EARLY SALT PRODUCTION IN THE FALKIRK DISTRICT

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Introduction

Falkirk district probably has the longest record of saltmaking of any place in Scotland. This circumstance arose from its unique geo-political position and the fortuitous occurrence of the fuel necessary for the process. In the former category we might include geographical and topographical elements such as the tidal estuary that provided the salt water as well as ready access to markets in Britain and northern Europe for the salt and its related materials such as coal, broad shallow mudflats that helped to concentrate the salt, proximity to Edinburgh, the seat of stable government that imposed peaceful conditions in the area throughout the medieval period, most of the time, and a large landward population forming a substantial home market. As for the fuel required to drive off the excess water, we had large peat mosses at Letham and Dunmore, woods at Callendar and Torwood, and latterly coal from the Stirlingshire and Lothian Coalfields.

Early History

There is circumstantial evidence for salt production in the area in the second century AD. In the Roman period the salt manufacturing industry in England appears to have been intensified with extensive working in the Fenland and Lincolnshire. Here too peat was plentiful. Pliny mentions the use of oak or hazel wood as the fuel in Germany and France (Natural History xxxi.73-92). In Saxon England wood was used as a fuel (Finberg 1972). Salt for the Roman army of occupation in Scotland was probably brought in with their other supplies using the established east coast trading routes. This sea-borne material could be landed at Carriden, Inveravon and Camelon at the eastern end of the Antonine Wall. Its trade may be reflected archaeologically by the imported pottery with which, or in which, it could have been transported. Large quantities of black-burnished ware jars are found on the sites along the Antonine Wall. This material was produced in Dorset and in the Thames Estuary, two of the major salt producing centres of this period.

Like the modern British army, the procurement of such supplies as the pottery indicates appears to have alternated between official civilian contracts and direct production by the state. The range of wares found on the Antonine Wall is far more limited that on contemporary sites in England, indicating selective sourcing. Salt extraction in the Roman Empire was normally an Imperial monopoly and there is a strong suggestion that the natural inland brine wells exploited in Britain came under the same control. At Droitwich, whose Roman name *Salinae* literally means 'saltpans', a large villa-like building

has been interpreted as a governmental headquarters for the administration of its production (Hurst 2006). It is probable that the salt imported to the large garrison along the Antonine Wall would have been supplemented by some official production in the zone where the Wall comes into intimate contact with the Forth, just the area where later medieval production occurred. Sites for neither period have been identified on the ground, but the latter are known from historical records.

Eric Birley put forward a cogent argument for the production of salt in the frontier zone in the Roman period (Birley 1936). This theory is based upon a passage in Justinian's Digest which reads: "A woman condemned, for a crime, to hard labour in the saltworks, was subsequently captured by bandits of an alien race; in the course of lawful trade she was sold, and by repurchase returned to her original condition. The purchase-price had to be refunded from the Imperial Treasury to the centurion Cocceius Firmus." From this extract it would seem that the woman was a slave in the household of the centurion when she committed her crime. She was then given a penal sentence by the governor of the province in which the crime had been committed, and put to work in a state-owned saltwork. Normally she would have served her time and then been returned to her lawful owner, the centurion. Whilst in state custody she was abducted by natives of a tribe which lay outside of the Empire. As it was through the negligence of the state that she was captured, they were compelled to refund the purchase price to the centurion. There were few provinces of the Roman Empire that could have possessed saltworks that were close enough to the frontier to be exposed to raids from tribes which owed no sort of allegiance to Rome. Britain and Dacia are the obvious two candidates. The former is confirmed by the discovery at Auchendavy on the Antonine Wall in 1771, during the construction of the Forth and Clyde Canal, of a series of altars dedicated by one Cocceius Firmus, centurion of the Second Legion Augusta. Cocceius Firmus is an unusual name and it is unlikely to have been a mere coincidence.

Figure 1. The four altars found at Auchendavy and dedicated by Cocceius Firmus (taken from Stuart 1852).

Medieval History

Salt production along the Forth very probably continued from the Roman period into the medieval, though it cannot be proven at present. There is charter evidence from the 12th century at Grangemouth and Airth. In this century we are given a glimpse of the flurry of activity in central Scotland as the church, in particular the monasteries, were being formalised by the monarchy. Many were endowed with lands, and with that important and necessary article, the means of producing salt. This privilege appears until then to have been largely reserved to the monarch, as indeed the Domesday Book shows to have been the case in England. Before the consolidation of regal power it was presumably in the hands of local leaders such as the Thane of Callendar. David I (1124-1153), whilst retaining many of the saltpans, made donations of individual pans on the upper reaches of the southern shore of the Forth Estuary to the abbeys of Holyrood, Newbattle and Dunfermline. These were confirmed by his successors and augmented by gifts to the abbeys of Kelso, Cambuskenneth, Jedburgh and Arbroath (Table 1). These sites lay alongside those of the king, as is made clear by the mandate of c1140 granting a saltpan near the King's saltpans on the Carse of Stirling to Dunfermline Abbey. The pan was to be apart and free as the King's pans and to be worked by the men of the Abbey sharing in the King's peace. In 1163 a second pan at this location was given to Cambuskenneth Abbey, a third in c1170 to Jedburgh, and a fourth in 1178 to Arbroath. A cluster of these pans occurred in what is now the petrochemical complex at Grangemouth and is reflected in the names of the internal streets taken from those of the farms.

The fuel for the evaporation of the water had to be found locally, whether in the form of wood or peat. At Airth the 1166 confirmation of a saltpan to Holyrood Abbey included the right to take wood in the King's own wood of Airth. At about the same time that abbey also received a pan on the Carse of Callendar (Grangemouth), the fuel for which was to come from the wood of that name. This suggests that wood for fuel was relatively scarce in that locality as Callendar Wood is some 4 km away. Similar conditions were allocated to the saltpan at Blanckelande, the exact site of which is unknown. Elsewhere, the fuel is not specified. Indeed, it has only been assumed in the last example as fuel could mean wood or coal, both of which are to be found in Callendar Wood. In later examples the term '*carbonum*' or '*carbonibus*' is used, meaning carbon, and again this could apply equally to coal or wood. Peat is certainly named in a grant of 1242 of a saltwork near to Aberdeen to the Abbey of Coupar Angus. There the pan came with sufficient peat moss for making the salt (Easson 1947, vol 1, 111). It may have been the provision of moss that is alluded to whenever a specified area of land is granted with the saltpan. The original provision for Holyrood Abbey at Airth, for example, was for 27 acres of land. Similarly, Cambuskenneth Abbey received as much land with its pan as was allocated to each of the King's pans. However, in a largely subsistence economy it would have been useful for the salters to have had the ability to grow their own food such that agricultural land may have been included in the total.

Other privileges granted in these early charters included the right for the monasteries to transport and sell the salt free of tax, and easements in pasture and water. These reflect the contemporary economic importance of salt production to the kingdom. Working the pans efficiently was a skilled task and every encouragement was given. Such concessions were also made necessary by the location of the saltworks on marginal land, usually salt greens unfit for cultivation but eminently suitable as pasture.

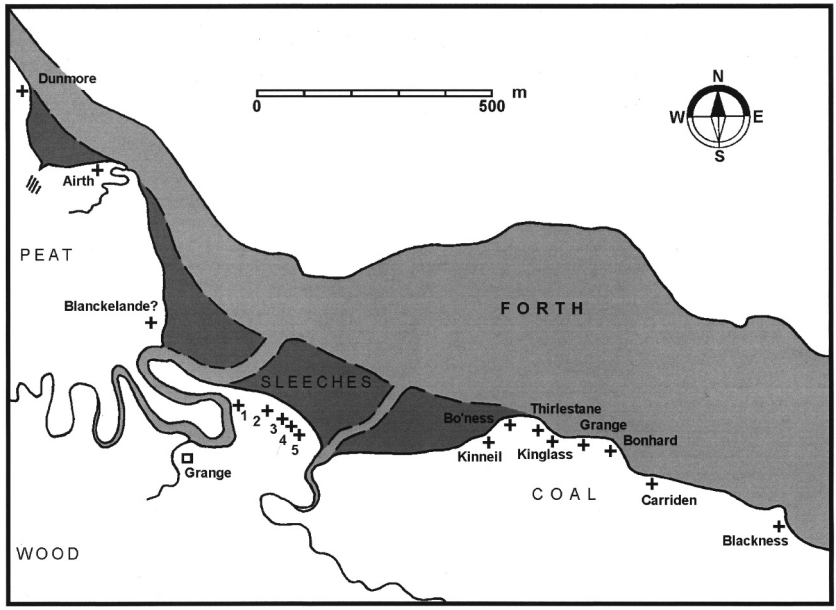

Figure 2. Map showing saltpans in the Falkirk district. Those at Grangemouth were 1: Panstead, 2: Powdrake, 3: Candie, 4: Overton, 5: Saltcoats.

The first fuels to be used in the saltpans were wood and peat. The use of these "primitive" sources of heat is termed 'eotechnic' operation by Clow (1952). They burn at moderate temperatures, which suited the early pans of clay or lead. Their extraction was relatively straight forward if somewhat labour intensive. They required traditional skills that were passed from generation to generation. Peat had to be cut, stacked, dried and transported. Woodland had to be properly managed to provide an annual harvest using techniques such as pollarding. However, this type of fuel and pan limited the scale of production, even though it satisfied the contemporary demand. Salt was used as a food preservative and flavouring, and in tanning, but not as part of a larger chemical industry. As metallurgical technology improved it became possible to make pans of iron, which required less structural support and transferred heat more evenly. Consequently they could be much larger. Hand

in glove with the development of iron production was the use of coal as a fuel, and its substitution for wood in the salt industry was inevitable. It soon became known as panwood. It burned at higher temperatures and was ideally suited to the new pans – the 'palaeotechnic' era had arrived. The basic technique remained essentially the same – salt water from the Forth was placed in a pan and heated to evaporate off the water. Little care was taken to use the coal efficiently, resulting in the profligate waste of this resource. Salters, who managed the panhouses, became skilled at managing their operation, but it was to be the late 18th century before 'scientific' empirical enquiry led to significantly increased efficiency, largely as a result of competition from outside. Lord Dundonald of Culross and Dr John Roebuck at Kinneil were in the van of such research.

The transition from 'eotechnic' to 'palaeotechnic' was gradual and did not occur at the same time throughout Britain. The Clows placed it around 1500 (Clow 1952). The Cheshire brine springs were amongst the last to adopt the new technique, probably due to their early economic advantage. The use of coal altered the balance of advantage between the different centres of production. In England it led to the convergence of salt-boiling on the Tyne where coal was easily wrought. The ready availability of iron plates for the pans was also an important factor, and saltpans were amongst the first products of the Carron Company after it was established in 1759, giving the Forth area an extra fillip. Salt production in the Forth valley moved away from the peat bogs to where coal was to be found at points along the coast (Adams 1965), and this adaptation can be used to date the 'palaeotechnic' transition in this area. Adams (1965) places this in the 13th century due to the absence of charter evidence for the continuance of the monastic saltpans, but there is no evidence for new pans in this period either. In 1474 a charter by James III conferred the barony of Kinneil on James Lord Hamilton with the five saltpans already constructed and others to be built (RGS 2, no. 1177; HMC 1887, 19). Shortly afterwards, in 1498, we hear about saltpans at Blackness, made over to the Viscount of Linlithgow as custodian of Blackness Castle (RGS vol 2, 528; Penny 1831). These involved noble families with money to invest in the new process. Over the next two centuries production spread to lesser lairds, exploiting their own coal reserves: Thirlestane (1608), Bonhard (1613), Grange (1610), Carriden (1627) and Kinglass (1691). The dates are, of course, the earliest that I have found and in each case the pans were already in existence. Conversely, the medieval pans may have continued to function long after they drop from view in the records, with added confusion caused by the persistence of place names containing elements for pans and salt. On balance the change may be placed in the period 1350-1450.

At Airth it was possible for coal to replace peat directly and here saltworking continued. It was, however, at an economic disadvantage to the saltworks in the Bo'ness area because the fuel had to be conveyed further and at Bo'ness the journey was downhill. Nevertheless salt was made at Airth until the mid 17th century, when land reclamation took its place. By then saltworking had been

augmented by new pans a little to the north where the coal outcropped closer to the coast at Elphinstonepans (modern Dunmore), and here salt boiling continued for another century.

There were three main sources available for the raw material used in the manufacture of salt in Britain. These were, in decreasing order of salinity, rock salt, brine and sea water. Rock salt is the mineral form of sodium chloride (NaCl) and can occur in vast beds of sedimentary evaporite minerals that resulted from the drying up of enclosed lakes and seas. Large quantities exist under Cheshire, where today it is extensively extracted. It was little known until the 18th century, but with its significantly higher yield of salt it eventually drove other sources out of the business. Brine is water saturated with salt and also occurs naturally, notably where ground water has passed through rock salt. It comes to the surface at springs at such places as Droitwich, Nantwich and even Newcastle. These sources were heavily exploited by the Romans, with surplus water driven off by evaporation in pans. Sea water is the least productive source material, but it is also the most readily available. It too was extensively used from the Iron Age onwards. However, it required far more water to be driven off than the other two sources. Lord Dundonald (Cochrane 1785) indicated that sea water from the Forth yielded 2 t 17 cwt 0 q per hundred tons, whereas that same water saturated with rock salt shipped from Liverpool to Scotland would produce 23 t 0 cwt 1 q of salt. Its use prolonged the life of the Scottish industry, but it was not available until the late 18th century.

It follows that saltworks on the shores of salt water estuaries should not be placed near to the debouchment of a fresh water river, as that would reduce the salinity of the water in the immediate vicinity. Yet the medieval salt industry in the Falkirk area was centred on Grangemouth, between the large rivers Avon and Carron. Airth, also with an important medieval pan, is even further up the estuary and hence the waters of the Forth are more dilute. These rather curious placements are not as strange as might first appear for the source material used at these sites was an odd mixture of those mentioned. Off the shallow coast at these sites are broad mudflats or sleeches that the tide continuously washes over, impregnating minerals into their fabric. The twice daily inundation led to considerable salt enrichment of the sleeches, and by using it rather than rock salt, it was possible to produce a saturated solution for panning (Smout & Stewart 2012, 183). The switch to using coal dross and larger pans made the use of sea water economically viable and the old form of working all but disappeared. One notable survival of this technique, however, occurred into the 19th century at Annandale (Whatley 1987, 13) where the salt-impregnated sand was gathered in dry weather during the summer months and taken by horse-drawn sledges to the pans. These pans were made of lead until after 1800, and output was exceptionally low.

The last saltpan in the Falkirk area, at Grangepans, utilised rock salt and local coal dross. It only ceased production in 1889, marking the end of almost 2,000 years of saltmaking.

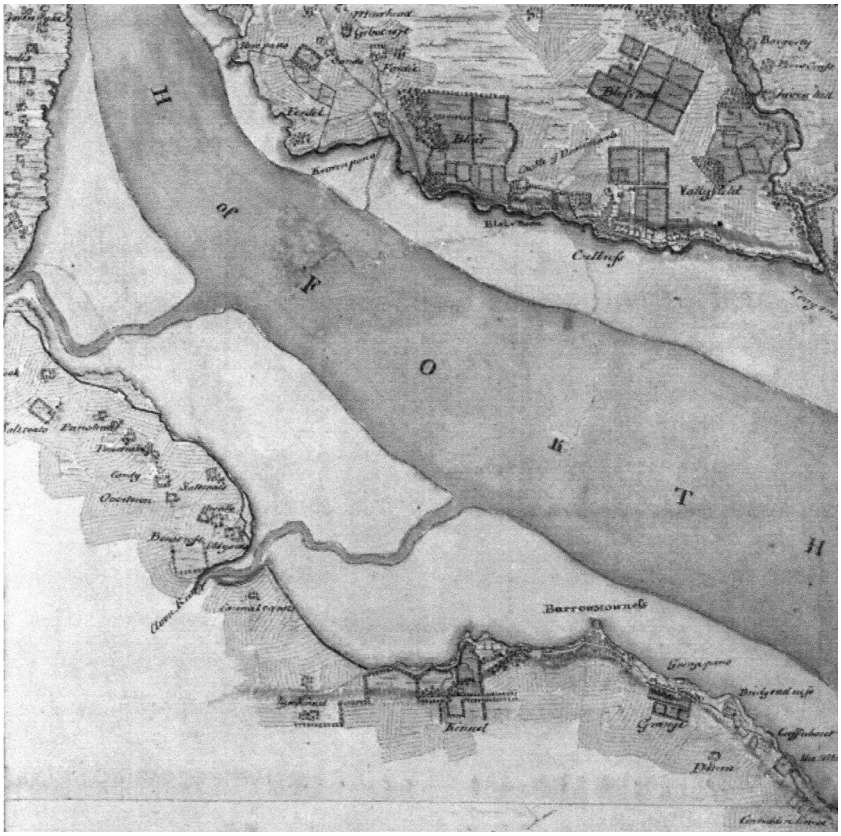

Figure 3. Roy's Military Survey of 1755 showing the broad sleeches between the rivers Avon and Carron.

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Table 1.

CALLANDER (GRANGEMOUTH)

c1160. One saltpan with common easements in pasture, water, and fuel for the saltpan in the wood of Callendar, to Newbattle Abbey (RRS vol 1, 176, no. 109; vol 2, 475, no. 546; Laurie 1905, 114; Newbattle no. 162, 163).
c1160. A saltpan which Walter, the son of Alan the Steward had given to Nicholas de Sules, to Newbattle Abbey (Registrum S. Marie de Neubotle (Bannatyne Club), 129; Charters of the Abbey of Inchcolm; Laurie 1905, 380-1).
c1160. William II. Confirmation to Newbattle Abbey of one satpan, with easements and all his arable in Callendar (RRS vol 2, 475, no. 546).
1236. All the Newbattle Abbey property in the Carse of Callendar let in feu-ferme to Holyrood (Newbattle no. 160).
1255. Holyrood Abbey leased 2 saltpans in the Carse of Kerse from Newbattle Abbey, which they held from Walter Olyfard and Sir David Cumyn (Porteous 1972, 123; Keir 1827, 69).

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