 8	1 22
N. Sydney Railway Repairs	205	1 2	.42
Shipping Charge on 115,167 Tons			<i>5. $\frac{163}{100}$</i>
Cost on Board vessels			6 8 $\frac{3}{100}$
Rent & Royalty			6 .
Cost for Ton -			<i>7 2 $\frac{3}{100}$</i>
on a Fraction $\frac{5}{12}$ of Ton.			

The simple act of increasing the number of cost categories does not in and of itself guarantee that managers utilized the expanded data for more effective cost control. Typically archives do not contain the evidence to provide such assurances. In this case, however, the detailed nature of the GMA's cost records, together with the inclusion of comparative data for previous periods, indicates that the costs incurred were subjected to *ex post* rationalization, which is confirmed in the surviving correspondence and comparisons of actual to budget. A letter in February 1869 from Forster to Foord began:

I have gone carefully through the various cost sheets of the Mines belonging to the General Mining Association, which you forwarded to me, and as far as I am able to judge from a consideration of the figures given, I think the increase in the working charges has arisen from the following causes: [NRO: 3410/FOR/3/2/140].

He then proceeded to discuss the major items, with suggestions about how they might be reduced. A statement for the Albion Mines in June 1842 computed the cost saving that would have arisen in the month had the work force been paid at the same rates as at Sydney. The situation was reviewed again in February 1843 when the actual labor cost saving was calculated at £431, which over 12 months was expected to reduce the cost of coal by nearly 2s a chaldron. The document also analyzed the "proposed reductions not carried out," totaling £38.8s.7d, and found additional cuts of £78.4s.6d over and above the ones proposed by Brown, Sr. This analysis is the most detailed we have seen in the GMA archive in terms of both the number of cost reductions undertaken and the narrative provided to explain and justify the cuts [PANS: RG21/A/Vol. 7, folder of materials 1842-1866].

In summation, there seems ample evidence of managerial attempts to control expenses. It appears that the Board of Directors in London were willing to be proactive in overseeing this phase of operations. One or two surviving letters indicate that the London-based Directors felt at a disadvantage because of the distances involved [see, for example, Foord's letter to Brown, Sr. of November 1849, BI: MG1419/82-42-1512/D9e]. The culmination came in 1878 with the first of Secretary Swann's "secret visits" that, for a while at least, became annual events. The Browns looked upon intrusion by the Directors as an irritant. In 1870, Brown, Sr. wrote to his son advising him to keep his responses to the Directors' requests for information

simple as he doubted their ability to comprehend details. He also urged his son to communicate expenses in pounds sterling as they would appear less than if stated in dollars [PANS: MG1/151/106]. In another letter of November 1877, perhaps in response to Brown, Jr.'s complaints about the intrusion of Swann into mine affairs, Brown, Sr. pointed out that Foord, as GMA Secretary, had been his cross to bear, and complained that the Secretaries attempted to justify their positions by investigating trifling matters of expense ("ascertainments") [PANS: G1/151/300].

Capital Estimates: While the 1870s saw a heightened attention to expense control of daily operations, what was not evident were accounting records relating to Sydney's obvious competitive shortcoming: the absence of an adequate distribution network. The Sydney operation did not have a fleet of coal carriers, as did some of its competitors. The 1871 annual report to the proprietors identified the "shipping problem," that the buyers had to supply their own vessels while other mining enterprises were delivering coal [BI: MG1419/91-68-2690/G/2]. The 1873 report urged the construction of a new wharf to accommodate steamers [BI: MG1419/91-68-2690/G/4]. In Rutherford's first report as General Manager in Nova Scotia, he averred that he had not yet had time to bring his attention to bear on production costs as he was dealing with distribution problems [BI: MG1419/91-68-2680/H, 1872]. In light of this documented, high-priority difficulty, one might expect to see in the archive estimates for dredging, wharf improvement, ship procurement and alternative transport. There is virtually nothing of this genre, giving rise to our thought that capital improvements were not a focus of the accounting system.

The archive was not totally devoid of capital project estimates, however. One of the best examples was prepared in March 1834 by D. Hoard, a Newcastle viewer. Hoard was one of Buddle's associates, and his computation was appended to a report by Buddle on the construction of a new railway at Sydney. The point at issue was whether to ship coal from the existing quay at North Sydney or a new one at Bar Harbor. Hoard costed the Bar Harbor link and calculated the relative cost saving of the shorter route [NRO: 3410/BUD/19/227]. Homegrown examples of a similar genre include a technology proposal (unauthored, but probably by Brown, Jr.) in 1882, in which it was pointed out to Swann that Sydney had spent \$9333.48 on drawing and pumping water alone. A new engine

costing \$8651.68 would save \$1726.20 per annum in working and \$700 on repairs [PANS: MG1/159/59]. Brown, Sr. sent an estimate to Foord in May 1860 of the cost of opening pits at Cornhill, along with the cost of a branch railroad [PANS: MG1/159/17b]. There was a reasonable amount of detail about the various cost items associated with these projects, but his estimates still fell short of the capital improvement estimates made on Tyneside a generation earlier. Brown sent the GMA's Board of Directors an estimate for a new colliery at Low Point in the early 1870s, totaling £27259 [PANS: MG1/159/54a, b]. Items that would have been broken down in Newcastle included "materials of all kinds in pit £3140" and "labor £1370." Contingencies were given at 20%, twice the "fudge factor" typical of Tyneside costings of capital projects.

If focusing on expense control was possibly a function of absentee ownership, is there an explanation as to why accounting for capital improvements, particularly in transportation, was in a nascent state of development compared to practice in the vicinity of Newcastle?⁵ It is difficult to tell as the mines in Nova Scotia appear to have had access to the same range of technical and accounting expertise as in Tyneside, although the relative concentration of expertise in England compared to Canada was probably a factor. Resident viewers, often trained in England, such as Brown, Sr., Scott, or Hudson were in place in the mines at Albion and Sydney, while general viewers from England acted as consultants. This was the pattern employed at the Earl of Lowther's estates in England from whence Brown, Sr. came, although in other situations, such as the Londonderry estates in County Durham, general viewers such as Buddle were in residence or acted as partners in mining enterprises. The greater depth of the Tyneside coal mines, at least until 1854 when the Queen Pit was opened at Sydney, and the more substantial distances of access to water transport may have occasioned a greater attention to capital expenditure projects. Also, the Newcastle-area viewers, who performed a variety of cost accounting functions, may have been more interested in "bigger-picture" items than daily expense control. Absentee ownership might have influenced differential agency patterns and the nature of the accounting data required. Another possibility is

⁵See Fleischman and Parker [1997, pp. 121, 125, 131] for a discussion of appraising the relative advantages of capital improvement projects and estimating the profitability of new workings on Tyneside.

the difference in competitive environments prior to 1858 when the GMA's monopoly ceased. In Britain, coal mining was extremely competitive throughout the 19th century, and technology provided the key to accessing more coal at greater depths at lesser cost, as well as reducing the cost of transportation. In Nova Scotia, the GMA's position was not seriously challenged until the second half of the century when its relative fortunes declined. Falling profit margins as a consequence of increased competition have been traditionally portrayed in the literature as an impetus to better costing systems [Solomons, 1952, p. 19].

Regulation: Another feature of Nova Scotian coal mining was the large amount of internal management data required by the provincial government. As lessor of the province's mineral rights (in the U.K. the mineral rights belonged to the landowner), the provincial government had an interest in the mines being managed efficiently to maximize its royalties and to preserve the mines' future operating capability. While it is assumed that British landowners were profit maximizers in terms of royalties from their coal leases, they could not command the volume of information solicited by the government.⁶ For this reason, the GMA was obliged to submit an annual survey of the state of the operations, and the government's Inspector of Mines had full access to the mine workings [PANS: RG1/461/123]. For instance, surveys have survived for the Joggins and Albion Mines in 1859 that give details of location, seams, method of access, shafts, depth, levels from the shafts, drifts, overground railways, winding gear, wharves, buildings, and steam engines [PANS: RG1/461/106, 198]. Analyses of sales and employees were also required on an annual basis. In 1846, for example, returns were prepared of the quantity and value of coal raised and sold during the year from the Albion, Sydney, and Bridgeport Mines, sub-analyzed by market (U.S., neighboring colonies, and home consumption) and by size of coals [PANS: RG1/461/3-4]. There are many similar examples covering a wide range of years. The analysis by markets shows that

⁶We are grateful to an anonymous reviewer for *AHJ* who informed us that the British government began to require data from collieries regarding employment and output, commencing in 1872. Apparently the amount of information solicited increased over time. In the case of Nova Scotia, there was a quantum leap in the required data between the 1840s and the 1870s, but returns for the 1880s and 1890s have not survived in the archives.

the purpose of this information went beyond the calculation of royalties (royalties were based on total output). The survival of various time series, such as a statement of coal shipped to the U.S. in the years 1830, 1840, 1850, and 1855, suggests that the main interest of the government in these returns was to monitor the industry's development [PANS: RG1/461/121]. The government also seems to have had a demographic interest in the industry, hence the requirement for the GMA to submit annual returns of the average numbers of persons employed at each mine during the two preceding years [PANS: RG1/461/123]. These returns listed the average numbers of men and boys by occupation and, like the surveys and sales returns, were sworn by two company officials before a justice of the peace [PANS: RG1/461/110].

On Tyneside as well, there was an institution exogenous to the individual coal-mining enterprises which dictated the generation of additional accounting data than would otherwise be required. There the relevant agencies were the coal-owners' cartels that collected large quantities of information for the purpose of controlling both the retail sales and labor markets [see Fleischman and Macve (2001) and Oldroyd (1996)].

Accounting for Labor: It seems clear that labor scarcity was a reality of Cape Breton mining as was the case in the Newcastle vicinity [Fleischman and Macve, 2001]. The problem was specifically mentioned in the reports to the proprietors' yearly meetings in 1871, 1873, 1883, and 1887 [BI: MG1419/91-68-2690/G2, 4, 14, 17] and was discussed in the GMA's abstracts of accounts for 1873 and 1874 [BI: MG1419/91-68-2690/H, 1873, 1874]. Occasionally reasons for the perceived shortfall were provided. In 1871, workers were siphoned off to work on the Intercolonial Railway [BI: MG1419/91-68-2690/G2]. Rutherford reported in 1873 that a shortage of worker housing was a problem [BI: MG1419/91-68-2690/H, 1873]. Strikes could also spawn temporary dislocations, as at Lingan in 1883 [BI: MG1419/91-68-2690/G 14]. Of course, one does not need to look very far for root-cause explanations given the smallness of population relative to the scale of coal-mining operations. Attempts to remedy the situation through the importation of workers proved abortive. The provincial government imported French emigrants in 1873 [BI: MG1419/91-68-2690/G, 1874]. Brown, Sr. wrote to his son in May 1882 of the "disgraceful conduct" of the scoundrels imported from Scotland to work in the mines [PANS: MG1/151/446]. The problem of labor shortage was exacerbated by the

extreme mobility of the mining population, who proved willing to move from coalfield to coalfield, often on a collective basis [McKay, 1983, pp. 306, 311, 323].

McKay [1983, pp. 311-320] did not find as serious a labor shortage in the Cumberland Coalfields further south in Nova Scotia. In point of fact, the local population was sufficient to obviate the need to import foreign-born labor. McKay also found that the "extraordinary mobility of the mining population" meant that Cape Breton miners could be attracted to the region, particularly to the major mining operation of Springhill. The movement does not appear to have been a two-way flow, however, as Cape Breton was a far more distant outpost with few alternative employment opportunities. Here, where the importation of British miners was a higher priority, the comparatively lower wages failed to attract many recruits.

Perhaps as serious a problem as the shortage of miners was their perceived low level of productivity. Rutherford complained in 1873 that the number of workers was adequate but that the recent increase in wages had "induced less work from each individual" [BI: MG1419/91-68-2690/G4]. Rutherford reported to the GMA's proprietors in 1874 that a vicious cycle involving wage levels and production characterized Nova Scotian mining. The miners took advantage of their scarcity and market conditions to secure wage increases. "The usual result of these advances was to be feared, viz., a diminished production arising from mere idleness in many cases, and from a reduction in the amount of work performed by the more industrious workmen" [BI: MG1419/91-68-2690/H, 1874]. Swann's visitations in the early 1880s brought a similar lament. He complained about the indolence of the men, rather than the paucity of numbers, as responsible for production shortfalls. His expectation was for 80-100 tons per man per month, but the actual results were 50-60 [BI: MG1419/91-68-2690/G 12]. The senior Brown was very conscious of the expense to the company of sub par work. He wrote in his book [Brown, 1871, p. 70; see also Martell, 1945, p. 170] that the company had to provide the same rations (and housing) for all workers, regardless of their skill levels.

The Sydney managers did not adopt methods used in the U.K. to guarantee an adequate supply of labor. In the Newcastle area, miners were bound to a specific colliery for a period typically just short of a year. The system was made functional by the mine-owners' cartel that limited to some degree the mobility of miners to seek out better conditions or wages within the

region. Martell [1970, p.170] found evidence that a form of binding existed in the early days of Nova Scotia coal mining. Supposedly miners could be engaged on either four or twelve-month contracts, commencing January 1. In either scenario, the miners were paid only at the contract's termination date. However, there is no indication that the GMA mines entered into contractual agreements of this type, and there was certainly no owners' association in Nova Scotia to clip the colliers' wings. In any event, "binding" had mostly disappeared from Tyneside by the middle of the century, to be replaced by monthly or fortnightly contacts [Church, 1986, pp. 237, 261; Fleischman and Macve, 2001; Hammond and Hammond, 1919, p. 12].

Other U.K. coal regions attempted to use subcontracting (the "butty" or "chartermaster" system) to retain a labor force. The Sydney archive contains both a proposal and an actual subcontracting agreement. In his 1842 report on the unprofitability of Albion, Wightman suggested subcontracting the labor function in order to pass the risk of inefficiency to the subcontractor [PANS: RG21/A/Vol. 3]. There is no evidence that the Board seriously considered establishing that form of labor control, although there does exist an 1869 subcontracting agreement with Richard Partridge, a molder (patternmaker). The contractor agreed to specified piece rates and to pay rents, doctor fees and coal for his charges [PANS: RG21/A/Vol. 3]. However, since the molding function was such a small part of the Sydney operations, it cannot be assumed that this method was of importance.

The labor control technique that found favor with Sydney's management was a series of piece-rate structures with varying degrees of sophistication.⁷ The accounting records that tracked labor varied considerably during the course of the 19th century. The earliest was a "GMA Timebook" dated 1830-1832 [BI: MG1419/83-110-1870/E1a]. The miners were numbered with comments offered for those who did not put in a full-day's work (such as, absences, injuries and sicknesses). The entries rarely dealt with workers' inefficiencies, except when their physical presence differed from expectation. There was one mention of

⁷It is well known in the economic literature that increasing piece rates as a device to attract labor is dysfunctional since the higher wages result in heightened voluntary absenteeism [Hirsh and Hausman, 1983, p. 147; Walters, 1975, p. 293].

an operative being fined for failing to separate slack from large coals and another who turned in a cart under measure. As time went on, the number of comments increased and came to include the home-coal consumption of individual miners. In March 1832, for example, items were recorded on 40 of the 140 operatives. The data collection improved with the July 1832 entry as monthly recapitulations appeared in the book wherein each man's productivity was totaled and reconciled to the production total from each pit. The prices for getting the coals were also stipulated as were the piece rates paid for carting coal to the wharf. These rates varied from 5d to 2s per 36-bushel chaldron as a function of pit location. In 1872, Brown, Sr. wrote to his son suggesting a premium plan whereby a 10% bonus would be paid to workers who averaged five days per week at work for the year [PANS: MG1/151/164]. While there is no indication whether this plan was ever implemented, it and other surviving evidence lead us to believe that Sydney management and the GMA were primarily concerned with labor turnout. Labor efficiency was an imponderable that a manipulation of piece rates failed to solve as was also the case on Tyneside and elsewhere in the U.K. [Fleischman and Macve, 2001]. This approach seems to be characteristic of environments where labor is scarce and cannot be recruited from other industries [see, for example, Fleischman and Tyson's (2000) study of accounting on Hawaiian sugar plantations].

This apparent concern for turning out as opposed to productivity was reflected in a lengthy series of time books, 1839-1879 [BI: MG1419/81-52-1272/A1-A10]. Throughout the length of the series, the only information conveyed were tick marks representing days worked by individual miners. Occasionally quarter days of work were indicated. The books contained columns for pay rates that were rarely filled. The only exception was the 1858-1859 time book [BI: MG1419/81-52-1272/A7] which contained details on individual hewers' productivity in terms of tubs mined, forward progress, and mine location. Whatever happened at Sydney at the time of this record-keeping discontinuity also occurred at the smaller Point Aconi Mine, another GMA holding [BI: MG1419/83-110-1870/A22]. Here, for example, Daniel Hartigan received £9.15s in September 1855 for 9½ days sinking at 6s, "15 yards of level at 4s" (presumably a reference to forward progress), and 105 tubs at 9d.

The lack of piece-rate information between 1839-1879 is surprising given that we know from other sources that the company was using piece-rate incentives in 1834 and 1878, that

piece rates were used at the Spanish River Mines in Sydney as early as 1801 [PANS: RG21/A], and that the piece-rate system was the established method of paying miners in Britain throughout the 19th century. In 1834, Buddle said that he was very concerned about the high proportion of small coals being produced at Sydney and made the following recommendation:

The present mode of paying the Colliers by cubical measure, is I conceive objectionable in every point of view, as it holds no inducement whatever to them, to take any pains in producing round Coals, as far as I can discover. And I should strongly recommend working by the Ton to be adopted, to separate or riddle the Coal below ground, and to pay the Collier for the round Coals only - or at any rate to pay a very reduced price for the small. By this plan it would become the Collier's interest to make all the round Coal he possibly could, and it would also enable the proprietors to reward him, for doing so, by giving him an additional price, on the round [NRO: 3410/BUD19/279].

This quote illustrates a system of piece rates already in operation, as well as showing a belief in their potential for influencing behavior so as to optimize the firm's profitability. Similarly, in 1878, the "Billy Fairplay" system was introduced at Sydney, having first been developed in South Wales and from thence making its way to the North of England [BI: MG1419/91-68-2690/H, 1879 report to the GMA]. The system was a screening process that separated small coals and stones from the more valuable larger chunks. Because the screening was done on the surface, the miners underground were spared the labor of "riddling," the process of separating the two coal varieties. Brown, Sr. initially informed his son of "Billy Fairplay" in April 1877 [PANS: MG1/151/285]. A year later, in a letter to H. Poole, Brown, Jr. reported the establishment of the system from April 1, 1878 [PANS: RG21/A/3]. Not only did the process produce a higher quality product for sale because the slack was now fully screened out, but it provided an inducement through a revised piece-rate structure for the miners to be more cautious in avoiding the smaller coals. Previously, miners had been paid \$0.39 per ton of large coal and \$0.17 for riddled slack. Now the piece rate was \$0.43 per ton for large coals and nothing for slack. Brown observed to Poole that the miners could typically make the same or slightly more money and produce more coal per day, saved as they were the labor of riddling. The fact remains, however, that complaints about productivity were a

recurrent theme, suggesting that while it is likely that piece rates were used throughout the period, they did not achieve the desired result, which could explain the emphasis on turnout in the pay records.

Commencing in the 1880s, the time books became vastly more complicated and reflected a wage structure that may have existed earlier, but which is not contained in extant Sydney records we have seen. A number of piece rates were inscribed into the front covers of the volumes. The rates paid in 1882-1883 for the quantity of tons mined varied from \$0.44 to \$0.62 as a function of the “height” of the seams from which the coal was taken. “Height” referred to the thickness of a coal seam so that a thicker seam would yield a greater quantity of coal more readily. Consequently, coal mined from a seam of four feet, eight inches in height was priced at \$0.44, while a ton from a three-foot seam returned \$0.62.⁸ Likewise, piece rates were also paid for forward progress, varying from \$0.50 to \$0.86 for workings ranging from six to nine yards wide. Day rates were also given — \$1.07 for cutters, \$0.80 for driving. Prices were also provided for slack coal and stones of various diameters. A few other points of interest were apparent in the 1882-1883 rates. Prices paid in winter were only 75% of those paid in summer.⁹ The transition from long tons to tons occurred at this time, and piece rates are provided for each. Finally, the U.K. term “hewer” for the miner taking coal from the coalface had been replaced by “coal cutter” [BI: MG1419/81-52-1272/A10].

The contents of these volumes featured the calculations of pay for the cutters, combining the various components. There were data categories for each individual cutter of days worked cutting at the day rate, the forward progress at four prevailing rates, the tonnage prices, as well as columns for fines and remarks. In subsequent books of this genre, there were additional data categories for non-routine cutter functions, such as “room breaking,” “troubles,” “timbering,” and “low coal” (with

⁸We are grateful to Trevor Boyns for correcting our error in previous drafts that “height” referred to vertical distance from the mine floor so that higher piece rates were paid for coal closer to the floor which would have required the miner to stoop in order to access the coal.

⁹Nothing we have seen in the archive explains this seasonal differential. It may have reflected the additional cost of banking and tied-up capital since Sydney’s harbor was frozen until the spring thaw. The lower piece rate may have represented the minimum the GMA felt it had to pay during the slack season to retain its labor force. This situation was in evidence on Tyneside at least for the hewers. Here, however, the slack season was considerable shorter.

subheaders of height, tons, and piece rate) [BI: MG1419/81-52-1272/A11]. It would appear that the Sydney management had developed a pay structure that took into account the wide variety of work environments which the cutter could encounter.

Later time books of the 1880s saw additional refinements. First, a distinction was made in the piece rates paid at two pits designated north and south. Second, the piece rates were amended annually, an attention not in evidence on Tyneside during the industrial revolution. Finally, the records came to include columns headed "cavil" and "tally." "Tally" was a general term that did not have a specific application in coal-mining terminology in the 19th century, and could signify any kind of matching up. McKay [1983, p. 864] defined it as the number placed by the miner on the tubs of coal filled. The fact that each miner had a distinct tally number, with his "previous tally" also recorded, meant that pay was cross-referenced to output on an ongoing basis. Positioning was a significant factor in earnings potential, and "caviling" enabled the cutters to share good and inferior places by drawing lots. Similar equity considerations were seen in Tyneside mining [Church, 1986, p. 275; Flinn and Stoker, 1984]. The "cavil" column reflected a sequential numbering of the miners in pairs, perhaps indicating the operation of a "buddy" system. Such mutual looking-after was much more vital in a "bord and pillar" environment where the cutters were more isolated in the mine.

Aside from the later time books, there is little surviving evidence that the GMA used the accounting books to control labor productivity.¹⁰ There are two coal account books for Sydney 1889-1890 [BI: MG1419/82-256-1726/D3a, b] and for Victoria Mines 1884-1885 [D3c]. These volumes recorded the individual miner's daily production of riddled coal and slack (in separate books for Sydney). There is also an extant hauling account book dated 1893-1896, which contains the tonnage hauled by each operative daily multiplied by the piece rate as

¹⁰Christopher Napier, the discussant of this paper at the IPA Conference, Manchester, July 2000, queried why would economically rational managers carry on for a half-century with a system that did not achieve the desired labor control. While we feel comfortable with the explanation that a new control system would be too costly, particularly with reference to anticipated resistance from a scarce labor force, there is a possibility that the apparently heightened attention to piece rates in the 1880s might have been in place all along and that the evidence just did not survive in the archive. After all, there were scattered time books from the 1850s that reflected the same intricate piece-rate calculation methodology.

determined by the distance involved. Also noted was the number of days each worked, although never expressed in half or quarter days as seen in the miners' time books [BI: MG1419/81-52-1272/A17]. In none of these volumes is there any indication that punitive action was taken against inefficient or unproductive workers, suggesting that their purpose was to reconcile payments to output rather than to increase efficiency. According to McKay [1983, p. 848], the lack of discipline of the work force was a distinctive feature of coal-mining culture in Nova Scotia.

It may have been that the GMA would have generated even less information on its laboring force were it not for the wealth of data required by Nova Scotia's provincial government through its Inspector of Mines. The paper has already touched on the provision of costing data for regulation. The government had to be in a position to respond to memorials such as the one presented in 1873 by the leading mine owners soliciting the revocation of royalties during hard times [PANS: RG21/A/Vol. 12]. A printed form was distributed to the mines in 1875, requesting a vast amount of information. 21 operative groups were identified, and for each, highest, lowest, and average wage data were required for 1873 and the average for "10 or 20 years ago." Additionally, prices of necessities were requested, along with data on housing availability and cost. These costs were totaled to calculate average cost per man per day. Further categories asked the cost and consumption of oil, powder, picks, and other mining materials. Finally, in questions which paralleled those asked by the Newcastle coal-owners' cartel in the 1830s, the greatest amounts of coal mined and shipped on a single day were solicited [PANS: RG21/A/Vol. 12; see also Fleischman and Macve, 2001]. In an interesting addendum, the government invited the owners to indicate with an asterisk any information they did not want made public.

AN IMPERIAL CONNECTION?

Having examined the accounting methods in evidence at the Sydney Mines, we will attempt in this section to measure Nova Scotia's inheritance from Tyneside specifically and the U.K. more generally. Given the GMA's absentee ownership, a researcher might expect a substantial flow of information to London and back as was found in various archives of participants in the industrial revolution such as Carron [Fleischman and Parker, 1990] and Cyfarthfa [Edwards, 1989]. However,

there are few surviving financial reports which were going to, or instructions coming from, the Board of Directors prior to the 1860s, and even subsequently most of the annual reports were short and uninformative. The London proprietors were concerned with controlling expenses, but this attention was more general than reflective of a careful item-by-item analysis. The more significant links to Tyneside and Britain were in terms of managerial accounting techniques and technological innovation. In particular, the expertise of the Newcastle viewer was a vital resource for the Browns in their management of Sydney.

It is difficult to assess what Richard Brown brought with him from the Earl of Lowther's estates in England because of the paucity of costing data that have survived in the estate records. However, what does survive reveals consistency with contemporary Newcastle practice. For example, annual unit cost was calculated during the 31 years prior to 1842, and planning schedules exist of the extra costs that would have been needed to increase weekly production [CRO: D/LONS/W7/1/28, 333A]. Brown does not feature in the estate papers despite his notability in Canada. John Peile, the chief colliery agent, was the main character, although they were both probably part of the same viewing network. In 1838, John Buddle reminded Brown of the method that had been employed by Peile to extinguish a fire in the estate mines in reply to a request for advice on a similar fire at Pictou [PANS: MG1/158/3]. Buddle's connection with the estates as a consultant went back at least as far as 1812 when he supplied answers to a number of Peile's technical queries [CRO: D/LONS/W7/1/28]. It is likely that he and Brown were personally acquainted, which would help to explain why the GMA used him subsequently. The same may have been true of T.E. Forster. He was at his most active with the GMA in the 1860s; the second earliest extant profit and loss statement for 1869 reveals a stipend paid to him of £105 [BI: MG1419/91-68-2690/H, 1870], but a document in the Nova Scotia archives shows that he and Brown had an earlier connection. In May 1839, Forster, "as requested by Mr Brown," reported to the Directors of the Northern Coal Company that had been formed two years previously in England [Church, 1986, p. 131] on the value of the collieries leased to them [PANS: RG21/A/Vol. 7].

Such connections are not surprising given the way viewers trained and operated. Top viewers like Buddle and Forster sold their consulting services nationally and internationally and were extremely influential. Church [1986, p. 410] referred to the importance of their patronage in securing positions at the

largest collieries, as was the case at the Albion Mines in April 1865 following the death of James Scott, the resident manager. Forster regretted Scott's death in a letter to Charles Tupper, the Provincial Secretary, and mentioned that it was he who had originally sent Scott out 11 years before [PANS: RG21A/5]. Forster's nephew, James Hudson, proved to be the replacement. Tupper had been asking for Forster's help in finding a new Inspector of Mines, and Forster replied that he could recommend someone, although the going rate for "a good and practical viewer" was £600 per annum plus expenses.

While the mines in Nova Scotia had "managers" who performed many of the same functions as the resident "viewers" on Tyneside, the GMA also drew upon the expertise of nonresident "general viewers" from the north-east on a wide range of issues. As well as providing consulting services, Buddle apparently did procurement for the Sydney Mines. In a letter to Brown, Sr., he averred that he had not yet made a contract for iron coal tubs but would work with Mr. Foord of the GMA on the matter. Forster, for his part, drafted a list of questions to put to Brown, Jr. in the late 1860s to serve as the basis for suggesting operational changes [PANS: MG1/151/52b]. Unfortunately, neither the questions nor the answers have survived in the archive. Apparently, Forster procured technology for the mines as had Buddle. A letter from Brown, Sr. on March 30, 1867 informed Brown, Jr. that Forster would solicit tender offers on a new engine once provided with information on the depth of shafts, the size of pumps, and the tons of coal to be raised [PANS: MG1/151/16]. In 1877 Forster reported to the GMA on underground haulage techniques [PANS: MG1/151/285].

Swann, the long-term Secretary of the GMA, visited mines in Wales and Staffordshire in 1880 to study underground haulage [PANS: MG1/151/389]. Earlier, Swann had observed and detailed the screening process used in the Newcastle vicinity [PANS: MG1/151/268]. These studies were but two of many technological investigations undertaken by GMA personnel. Brown, Jr. toured the Seaton Delaval Colliery in February-March, 1864. He filled an 80-page notebook with his observations on this major Tyneside coaling operation [PANS: MG1/152/74]. His major interest was in technology as typified by a coal-hewing machine he described to Foord in a letter dated February 23, 1864 [PANS: MGI/159/10a,b]. Although the machine was applicable only to the "longwall" method of mining rather than the "bord and pillar" technique typical of Nova Scotia and Tyneside, Brown wrote a very detailed narrative of

operations, including the descriptions and pay rates of the 16 operatives required per shift. The total cost per shift was £3.7s.2d with typical production of 90 tubs of 8 cwt. each, depending upon seam thickness. Brown was also interested in the British names given to various operative classifications and to U.K. ventilation methods. He also took notes on testimony given by T.E. and G.B. Forster before a Parliamentary investigating committee. In particular, Brown wanted to get expert opinion on how much coal to extract (1/3) and how much to leave in the pillars of the mine (2/3) to provide adequate shoring for the roof using the extraction technique employed in Nova Scotia [PANS: MG1/152/74].

Personnel were sent from Canada to Newcastle for training. The best viewers had their own firms of associates and apprentices, as is revealed by correspondence in 1872 between James Hudson and G.B. Forster. Hudson had inquired whether Forster was prepared to accept the nephew of Mr. Cunard, the GMA's agent in Halifax, as a trainee, and Forster wrote back in the affirmative, setting out his terms. He revealed that he currently had six apprentices, although he personally was not involved in their early training as they were too much of "a bother at first" [NRO: 3410/FOR/2/16/136]. Three generations of Richard Browns were committed to the lessons that could be learned from U.K. mining. In September 1870, the senior Brown, now in semi-retirement in the U.K., advised his son that managers in Nova Scotia should travel to England to visit the northern collieries "to get any information or knowledge of improvement" [PANS: MG1/151/107]. A quarter of a century later, Brown, Jr. proposed to the GMA that he send his son to England "to get familiar with the most modern mining practices," particularly those with undersea operations [PANS: MG1/152/255]. However, it was recognized that on occasion the parroting of British methods could produce costly results because of environmental differences. For example, the report of George Wightman for 1842, which identified the causes of losses incurred at the Albion Mines, observed that the miners were overpaid since a sufficient number of miners had to be retained for periods of maximum production, and the wages paid had to cover the lengthy slack period of winter (frequently four months). The precedent for this practice was related "to the maxims and practices of England," but there the slack season was considerably shorter, typically a month around Christmas in Tyneside [PANS: RG21/A/Vol. 3, folder of materials, 1841-1856].

CONCLUSION

The paper has compared the costing methods employed by the GMA in Nova Scotia to practice in the U.K. in the 19th century, especially to the North-East of England. Costing was used by the GMA for expense control, including labor, and to generate data for the regulatory authorities. In the area of day-to-day expense control, the GMA mine managers seem to have taken great care, as did their counterparts in Newcastle. In Nova Scotia the system went beyond the tracking of expenditure and constituted a genuine system of cost control. Expenses were analyzed monthly and yearly and subjected to *ex post* rationalization. There are indications that this heightened emphasis on expense control reflected difficulties felt by the Directors in London in managing the operations at such a distance. It might also be the case that greater attention to actual costs, as distinct from *ex ante* cost estimation techniques for business decision making, may typify more nascent cost accounting frontiers. In terms of the major items of capital expenditure, the GMA's costings do not compare favorably with the careful estimations and cost tracking of pit sinkings, rail and wagon-way construction, and new technology procurement in North-East England. This deficiency was probably related to the concentration of technical and accounting expertise in Tyneside compared to Canada. The difference in competitive environments was another factor.

Common links with Tyneside in the personnel and in the costing procedures adopted show that some costing methods were exported from Britain to Canada. Tyneside viewers were highly influential. Resident managers at Albion and Sydney were drawn from their ranks, and the best viewers also provided consultancy, recruitment, and procurement services. Personnel were sent from Canada to Britain for training.

These findings support a global view of the development of management accounting in different locales at the expense of cultural differences. However, the paper has only considered the costing records of the GMA, an English company. Perhaps it is not surprising that it relied heavily on English practice. Although the GMA was the single most important company in the development of coal mining in Nova Scotia in the 19th century, it became but one of several mining companies after 1858, with capital coming from the U.S. and Montreal as well as the U.K. The province therefore stood at a cultural crossroads between investors from the south, west, and east, and it

would be worthwhile replicating this study in relation to the new investment taking place in the second half of the century. Similarly, there are the coalfields of Pennsylvania and Virginia to consider which were the GMA's major competitors in the U.S. market. Harris [1976] referred to a number of studies on the transfer of coal-mining technology from Britain to the U.S., and it would be interesting to see whether costing practice was homogenized here also, or whether these fields developed their own distinct tradition.

REFERENCES

- Annisette, M. (1999), "Importing Accounting: The Case of Trinidad and Tobago," *Accounting Business & Financial History*, Vol. 9, No. 1: 103-133.
- Ashton, T.S. and Sykes, J. (1964), *The Coal Industry of the Eighteenth Century*, 2nd ed. (Manchester: Manchester University Press).
- Boyns, T. (1993), "Cost Accounting in the South Wales Coal Industry, c. 1870-1914," *Accounting, Business & Financial History*, Vol. 3, No. 3: 327-352.
- Boyns, T. and Edwards, J.R. (1997), "The Construction of Cost Accounting Systems in Britain to 1900: The Case of the Coal, Iron and Steel Industries," *Business History*, Vol. 39, No. 3: 1-29.
- Boyns, T., Edwards, J.R., and Nikitin, M. (1997a), "The Development of Industrial Accounting in Britain and France before 1880: A Comparative Study of Accounting Literature and Practice," *European Accounting Review*, Vol. 6, No. 3: 393-437.
- Boyns, T., Edwards, J.R., and Nikitin, M. (1997b), *The Birth of Industrial Accounting in France and Britain* (New York: Garland Publishing, Inc.).
- Boyns, T. and Wale, J. (1996), "The Development of Management Information Systems in the British Coal Industry, c. 1880-1947," *Business History*, Vol. 38, No. 2: 55-80.
- Briston, R.J. and Kedsle, M.J.M. (1997), "The Internationalization of British Professional Accounting, The Role of Examination-exporting Bodies," *Accounting, Business & Financial History*, Vol. 7, No. 2: 175-194.
- Brown, R. (1871), *The Coal Fields and Coal Trade of the Island of Cape Breton* (London: Sampson Low).
- Bulman, H.F. and Redmayne, Sir R.A.S. (1951), *Colliery Working and Management*, 5th ed. (London: The Technical Press).
- Carnegie, G.D. (1997), *Pastoral Accounting in Colonial Australia: A Case Study of Unregulated Accounting* (New York: Garland Publishing, Inc.).
- Carnegie, G.D. and Parker, R.H. (1999), "Accountants and Empire: The Case of Co-membership of Australian and British Accountancy Bodies, 1885 to 1914," *Accounting, Business & Financial History*, Vol. 9, No. 1: 77-102.
- Chua, W.F. and Poullaos, C. (1998), "The Dynamics of 'Closure' Amidst the Construction of Market, Profession, Empire and Nationhood: An Historical Analysis of an Australian Accounting Association, 1886-1903," *Accounting, Organizations and Society*, Vol. 23, No. 2: 155-187.
- Church, R. (1986), *The History of the British Coal Industry*, Vol. 3 (Oxford: Clarendon).
- Clement, D.M. (1951), "Colliery Costs and Costing," *University of Durham King's College Mining Society Journal*: 35-52.

- Edwards, J.R. (1989), "Industrial Cost Accounting Developments in Britain to 1830: A Review Article," *Accounting and Business Research*, Vol. 19, No. 76: 305-317.
- Edwards, J.R., Boyns, T., and Anderson, M. (1995), "British Cost Accounting Development: Continuity and Change," *The Accounting Historians Journal*, Vol. 22, No. 2: 1-41.
- Edwards, J.R. and Newell, E. (1994), "The Development of Industrial Cost and Management Accounting before 1850," in Parker, R.H. and Yamey, B.S. (eds.), *Accounting History, Some British Contributions* (Oxford: Clarendon): 408-433.
- Fleischman, R.K. and Macve, R.H. (2001), "Coals from Newcastle: Alternative Paradigms for Interpreting the Development of Cost and Management Accounting in Northeast Coal Mining during the British Industrial Revolution," working paper.
- Fleischman, R.K. and Parker, L.D. (1990), "Managerial Accounting Early in the British Industrial Revolution: The Carron Company, A Case Study," *Accounting and Business Research*, Vol. 20, No. 79: 211-221.
- Fleischman, R.K. and Parker, L.D. (1997), *What is Past is Prologue: Cost Accounting in the British Industrial Revolution, 1760-1850* (New York: Garland Publishing, Inc.).
- Fleischman, R.K. and Tyson, T.N. (2000), "Accounting in a Racist Society: The Hawaiian Sugar Plantations, 1835-1920," *Accounting History*, Vol. 5, No. 1: 7-32.
- Flinn, M.W. and Stoker, D. (1984), *The History of the British Coal Industry*, Vol. 2 (Oxford: Clarendon).
- Forsey, E. (1926), *Economic and Social Aspects of the Nova Scotia Coal Industry* (Montreal: Macmillan).
- Harris, J.R. (1976), "Skills, Coal and British Industry in the Eighteenth Century," *History*, Vol. 61: 167-182.
- Hammond, J.L. and Hammond, B. (1919), *The Skilled Labourer 1760-1832* (London: Longmans, Green).
- Hatcher, J. (1993), *The History of the British Coal Industry, Vol. 1, Before 1700* (Oxford: Clarendon).
- Hirsch, B.T. and Hausman, W.J. (1983), "Labour Productivity in the British and South Wales Coal Industry, 1874-1914," *Economica*, Vol. 50: 145-157.
- Hiskey, C.E. (1979), *John Buddle 1773-1843: Entrepreneur and Agent in the North-East Coal Trade*, unpublished M.Lit. thesis, Durham University.
- Macnutt, W.S. (1965), *The Atlantic Provinces* (Toronto: McClelland and Stewart).
- Martell, J.S. (1945), "Early Coal Mining in Nova Scotia," *Dalhousie Review*, Vol. 25: 156-172.
- McCord, N. (1979), *North East England, an Economic and Social History* (London: B.T. Batsford).
- McKay, I. (1983), "Industry, Work and Community in the Cumberland Coalfields, 1848-1927," unpublished Ph.D. thesis, Dalhousie University.
- McLean, T. (1997), "Agent's Reputation, Accounting and Costing in Organizational Control Structures," *The Accounting Historians Journal*, Vol. 24, No. 1: 1-23.
- Medlicott, I.R. (1981), "The Landed Interest and the Development of the South Yorkshire Coalfield 1750 to 1830," unpublished M.Phil. thesis, Open University.
- Neu, D. (1999), "'Discovering' Indigenous Peoples: Accounting and the Machinery of Empire," *The Accounting Historians Journal*, Vol. 26, No. 1: 53-82.

- Oldroyd, D. (1996), "The Costing Records of George Bowes and the Grand Allies in the North-East Coal Trade in the Eighteenth Century: Their Type and Significance," *Accounting, Business & Financial History*, Vol. 6, No. 1: 1-22.
- Oldroyd, D. (1999), "Through a Glass Clearly: Management Practice on the Bowes Family Estates c.1700-70 as Revealed by the Accounts," *Accounting, Business & Financial History*, Vol. 9, No. 2: 175-201.
- Parker, R.H. (1994), "Importing and Exporting Accounting: The British Experience," in Parker, R.H. and Yamey, B.S. (eds.), *Accounting History: Some British Contributions* (Oxford: Clarendon Press): 590-613.
- Rowe, J.W.F. (1923), *Wages in the Coal Industry* (London: P.S. King & Son).
- Solomons, D. (1952), "The Historical Development of Costing," in Solomons, D. (ed.), *Studies in Costing* (London: Sweet and Maxwell): 1-54.
- Spraakman, G.P. (1999), "Management Accounting at the Historic Hudson's Bay Company: A Comparison to 20th Century Practices," *The Accounting Historians Journal*, Vol. 26, No. 2: 35-64.
- Vent, G. and Milne, R.A. (1997), "Cost Accounting Practices at Precious Metal Mines: A Comparative Study, 1869-1905," *Accounting History*, Vol. 2, No. 2: 77-104.
- Wale, J. (1989a), "The Cramlington Coal Co. Ltd., Northumberland, 1824-1914: A Case Study in Business History," *Business Archives*, Vol. 58: 1-21.
- Wale, J. (1989b), "The Griff Colliery Co. Ltd., Warwickshire, 1882-1914: A Case Study in Business History," *Midland History*, Vol. 14: 95-119.
- Walters, R.H. (1975), "Labour Productivity in the South Wales Steam-coal Industry, 1870-1914," *Economic History Review*, Vol. 28: 280-303.
- Wylie, W.N.T. (1997), *Coal Culture: The History and Commemoration of Coal Mining in Nova Scotia* (Historic Sites and Monuments Board of Canada).